Multiple-Choice Allocations with Fixed Densities

Ebrahim Malalla
Computer Sciences Department
Ahlia University
Manama, Kingdom of Bahrain
emalalla@gmail.com

Abstract

We analyze the performance of the randomized multiplechoice allocation process in the fixed density model. We show that the allocation process leads to $O(\log \log n)$ expected maximal bin load when $\Theta(n)$ balls are allocated into n bins, where each ball is inserted into the less loaded bin among two bins chosen independently and according to two fixed—but possibly different—bounded probability densities. Other results are presented.

Keywords: Multiple-choice allocation process, on-line load balancing, two-way chaining, witness tree

Exact Heuristic Algorithm for Traveling Salesman Problem

Dongmei Lin
*Center of Information and
Education Technology
Foshan University
Foshan, Guangdong
528000, China
dmlin@fosu.edu.cn*
Xiangbin Wu
*College of Geosciences and
Environmental Engineering
Central South University
Changsha, Hunan, 410083,
China
wuxb@mail.csu.edu.cn*
Dong Wang
*Department of Computer
Science and Technology
Foshan University
Foshan, Guangdong 528000,
China
wdong@fosu.edu.cn*

Abstract

Natural properties of stochastic searching strategies and operations in metaheuristic algorithms have important influence on convergence performance of various metaheuristic algorithms. Through similarity analysis to two kinds of metaheuristic algorithms, exact heuristic algorithm based on branchand- cut is put forward according to change trend of similarity between two arbitrary

high-quality solutions. In the meanwhile, two conditions were given in this paper because efficiency of branch-and-cut algorithm is closely allied to complexity of solved object. New heuristic algorithm can help metaheuristic algorithms finding superior solutions than other heuristic algorithms, and accelerate metaheuristic algorithms convergence. Simulation experiments show that new heuristic algorithm is efficacious.

Keywords

Design and Evaluation of Sectional Real-Time Scheduling

Algorithms

Based on System Load

Wanfu Ding[1, 2], Ruifeng Guo[2]
[1]*(Graduate University of Chinese Academy of Sciences, Beijing 100039, China)*
[2]*(Shenyang Institute of Computing Technology, Chinese Academy of Sciences, Shenyang 110004,*
China)
E-mail: dingwanfu@sict.ac.cn

Abstract

The real-time scheduling algorithms play an important role in real-time systems .Whether or not the real-time tasks could be completed within the specified deadline mainly relies on scheduling algorithms. This article proposes a sectional real-time scheduling algorithm called SS (Sectional Scheduling), and this algorithm divides the system load into three cases according to the intension of system load: normal load, overload and serious overload. Every case utilizes a different algorithm. The experimental results show that this algorithm could improve real-time system performance remarkably compared to the classical EDF (Earliest Deadline First)，HVF (Highest Value First) and HVDF (Highest Value Density First) algorithms under all workload conditions.

Keywords: Real-time system,dynamic priority
scheduling,earliest deadline first, hit value ratio,
deadlines missed ratio.

2(Shenyang Institute of Computing Technology, Chinese Academy of Sciences, Shenyang 110004,
China)
E-mail: dingwanfu@sict.ac.cn

Abstract

The real-time scheduling algorithms play an important role in real-time systems .Whether or not the real-time tasks could be completed within the specified deadline mainly relies on scheduling algorithms. This article proposes a sectional real-time scheduling algorithm called SS (Sectional Scheduling), and this algorithm divides the system load into three cases according to the intension of system load: normal load, overload and serious overload. Every case utilizes a different algorithm. The experimental results show that this algorithm could improve real-time system performance remarkably compared to the classical EDF (Earliest Deadline First)，HVF (Highest Value First) and HVDF (Highest Value Density First) algorithms under all workload conditions.

Keywords: Real-time system,dynamic priority scheduling,earliest deadline first, hit value ratio, deadlines missed ratio.

An Improved Method for Computing Dixon Polynomial

Yaohui Li[1],Yong Feng [2] and Jiwei Xue[3]
[1] Dept. of Computer Sci. Tianjian Univ. of Tech. and Education, Tianjin 300222
[2] Chengdu Inst. of Computer App., Chinese Academy of Sci. Chengdu 610041
[3] Computer and Information Tech. College, Daqing Petroleum Inst. Daqing 163318

Abstract—Computational methods for manipulating sets of polynomial equations are becoming of greater importance due to the use of polynomial in various application. Dixon resultant algorithm provides one of the most efficient methods for solving the system of polynomial equations or eliminating variables. When computing Dixon resultant, we first construct the Dixon polynomial for input polynomial system. However, as the entries in the determinant are symbolic, large intermediate symbolic expression is generated and leads to computer algebra systems run for a long time or crash. To avoid the intermediate expression swell, we propose using Zippel's multivariate probabilistic interpolation to compute Dixon polynomial. At first, the method of truncated formal power series, which converts the operation of division to multiplication, is used to preprocess the expression of Dixon polynomial. Secondly, Dixon polynomial is interpolated heuristically by Zippel's method. In order to solve the linear equation effectively in Zippel's method, Kaltofen, E.'s efficient algorithm[4] is introduced to solve the equations of transposed Vandermonde system in interpolation. Besides these, we combine Zippel's multivariate method with Lagrange interpolation so as to take advantage of the sparsity of polynomial system sufficiently. Intermediate symbolic expressions can be reduced because the algorithm converts the symbolic computation to the numerical. Keywords: Dixon resultant, Zippel interpolation method, symbolic computation, intermediate expression swell.

An Algorithm for Dynamic Optimal Path Selection with Constraint

Xiaogang QI1 Lifang LIU 2 Sanyang LIU 1
(1*Department of Applied Mathematics, Xidian University, Xi'an 710071, China*

2*School of Computer Science & Technology, Xidian University, Xi'an 710071, China*）

E-mail：*qixiaogang@gmail.com*

Abstract

Optimal path selection (OPS) with unique or multiple constraints is one of key issues in the dynamic networks, in which arc' weight metric is an interval number. Firstly, some existing solutions for this problem are analyzed, and some shortages and flaws are pointed out. Secondly, regularities of distribution of the summation of multiple independent random numbers with same and different distributions are analyzed and formulated by data simulating and fitting. Furthermore, an algorithm named DOPS_Const *for the OPS with an additive arc weight is proposed based on the above analysis, and the randomness and subjectivity in path selection can be avoided according to the algorithm. Finally, the theoretical and statistical probabilities of the selected path satisfying the given constraint are compared, and our algorithm is feasible and valid to solve the OPS with constraint in the dynamic networks.*

The Partition Transform Algorithm of Join Query

Xianxia Zou1,3 , Weijia Jia1,2 , Jiuhui Pan3 , Wei Du4
1*School of Information Science and Engineering, Central South University, Changsha 410083, China*
2*Department of Computer Science, City University of Hong Kong, Kow loon, Hongkong , SAR China*
3*Department of Computer Science, JiNan University, Guangzhou 510632, China*
4*Department of Computer Science, Gong Dong Police College, Guangzhou 510230, China*

Abstract

Distributed data processing and information integration system usually involve join queries which are based on base relations of the data source. These queries could be repeatedly used so the results of each join query could be very large. Therefore how to reduce the induced traffic will affect the overall performance of the distributed system or information integration system. The paper introduces the algorithm of partition-based on query definition in order to reduce communication costs inside the distributed system. Experiments show that the algorithm can reduce traffic and cut down the number of partition. In addition, our technique can be applied to simplify the definition of materialized view and improve the self-maintenance efficiency.

Multi-label Classification based on Association Rules with

Application to Scene

Classification

Bo Li
(School of
Information Science
and Engineering,
Central South
University, Chang
sha 410083)
E-mail:
darcy007007@126.co
m
Hong Li
(School of
Information Science
and Engineering,
Central South
University, Chang
sha 410083)
E-mail:
lihongcsu@mail.csu.e
du.cn
Min Wu
(School of
Information Science
and Engineering,
Central South
University, Chang
sha 410083)
E-mail:
min@mail.csu.edu.cn
Ping Li
(School of
Information Science
and Engineering,
Central South
University, Chang
sha 410083)
E-mail:
tncuslp@126.com

Abstract

In this paper, a multi-label classification based on association rules is proposed. To deal with multiple class labels problem which is hard to settle by existing methods, this algorithm decomposes multi-label data to mine single-label rules, then combines labels with the same attributes to generate multi-label rules. It extracts partial dataset features to build the initial classifier through assembling, and conducts classification prediction by assembling the classifiers. Thus, the computational complexity caused by

the high dimensional attributes decreases while the performance and efficiency increases. Then, the multi-label classification algorithm based on association rules which achieve good performance in an application to scene classification.

Keywords：*association rules; multi-label; ensemble; classification*

Quick Searching Based on L-K Means Hierarchical Clustering in a Huge

Scale Face Database

Xiaohua Liu, Chunguang Zhou, Libiao Zhang, Huipeng Sheng, Jiangchun Li
College of Computer Science and Technology, Jilin University, Changchun 130012,China
E-mail Email address: liuxiaohua@yahoo.cn, cgzhou@jlu.edu.cn

Abstract

The L-K means hierarchy clustering is proposed to decrease the long time of searching in a huge scale face database by reducing retrieving range. The database is divided into several sub sets after clustering. One-step split is used to divide the massive sub set into a few of small sets. Data redundant technology and predefined thresh are worked on a class's edge elements which will be re-signed into some categories for correctly searching in sets. The experiment results show that the proposed methods can effectively improve the searching speed while ensuring similar retrieval accuracy to search in the whole database.

Key words: Face recognition, clustering, fast searching, one-step split

Algorithm Research of Flexible Graphplan Based on Heuristic

Yang Li [1, 2], Yan Sun [1, 2], Chengshan Han[1], Xiaodong Wang[1], Shuyan Xu[1]
[1] Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences,
Changchun 130033, China
[2] Graduate School of the Chinese Academy of Sciences, Beijing 100049, China
Email:victoria_liy@163.com

Abstract

Classic Graphplan has too much restriction on capturing the full subtlety of many real problems. Flexible Graphplan is defined which supports the soft constraints often found in reality. Heuristic concept is introduced to the process of plan extraction in flexible graphplan in order to improve the efficiency of plan extraction and the quality of plan. A novel algorithm using the new heuristic function which is applied by improved sum mutex heuristic to deal with planning problems is proposed. Sum mutex heuristic which is in common use as heuristic function takes into account only static propositional mutexes, and ignores the mutexes of actions. The performance of the new algorithm on many benchmark problems is remarkably robust. It can solve many planning problems, which can't be solved by the heuristic state space search planning system using sum mutex heuristic.

Keywords: State space search, flexible graphplan, heuristic, authorization, mutual exclusion.

An Edit Distance Algorithm with Block Swap

Tian Xia[1,2]

1 Key Laboratory of Data Engineering and Knowledge Engineering (Renmin University of
China), MOE, Beijing 100872, China
2 School of Information Resource Management, Renmin University of China. Beijing 100872,
China
xiat@ruc.edu.cn

Abstract

The edit distance between two given strings X and Y is the minimum number of edit operations that transform X into Y. In ordinary course, string editing is based on character insert, delete, and substitute operations. It has been suggested that extending this model with block edits would be useful in applications such as DNA sequence comparison and sentence similarity computation. However, the existing algorithms have generally focused on the normalized edit distance, and seldom of them consider the block swap operations at a higher level. In this paper, we introduce an extended edit distance algorithm which permits insertions, deletions, and substitutions at character level, and also permits block swap operations. Experimental results on randomly generated strings verify the algorithm's rationality and efficiency. The main contribution of this paper is that we present an algorithm to compute the lowest edit cost for string transformation with block swap in polynomial time, and propose a breaking points selection algorithm to improve the computation speed.

Keywords: Edit distance, edit operation, block swap, string matching.

Hardness of Approximation Algorithms on k-SAT and (k,s)-SAT

Problems

Tianyan Deng[1,2] and Daoyun Xu[1]
[1]Department of Computer Science,Guizhou University (550025), Guiyang
[2]Guangxi Teachers Education University (530001), Nanning, P.R.China
dengty@gxtc.edu.cn , dyxu@gzu.edu.cn

Abstract

k-CNF is the class of CNF formulas in which the length of each clause of every formula is k. The decision problem asks for an assignment of truth values to the variables that satisfies all the clauses of a given CNF formula. k-SAT problem is k-CNF's decision problem. Cook has shown that k-SAT is NP-complete for $k \geq 3$. (k,s)-CNF is the class of CNF formulas with each clause has exactly length k and each variable occurs at most k times. (k,s)-SAT is (k,s)- CNF's decision problem. NP=PCP(log,1) is called PCP theorem, and it is equivalent to that there exists some constant $r > 1$ such that (3SAT, r-UN3SAT)(or denoted as (1- 1/r)-GAP3SAT) is NP-complete [1][2]. In this paper, we show that there exists some $r > 1$ such that (k-SAT, r-UNk- SAT) is NP-complete for $k \geq 3$, and prove that for some $r > 1$ the approximation problem r-Approx-k-SAT is NPhard for $k \geq 3$. Based on the application of linear MU formulas, we construct a reduction from (3SAT, r-UN3SAT) to ((3,4)-SAT, r'-UN-(3,4)-SAT),

and prove that there exists some $r > 1$ such that ((3,4)-SAT, r-UN-(3,4)-SAT) is NPcomplete, so for some constant $s > 1$ the approximation problem s-Approx-(3,4)-SAT has no efficient algorithm to solve.

Key words: PCP theorem, (r, s)-CNF, NP-complete , reduction

Hybrid SAT Solver Considering Circuit Observability

Xiuqin Wang
Computer Science and
Technology Institute,
Harbin Engineering
University
sd_wxq@sina.com
Hao Wang
Department of Computer and
Information Engineering,
Heilongjiang Institute of
Science and Technology
wanghao_1976@sina.com
Guangsheng Ma
Computer Science and
Technology Institute,
Harbin Engineering
University

Abstract

Boolean satisfiability is a NP-hard problem in computer theoretic science. There are two types of SAT solvers, random local solver and DPLL-based complete solver. Recently, some people have proposed hybrid SAT solvers that combined the advantage of them both. They have successfully applied them to solve large or hard random SAT problems and circuit related problems. However, these solvers often find over-satisfying assignments when solving some circuit related problems. In this paper, circuit observability is considered in hybrid SAT solver, which helps reduce the overhead caused by over-satisfying and prune the searching space. The experimental results show that our hybrid SAT solver is more efficient than other solvers for large and hard circuits.

Keywords: Boolean satisfiability, complete algorithm, hybrid method, circuit observability, over-satisfying assignment

OpenMail File System Workloads Analysis and Characterization

Qiang Zou_†, Dan Feng_†

_ School of Computer, Huazhong University of Science and Technology, Wuhan, Hubei, China
† Wuhan National Laboratory for Optoelectronics, Hubei, China
E-mail: hustmathcs@gmail.com, dfeng@hust.edu.cn

Abstract

With the prevalence and increasing importance of electronic mail in people's daily life, how to ensure the performance of email system has become a challenging issue to the email service providers. A good understanding of email file system workloads is very important to provide useful insight into the design of email system for performance gains.In this paper, the empirical contributions of various traffic characteristics of email file system are studied, through analyzing the traces collected from an OpenMail file system. The results of the study, especially the correlation study results of I/O inter-arrival times, show that the self-similarity study is quite necessary and meaningful to email traffics.Some statistical evidences are provided to demonstrate the existence of self-similarity in the email traffics.
Keywords: I/O workload, access pattern, self-similarity.

A Novel ROI-Based Rate Control Scheme for H.264

Yunhui Shi [1], Shaoyuan Yue [1], Baocai Yin [1] and Yi Huo [2]
[1] Beijing Key Laboratory of Multimedia and Intelligent Software Technology,
College of Computer Science and Technology,
Beijing University of Technology, Beijing 100124, China
[2] Department of Computer Science and Technology,
College of Career Technology,
HeBei Normal University, ShiJiazhuang 050031, China
syhzm@bjut.edu.cn ysystram@emails.bjut.edu.cn hawaii_2004@emails.bjut.edu.cn

Abstract

For the limited bandwidth and other limiting factors in the video coding, the visual quality always cannot satisfy the clients, especially the subjective visual quality. This paper proposes a novel ROI-based rate control scheme for H.264/AVS, aiming at improving the subjective visual quality. In our scheme, an efficient method is presented for extracting Region-of-Interest (ROI) adaptively and exactly with introducing some new concepts. Relatively more bits are allocated to Region-of-Interest and the frames with high complexity. The extensive experimental results show that proposed rate control scheme can control bit rates more accurately and achieve better subjective visual quality than the rate control scheme JVT-G012 in the latest JVT H.264/AVC reference model JM11.0.
Keywords: ROI, rate control, subjective visual quality.

A Fast Frequent Subgraph Mining Algorithm

Jia Wu[1] Ling Chen[12]
[1]Department of Computer Science, Yangzhou University, Yangzhou 225009
[2]National Key Lab of Novel Software Tech, Nanjing University, Nanjing 210093
lchen@yzcn.net

Abstract

An algorithm for mining frequent subgraphs in large database of labeled graphs is proposed. The algorithm uses incidence matrix to represent the labeled graphs and to detect their isomorphism. Starting from the frequent edges from the graph database, the algorithm searches the frequent subgraphs by adding frequent edges progressively. By normalizing the incidence matrix of the graph,

the algorithm can effectively reduce the computational cost on verifying the isomorphism of the subgraphs. Experimental results show that the algorithm has higher speed and efficiency than that of other similar ones.
Key words: Graph, associated matrix, isomorphism,data mining.

A Type of Variation of *Hamilton Path* Problem with Applications

Jitian Xiao
School of Computer and Information
Science, Edith Cowan University,
Mount Lawley, WA 6050, Australia
E-mail: j.xiao@ecu.edu.au
Jun Wang
School of Computer Science and Computer
Engineering, Wenzhou University,
Zhejiang, China
Email: jsj_wj@wzu.edu.cn

Abstract
This paper describes a type of variation of the Hamilton Path problem that can be applied to a type of applications. Unlike the original Hamilton Path problem, the variation always has a solution. The problem of finding solutions to the variation of the Hamilton Path problem is NP-complete. A heuristic for finding solutions to the problem is developed and analyzed. The heuristic is then applied to a real application scenario in the area of spatial cluster scheduling in spatial join processing. Experiments have demonstrated that the proposed method generates better cluster sequence than existing algorithms.
Keywords: Hamilton path, heuristic, scheduling, approximation.

From Word Automata to Tree Automata

Chenguang Luo
Department of Computer Science, Durham University
chenguang.luo@durham.ac.uk

Abstract
Finite tree automata have now become a live research field both because of its features as a theoretical model of computation and its practical value in the parsing, query and verification of semi-structured data, such as XML. The aim of this work is to create a link between the already well-developed finite state automata over words and the finite automata over trees, by adding the mechanism of "invocation-and-return" to a group of finite word automata. In this paper, the definition of this link and the resulted computation model, recursive tree automata, are formalized based on former works. Then we present an analysis for its expressiveness, closure properties and decision problems, to show that a group of finite word automata armed with this link has identical power of a tree automata. Also some applications of this link are introduced, involving a means of formalization of the W3C XML Schema.

Estimation of the *k*-Orientability Threshold

Ebrahim Malalla
Computer Sciences Department
Ahlia University
Manama, Kingdom of Bahrain
emalalla@gmail.com

Abstract

Let $G(n,m)$ be an undirected random graph with n vertices and m multiedges that may include loops, where each edge is realized by choosing its two vertices independently and uniformly at random with replacement from the set of all n vertices. The random graph $G(n,m)$ is said to be k-orientable, where $k \geq 2$ is an integer, if there exists an orientation of the edges such that the maximum out-degree is at most k. Let $c_k = \sup \{c : G(n, cn)$ is k-orientable w.h.p.$\}$. We prove tha for k large enough, $1 - 2k\exp\_ -k + 1 + e-k/4\_ < c_k/k < 1 - \exp\_ -2k\_1 - e-2k\_\_$, and the time $c_k n$ is a threshold for the emergence of a giant subgraph of size $\Theta(n)$ whose edges are more than k times its vertices. Other results are presented.

Theoretical Research on Topological Properties of Generalized

K-Ary *n*-Cube

Interconnection Network

Bin Yao, Haisen Li, Tian Zhou, Baowei Chen
Harbin Engineering University, Harbin, 150001, P.R. China
Email: yaobin@hrbeu.edu.cn or ybhrbeu@126.com

Abstract

*The k-ary n-cube interconnection network has been widely used in the multi-computer and parallel processing system. When the numbers of the nodes at some dimensions in the k-ary n-cube network are different, the generalized **K**-ary n-cube interconnection network is proposed and defined using cross product of the cycles. Some topological properties of this new network were proved, then a recursive expression of surface area and volume in the network were proposed and proved. At last, the non-recursive expression of the surface area and volume in the k-ary n-cube network were proved.*

Comparative Research of XML Compression Technologies

Sheng Zhang[1,2], Xiaoling Bao Jian Shu and Sha Chen
1. *Key Laboratory of Nondestructive Test (Ministry of Education)*, 2. *Faculty of Computing, Nanchang Hangkong*
Nanchang Hangkong University University

Nanchang, Jiangxi Province 330063, China Nanchang, Jiangxi Province 330063, China
zwxzs168@126.com, bxl007315@sina.com shujian@jxjt.gov.cn, chensha2011@126.com

Abstract

XML is a de-facto standard for exchanging and presenting information on the Web. However, XML data is also recognized as verbose since it heavily inflates the size of the data due to the repeated tags and structures. The data verbosity problem gives rise to many challenges of conventional query processing and data exchange. The hindrance is more apparent in bandwidth-and memory-limited devices. Compression techniques are the important way to overcome the verbosity problem. This paper compares and analyzes recently proposed the state-of-the-art XML-conscious compression technologies, study their pros and cons, then discuss further works.

Keywords: *XML, data compression, query processing, Web applications.*

Formal Analysis of Architectural Policies of Self-Adaptive Software by Bigraph

Zhiming Chang, Xinjun Mao, Zhichang Qi

Dept. of Computer Science, National University of Defense Technology, China, 410073

zmchang@nudt.edu.cn

Abstract

With the rapid spread of the Internet and user requirements for complex self-adaptive software systems, software often need be reconfigured based on pre-defined or online policies during runtime in open, dynamic environments in order to satisfy design objectives, which poses new problems uch as, how to ensure the correction and consistency of the architectural policies? In this paper, we formalize reconfigurable architecture by bigraph, and build automata model for evolution of self-adaptive software architecture. Based on the automata model, we obtain an important theorem for extending the automata, and then present an algorithm which can check the correction and consistency of any self-adaptive software architectural policy.

Keywords: Self-adaptive software, architecture, bigraph.

Modeling and Analyzing Time Constrains for Service Composition

Guisheng Fan, Huiqun Yu, Dongmei Liu, Liqiong Chen

Department of Computer Science and Engineering

East China University of Science and Technology, Shanghai 200237, China

Abstract

As a way to compose independent services together to fulfill a function, service composition is widely applied in different applications. One key issue is how to model and analyze time-related properties in service composition so that it can satisfy user's deadline requirements. A model called service composition time-constrained Petri net(SCTNet) is introduced in the paper, which is capable of capturing time behavior of services accurately.

The basic relationships,priority and preemption constraints between service are also characterized based on SCT-Net. In order to reduce the state space of model, we propose four simplification schemas which can maintain structural feature and time delay of SCT-Net. We advance the concept of greatest concurrent set, and a heuristic algorithm for schedule computation is given. Finally, two specific experiments demonstrate the feasibility and practicability of our method.

A Parameter Choosing Method of SVR for Time Series Prediction

Shukuan Lin, Shaomin Zhang, Jianzhong Qiao, Hualei Liu, Ge Yu
College of Information Science and Engineering, Northeastern University, Shenyang 110004,
Liaoning, China
linshukuan@ise.neu.edu.cn

Abstract

It is important to choose good parameters in Support Vector Regression (SVR) modeling. Choosing different parameters will influence the accuracy of SVR models. This paper proposes a parameter choosing method of SVR models for time series prediction. In the light of data features of time series, the paper improves the traditional Cross-Validation method, and combines the improved Cross-Validation with ε-weighed SVR in order to get good parameters of models. The experiments show that the method is effective for time series prediction.

Influence Graph based Task Decomposition and State Abstraction in Reinforcement Learning

Lasheng Yu, Fei Hong, PengRen Wang, Yang Xu, Yong Liu
(School of Information Science and Engineering, Central South University, Changsha, 410083, China)

Abstract—Task decomposition and State abstraction are crucial parts in reinforcement learning. It allows an agent to ignore aspects of its current states that are irrelevant to its current decision, and therefore speeds up dynamic programming and learning. This paper presents the SVI algorithm that uses a dynamic Bayesian network model to construct an influence graph that indicates relationships between state variables. SVI performs state abstraction for each subtask by ignoring irrelevant state variables and lower level subtasks. Experiment results show that the decomposition of tasks introduced by SVI can significantly accelerate constructing a near-optimal policy. This general framework can be applied to a broad spectrum of complex real world problems such as robotics, industrial manufacturing, games and others.

An Extensive Hardware/Software Co-design on a Descriptor-Based

Embedded Java Processor

C. H. Yau, Y. Y. Tan., A. S. Fong, P. L. Mok
Department of Electronic Engineering, City University of Hong Kong
Tat Chee Avenue, Hong Kong
Anthony.Fong@cityu.edu.hk

Abstract

Although Java is attractive in many aspects, it is not likely to be popular in embedded market. The obstacle is that Java relies on a Java virtual machine to processthe Java bytecodes that imposes large overheads on the embedded system. It is effective to solve thisproblem by implement an embedded Java processor. In this paper, an extensive co-design version of Java processing system: jHISC V4 is proposed with hardware/software co-design to realize some Javavirtual machine overheads in hardware directly. jHISC is a 32-bit object-oriented processor based on the High Level Instruction Set Computing (HISC) architecture,which extents typical computer architecture to support object-oriented and Java characteristics by using hardware-readable data types called operand descriptors (OD). Our proposed new design not only increases the performance of executing bytecodes, but also enhances the overall system security. In jHISC V4,it speeds up the overall performance on executing object-oriented bytecodes, comparing with the no. ofcycles executed on PicoJava II.

Transient Fault Recovery on Chip Multiprocessor based on Dual Core Redundancy and Context Saving

Rui Gong, Kui Dai, Zhiying Wang
School of Computer, National University of Defense Technology, Changsha, 410073, China
{rgong, daikui, zywang}@nudt.edu.cn

Abstract

To address the increasing susceptibility of microprocessors to transient faults, many techniques have been proposed to exploit core redundancy of Chip Multiprocessors (CMPs). Chip-level Redundant Threading (CRT) is a novel approach to detect transient fault on CMPs by executing two copies of a given program on separate cores and comparing the store data. CRTR (CRT with Recovery) achieves fault recovery by comparing the result of every instruction before commit. Once detecting a nonidentical result,the microporcessor could be recovered by re-executing from the wrong instruction. The inter-core communication becomes critical in CRTR. To reduce the inter-core communication bandwidth demand, a new approach, Dual Core Redundancy with Context saving (DCR-C), is proposed for fault recovery in this paper. DCR-C extends CRT by adding hardwareimplemented context saving and recovery. In DCR-C, only store instructions are compared before commit as in CRT, so that the bandwidth demand can be largely reduced. The context saving is triggered by store caused cache miss. Therefore the context saving latency could be efficiently hidden. Once detecting a fault, the processor could be recovered to the saved context. The experimental results demonstrate that DCR-C is a preferable approach to achieve fault recovery with low performance overhead and intercore bandwidth demand.

Key words: Chip multiprocessor, transient fault recovery, dual core redundancy, context saving.

Efficient Verification of Parameterized Cache Coherence Protocols

WanXia Qu, Yang Guo, ZhengBin Pang, XiaoDong Yang
National University of Defense Technology, P. R. China
quwanxia@nudt.edu.cn

Abstract

To address the state explosion problem of parameterized directory based cache protocol in model checking, we put forward the concept of pseudo-cutoff, a bound of the number of nodes which share the same memory block in this paper. Based on the analysis on inherent characteristics of parallel programs, we deduce the pseudo-cutoff value in relaxed consistency Cache-Coherent Non-uniform Memory Architecture (CC-NUMA) system under certain conditions. We optimize the state space of parameterized directorybased cache protocol effectively using pseudo-cutoff, and present a new scheme to small probability matter of wide sharing. Experiment results including different system scales show that, the method of protocol model optimization based on pseudo-cutoff could effectively reduce the state space of parameterized cache protocol, accelerates verification speed and improves the capability of verifying large scale Cache protocol.

A Double-Buffering Strategy for the SRF management in the

Imagine Stream

Processor

Yu Deng, Li Wang, Xiaobo Yan and Xuejun Yang
PDL, School of Computer, National University of Defense Technology,
Changsha, Hunan 410073, China
yudeng@nudt.edu.cn

Abstract

The Stream Register File (SRF) is a fast on-chip storage in the Imagine stream processor and its efficient management is essential for good performance. Double-buffering is an important strategy to manage the SRF efficiently. This paper introduces a double-buffering strategy which aims at reducing the overhead of double-buffering and the offchip memory transfers. Compared with the current strategy for double-buffering, a new heuristic is proposed to determine the optimal buffer size and minimize the overhead of double-buffering. Besides, a reusing-first strategy is presented to reduce the offchip memory transfers. Preliminary results over some stream programs show that our strategy represents a promising solution for double-buffering.

Implementation and Evaluation of a Dynamic Schedule Policy for

Multi-user Request in Network-Attached Disk Array

Jieqiong Li Dan Feng

Computer Department, Huazhong University of Science and Technology,
Wuhan 430074, China
Jieqiong_li@yahoo.com.cn, dfeng@hust.edu.cn

Abstract

In the storage system, the bottom layer I/O schedule strategy is very important which decides the efficiency of the system. A good schedule policy can improve system performance obviously. This paper proposes an innovational solution that traces net users' requests and queues them according to their logical addresses based on the characteristics of network attached disk array. Theoretical analysis and test results show that the policy makes the access arm of the disks move regularly, decreases the disk's I/O time maximally, and reduces the average I/O response time of the system.
Keywords: Net-RAID, dynamic schedule policy, I/O response time, aggregative bandwidth

A GPDMA-based shared I/O solution for CC-NUMA system

Qiong Li, Zhengbin Pang, Yufeng Guo, Enqiang Zhou, Xuejun Yang
School of Computer, National University of Defense Technology
qiong_joan_li@yahoo.com.cn

Abstract

A distributed shared I/O solution for CC-NUMA (Cache Coherent Non-Uniform Memory Access) system is introduced. To improve the remote I/O performance, GPDMA (Globally Parallel Direct Memory Access) technique is introduced, enable I/O device to directly read/write not only the local memory,but also remote distributed shared memory (DSM). Taking advantage of GPDMA, file system is able to use optimized data transfer protocol to bypass the storage server Cache during the data transfers. Different from traditional RDMA communication technique, GPDMA technique minimizes the number of I/O specific messages between the nodes, avoids data copy from server Cache to client Cache. The data consistency between memory and its Cache is guaranteed by hardware. SGP6, a 2048-processor CC-NUMA supercomputer and CC-GPFS, a global parallel file system have been developed. The evaluation results show that the GPDMA-based distributed shared I/O Solution improve the I/O performance greatly.

FG-NC: A Schedule Algorithm of Designing Concurrent Multi-direction Data Switch Structure

Jiaxin Li, Ning Deng, Caixia Liu, Mengxiao Liu, Zuo Wang, Qi Zuo
School of Computer Science and Technology, Beijing Institute of Technology, Beijing 100081
carefulbaby@gmail.com

Abstract

Packet-switched networks on chip have been advocated as a natural communication mechanism among the processing cores in future chip multiprocessors (CMP).This paper proposes a design of concurrent multi-direction data switch structure (CMDSS), which can be used as a switch in network on-chip. Three modules (MTS, fabric and scheduler) consisted in CMDSS are briefly described. We present a schedule algorithm called FG-NC used in designing the scheduler module of CMDSS. By the simulations based on SIM simulator, we find that FG-NC algorithm performs well in multicasts,

especially in continuous same requests, and the combination of FGNC and 2-stage crossbar can perform not much worth than some unicast algorithms in fully connected crossbar.

DVMM: a Distributed VMM for Supporting Single System Image on Clusters

Jinbing Peng Xiang Long Limin Xiao
School of Computer Science & Engineering, Beihang University, Beijing
pengjinbing@les.buaa.edu.cn long@les.buaa.edu.cn xiaolm@buaa.edu.cn

Abstract
Providing single system image (SSI) on clusters has ever been one of the hot topics in the research field of parallel computer architecture, since SSI supports easier programming and administration on clusters. Currently, most SSI studies focus on the middleware level of clusters, leading to some problems of poor transparence, low performance and so on. This paper presents a novel solution to provide SSI on clusters using a distributed virtual machine monitor (DVMM) with hardware-assisted virtualization technologies. The DVMM contains some symmetrical and cooperative VMMs distributed on multi-node. The cooperation among the VMMs virtualizes the distributed hardware resources to support SSI on a cluster. Thus, the DVMM can support an unmodified legacy operating system (OS) to run transparently on a cluster. Compared with the related work, our solution has some advantages of good transparence, high performance and easy implementation.

Performance Estimation: IPC

Abhijit Ray, Wu Jigang and Thambipillai Srikanthan
School of Computer Engineering
Nanyang Technological University
Singapore, 639798

Email: {PA8760452, asjgwu, astsrikan}@ntu.edu.sg

Abstract
Performance estimation of a processor can easily lead to a large saving in time, which would otherwise be spent on time consuming simulations. Poor choice of processor can lead to an expensive design due to either the choice of an expensive processor or due to a large hardware as the selected processor severely under performs. In this work,we estimate the IPC (instructions per cycle) of the proces-sor for a particular application. We propose a technique to estimate the upper and lower limit of IPC for a given application. Experimental results indicate that IPC can be estimated within about 20% accuracy without using time consuming instruction set simulators.

Evaluating the Data Access Efficiency of Imagine Stream Processor with Scientific Applications

Yonggang Che
National Laboratory for Paralleling and Distributed Processing, School of Computer,
National University of Defense Technology, Changsha 410073, Hunan, P.R.China
ygche@nudt.edu.cn

Abstract

The performance gap between processor and memory keeps expanding and memory access continues to be the crucial bottleneck of program performance. Traditionally,this problem is mitigated with cache technique. Stream processing is another approach that tackles this problem and has shown its effectiveness in reducing the number of memory accesses for media applications. Whether it is effective in reducing the memory traffic of scientific application is a question. This paper tries to investigate this problem. It first comparatively analyzes the memory hierarchy organization and the data access pattern of the Imagine stream processor and conventional cache based processors. Then it performs experiments on Imagine and a contrastive cache based general purpose processor (Intel PentiumM) with five typical scientific programs. The data obtained on two processors are compared against each other, with special focus on data access efficiency. The results show that data traffic between the LRF (Local Register File) and the SRF (Stream Register File) are effectively reduced on Imagine. But SRF of Imagine alone can not effectively reduce the number of off-chip memory accesses. Off-chip memory access still accounts for a large fraction of the total runtime on Imagine, as far as the programs are evaluated.

Keywords: Memory hierarchy, stream processor, cache based processor, stream register file, data access efficiency

Low-Level Component for OpenGL ES Oriented Heterogeneous

Architecture with Optimization

Xinbiao Gan, Kui Dai, and Zhiying Wang
School of Computer, National University of Defense Technology, Changsha Hunan 410073,
China
E-mail:binghan_gan@yahoo.com.cn

Abstract

Efficient graphics and image rendering is urgent for embedded mobile devices. In order to exploit potential parallelization of OpenGL ES (OpenGL for Embedded System) graphics processing, we do a statistic and analysis on OpenGL ES APIs involving fixed pipeline and programming pipeline, and then propose a lowlevel component for OpenGL ES. The distilled component, mainly including vector and matrix structure manipulation, can be used to built graphics library for different versions of OpenGL ES.Furthermore, the component is implemented and then followed by optimization according to Synchronous Data Triggered Architecture (SDTA). Experimental results show that the library core component can obtain high performance on SDTA.

Keywords: OpenGL ES library, synchronous data triggered architecture, core component, optimization.

A Fast Implementation of Computing the Transparency Order of S-Boxes

Limin Fan , Yongbin Zhou, Dengguo Feng

State Key Laboratory of Information Security,

Institute of Software of Chinese Academy of Sciences

P. O. Box 8718, Beijing 100190, P. R. China

e-mails: {fanlimin, zyb, feng}@is.iscas.ac.cn

Abstract

Prouff has introduced, at FSE2005, the notion of transparency order of S-Box. This characteristic is related to the ability of an S-Box to thwart DPA attacks. In this study, we present a fast implementation method of computing the transparency order of S-Box. Our method introduces an elaborately-devised threshold filter which aims to minimize the unnecessary loops in the computing. Meanwhile, two optimization techniques are presented to further accelerate the computing. Our experiments show that it takes only 2.15 seconds by the trivial method to compute the transparency order of a 12×12 S-Box, while it takes 22161.92 seconds by our method, which is about 10, 356 times faster to do the same job.
Keywords: Block cipher, differential power analysis, SBox, transparency order, fast implementation

Performance Bound Analysis and Retiming of Timed Circuits

Lei Wang, Zhiying Wang, Kui Dai
School of Computer, National University of Defense Technology, Changsha, 410073, China
{leiwang, zywang, daikui}@nudt.edu.cn

Abstract

Timed asynchronous circuits are efficient in performance and power consumption. Traditional performance analysis method can not analyze timed circuits efficiently. In this paper, we model timed circuits using timed Petri net and digraph. We studied the mean cycle time of timed Petri net model. The upper bound and lower bound of mean cycle time were given. Then we proposed an algorithm for timed circuits retiming. The algorithm can efficiently distribute buffers along communication channels of timed circuits to gain maximal performance and minimal area. These algorithms were applied to Phased Logic circuits' design and optimization.
Key words: Timed Asynchronous Circuits, Timed Petri Net, Performance Evaluation.

Intrusion Detection for Object-Based Storage System

Di Yao Dan Feng
Hua Zhong University of Science and Technology
deeyao@21cn.com fengd@hust.edu.cn

Abstract

Since storage systems can see changes to persistent data on them, some types of intrusions can be detected by storage systems. Storage-based intrusion detection system (SIDS) has become a valuable tool in monitoring for the intrusion. However, the traditional storage device works on the block-level while intrusion always happens on the file-level, this gap has to be erased by detection software, which is a hard and time-consuming task. To solve this problem and to accord with the trend of storage technology, this paper presents a novel idea to design object-based intrusion detection architecture. In this paper, we study how intrusion can be detected at object level in the OBSS (Object-based storage system) environment, and discuss how features of the OBSS can be used in intrusion detection. Through analysis, we find that the impact of intrusion detection on the OBSS is negligible. The advantage of this approach is simple. It does not require many changes to the storage system or the intrusion detection software.

Keywords: Intrusion detection, object-based, storage system, object-based storage device.

Autonomic Grid Node Organization and Management in RNMS

Yuanzhe Yao
School of Computer Science and Engineering, University of Electronic Science and Technology of China, Chengdu, Sichuan 610054
yaoyuanzhe@gmail.com
Binxing Fang
Research Center of Computer Network and Information Security Technology, Harbin Institute of Technology, Harbin,

Heilongjiang 15001，

Xinran Liu, Hong Zhang
National Computer network Emergency Response technical Team/Coordination Center of China (CNCERT/CC), Beijing 100029

Abstract

Due to the dynamic characteristic of nodes in the Grid environment, the state of nodes need be efficiently monitored. Grid node organization, deployment,configuration and management problems of Grid monitoring system are the closely-related. Benefiting from self-management and self-configuration thinking of Autonomic Computing, the node self-organization mechanism and node initialization algorithm are put forward. Based on the self-organization, the selfmonitoring and self-management mechanism of node are researched, making it possible to monitor the whole lifecycle of Grid node, from the initialization of joining the Grid environment to the leaving.

Keywords: Autonomic Computing, RNMS, selforganization, node initialization, state transition.

Design and Implementation of an Integrity Measurement System

Based on

Windows Trusted Computing Platform

Yang Yang[1], Huanguo Zhang[1,2,3], Li Wan[1], Bingyu Zou[1]
[1]*School of Computer, Wuhan University, Wuhan, China*
[2]*State Key Lab of Software Engineering, Wuhan University, Wuhan, China*
[3]*Key Laboratory of Aerospace Information Security and Trust Computing, Ministry of Education,*
Wuhan, China
little_mud2004@yahoo.com.cn

Abstract

This paper presents the design and implementation of an integrity measurement system based on Windows trusted computing platform. The trust chain is established from the BIOS up to the application layer, where the executable codes are taken the load-time measurements before execution. And the measurement system can generate an integrity proof for TPM-based remote attestation. In order to accurately reflect runtime integrity of critical applications, a light weight Clark-Wilson model is introduced for verify information flow integrity guarantee. Our experimental system strengthens the security posture of the platform. With the analysis of the tradeoff between performance and security, our system gives great consideration to the impact which the measurements cause to system performance.

Keywords: Trusted computing, integrity measurement,transitive trust, information flow, CW_Lite model.

On evolution of cooperative overlay network based on group

selection

mechanism

Yufeng Wang[1,3], Akihiro Nakao[2,3]
[1]*Nanjing University of Posts and Telecommunications, China*

2 University of Tokyo, Japan

3 National Institute of Information and Communications Technology (NICT), Japan

wfwang@nict.go.jp

Abstract

In this paper, we study the dynamic evolution of individual strategies of autonomous peers when the overlay network structure is formed by those peers. Inspired by evolutionary game, we propose general mechanism for the decentralized coordination evolution of overlay network structure, based on peers' simple local interaction, which integrates the network reciprocity and group selection mechanism, and can lead to the emergence of cooperative overlay structure.Specifically, we design the link-formation game to characterize the social dilemma of forming links in overlay network. Then, in evolution phase of each peer, we adopt simple economic concept to facilitate the evolution of overlay network into cooperative structure. Simulations clearly show the effects of various parameters, like mutation probability, the number of left peers in evolution phase and the ratio of benefit to cost, on the evolution of cooperation in overlay networks.

Keywords: overlay network, evolutionary game

Property Preservation by Petri-Net-Based Refinements in System Design

Chuanliang Xia

State Key Laboratory of Computer Science, Institute of Software, Academy of Sciences, Beijing,
100190, P.R.CHINA
School of Computer Science and Technology, Shandong Jianzhu University, Jinan, 250101,
P.R.CHINA
_chuanliang_xia@126.com_

Abstract

We motivate and study the refinements of places and transitions in Petri nets. A refinement of Petri nets is a transformation by replacing a simple entity of a system with its functional and operational details. In general, the refined system may become incorrect even if the original system is correct because some of its original properties may have been lost or some undesired properties may have been created. For systems specified in ordinary Petri nets, this paper proposes the conditions imposed on two types of refinements under which the following properties will be preserved: liveness, boundedness, reversibility, and fairness. Such results release the designer's burden for having to provide different methods for individual properties.

Keywords: _Petri nets, refinement, liveness, property preservation, transformation._

A New Algorithm for Network Diameter

Rui Yang, Shijie Zhou and Chengyu Fan
School of Computer Science & Engineering
University of Electronic Science and Technology of China

Chengdu, Sichuan, China
yrui@uestc.edu.cn, sjzhou@uestc.edu.cn, fancy198189@163.com

Abstract

Network diameter is one of the important parameters of a network. Until now, however, there has not been a perfect algorithm which has a lower time complexity than $O(n_2)$ to deal with this problem. As increasingly expanding of network scale and increasing number of nodes and edges, it would spend a lot of time that using Floyd algorithm whose time complexity is defined $O(n_3)$ or Breadth-first Search(BFS) algorithm whose time complexity is defined $O(nm)$ to compute network diameter. Moreover, BFS is only effective in non-weighted graph. For decreasing the time complexity of computing network diameter, this paper proposes a new algorithm,Compressing Graph(CG), which is based on the correlative knowledge of graph compression. Through the analysis of time complexity, it shows our algorithm is a feasible method applied for diverse topology graphs and its range of time complexity is $O(n)$ to $O(n_3)$.

Keywords: Compressing graph, graph compression, improved Floyd, network diameter.

Cost Minimization for Multi-Source Multi-Sink Network Coding

Rami S. Youail, Student Member IEEE, Cheng Wenqing, Tao Shaoguo
Department of Electronics and Information Engineering
Huazhong University of Science and technology
Wuhan, China
r.rami.samir@gmail.com
chengwq@mail.hust.edu.cn
taoshaoguo@gmail.com

Abstract

Network coding is a novel technique used to improve the performance of multicast network by performing encoding operation at intermediate nodes. In the implementation of network coding, the multi-source network coding is the hottest spot that many researchers focusing on, but still no many researches have been done on it, especially in minimizing the complexity of the network. The complexity of the system depends on the number of encoding nodes in the network and the size of the finite field (GF). In this paper, we address the problem of complexity from number of encoding nodes point of view, and reduce the complexity via reducing the number of encoding nodes. We applied this algorithm to random networks and topologies; we conclude that the complexity is reduced effectively.

Keywords: Multi-source network coding, complexity,minimum cost.

A Novel Management Information Retrieval Algorithm Based on

NGI

Jinxiang Zhang Jiahai Yang and Jianping Wu
Network Research Center of TsingHua University, Beijing, China
jxzhang@cernet.edu.cn

Abstract

It is increasingly a difficult problem how to decrease the usage of network resources by network

management systems. Otherwise, the performance of network management is affected by the scheme to collect MIB(Management Information Base) information. A novel algorithm—DGP(Distributed Group-refetching algorithm) is put forward, which is used for retrieving MIB information from the managed devices in the management of CERNET2(China Education and Research Network based on IPv6). DGP can adjust many little retrieving objects into one prefetching group to access, decrease the requency of retrieval, and thus can use fewer network resources and decrease the network overhead without alteration of existing network management protocols.
Keywords: Network management, information retrieval, mib, group-Prefetching.

A Class of Petri Nets for Modular and Hierarchical System Modeling

Zhijian Wang, Dingguo Wei
Information Science School, Guangdong University of Business Studies,
Guanzhou 510320,China
E-mail: zjian@gdcc.edu.cn

Abstract

Existed researches on transition refinement and subnet abstraction mainly paid attention to preserve different attributes during the transformation, usually led to very strict conditions for the subnet. iming to provide the same service and interface after transformation as original module while less estricts are given, a kind of subnet – the Engineering Subnet, is put forward to model complex manufacturing system. The surrounding environment and interface of a subnet are analyzed and defined, the concept "standardized interface" is presented; transition subnets are classified into different types, the idea of "normalized subnet" is presented; a live and normalized subnet with finite live loopbacks is proved to be an Engineering Subnet. Because of live loopbacks owned by Engineering Subnets, the same interface and service as the original module are reserved after the transformation between an Engineering Subnet and the corresponding transition, mean while fewer preconditions are required for the Engineering Subnet compared with previous researches.
Keywords: Petri nets, subnet, interface, loopback, service.

A Crosslayer Concurrent Multipath Random Forward Algorithm

Laiquan Han Jinkuan Wang Cuirong Wang
Information Science and Engineering, Northeastern University
likesea@163.com wjk@mail.neuq.edu.cn wangcr@mail.neuq.edu.cn

Abstract

The rapid development of next generation network (NGN), communication technology and programming router in the last few years have given rise to a strong research interest in Concurrent MultiPath (CMP) technology. Based on the analysis of flow relation and forward granularity, a novel network layer CMP forward algorithm, CCRF (Crosslayer CMP Random Forward), is proposed. CCRF can classify different paths and different flows and forward packets concurrently, NS2 simulations prove that CCRF reduces the degradation of different paths performance and achieves a better performance of throughput and delay and it is easily deployed into the programming router.

Privacy-Preserving Query based on Virtual Organization in Grid Database

Naijing Hu , Huan Zhou , Liang Zhao

Department of Computing and Information Technology , Fudan University

Department of Information Management , Shanghai Finance University

Njhu71@hotmail.com

Abstract

As the development of the grid technology, it becomes more and more important in commerce application to preserve privacy and prevent information from being leaked when querying in a dynamic and heterogeneous grid database. This paper proposes a privacy-preserving query middleware PVOM (Privacy-preserving Visual Organizations Mediator) based on the security requirement of heterogeneous grid nodes, and present Query Algorithm Based on Privacy-Preserving Rule processed by PVOM, which can effectively preserve private information via detecting query and improve security in commercial environment application.

Keywords : *privacy preserve , gird , database , query*

Approximate Performance Analysis of Job Scheduling on Computational Grids

Zhiguang Shan[1] Chuang Lin[2]

[1]Department of Informatization Research, State Information Center
Beijing 100045, China, shanzg@mx.cei.gov.cn
[2]Department of Computer Science and Technology, Tsinghua University
Beijing 100084, China, chlin@tsinghua.edu.cn

Abstract

Our former study had investigated the modeling and performance evaluation of QoS-aware job scheduling on computational grids using the stochastic high-level Petri net (SHLPN). This paper proposes an approximate performance analysis technique, which is based on the decomposition and refinement of the SHLPN model as well as iteration among submodels, to reduce the complexity of the model and cope with the state-space explosion problem. Numerical results of performance analysis show that this approximate analysis technique is effective for accuracy of the numerical results as well as significantly reduces the state complexity of the model.

Key words: Grids, approximate performance analysis, job scheduling, stochastic high-level Petri nets

Grid Load Balancing Scheduling Algorithm Based on Statistics Thinking

Bin Lu Hongbin Zhang
School of Computer Science and Technology School of Computer Science and

Technology
North China Electric Power University North China Electric Power University
Baoding, Hebei, China Baoding, Hebei, China
binlu714@yahoo.com.cn hongbinzhang@163.com
Abstract

As Grid technologies evolve quickly on Internet, research related to resource allocation and task scheduling faces new opportunities and challenges. These new technologies, ideas and approaches provide a new environment for researching and developing load balancing-oriented job scheduling system. Aiming at the hierarchical Grid model structure, following statistical thinking, this paper proposed a new task scheduling and resource allocation algorithm, which can not only increase the utilization of resources and system throughput, but also realize the load balancing within Grid systems. This algorithm consists of three main modules, they are load tracking module, job distributing module and load monitoring module. On the basis of having explained the functions of the different functional parts and the relationships between them, the corresponding pseudo-code algorithm are given. The results of simulative experiments show that the algorithm is effective.
Keywords: Grid computing, resource allocation, task scheduling, load balancing, statistics.

Bayesian Network based QoS Trustworthiness Evaluation Method in

Service

Oriented Grid

Yi Fu, Zhigang Hu, and Qingjun Zhang
School of Information Science and Engineering, Central South University, Changsha 410083,
China
csufuyi@126.com, zghu@mail.csu.edu.cn, zhqj.csu@gmail.com
Abstract

With the converging of grid computing and web service, grid has extended its territory from traditional computing grid to service oriented grid, aiming to realize coordinated resource sharing and problem solving through service selection and composition. Therefore, selecting credible services for applications becomes a key issue in grid environment. To ensure this, a Bayesian Network based approach is presented to evaluate the trustworthiness of grid service. Two new concepts, namely QoS Trustworthiness and QoS Satisfactoriness, are introduced into the proposed method, which are used to describe the resources' capabilities to provide services and users' satisfaction respectively. The approach employs performance history to construct an evaluation model, which ranks the services in terms of their trustworthiness of QoS information and considers degree of consistency in QoS provision. Simulative results show that the proposed approach can effectively enhance trustworthiness of service information and improve reliability of service selection.
Keywords: Trustworthiness, qos, bayesian network, evaluation, service oriented grid.

On Graph Embedding of Crossed Cube-Connected Ring Networks

Xin Yu Min Wu

College of Computer, Electronics and College of Information Science and Information, Guangxi University, Engineering, Central South University Nanning, China Changsha, China

yuxin21@126.com

Taoshen Li Zhaowen Wei

College of Computer, Electronics and College of Computer, Electronics and Information, Guangxi University, Information, Guangxi University, Nanning, China Nanning, China

Abstract

Crossed cube is a variation of hypercube, but some properties of the former are superior to those of the latter. However, it is difficult to upgrade crossed cube networks. For example, it is necessary to double the number of nodes to upgrade crossed cube networks. As a kind of hierarchical ring interconnection networks HRN, crossed cube-connected ring interconnection network CRN can effectively overcome the disadvantage. When upgraded, it only needs to be added a crossed cube. In this paper, we prove that, if $n \geqslant 3$, any circle of length l ($4 \leqslant l \leqslant 2_n$) can be embedded into CRN(m, n) with dilation 1, and if $n \geqslant 3$, CRN(m, n) is Hamilton-connected. It shows that CRN maintains the Hamilton‐connectivity and pancyclicity of crossed cube.

Keywords: Crossed cube-connected ring, hypercube, crossed cube, hamilton-connectivity, ancyclicity.

Characterizing Churn in Gnutella Network in a New Aspect

Fuhong Lin, Changjia Chen, Hongke Zhang

School of Electronics and Information Engineering, Beijing Jiaotong University, Beijing 100044,

P. R. China

06111006@bjtu.edu.cn, changjiachen@sina.com.cn , hkzhang@bjtu.edu.cn

Abstract

In this paper, we just study churn in Gnutella Network, and there are two points that we pay more attention to. Firstly we visualize that the connection changes are much bigger than the degree changes in the Gnutella network; secondly we calculate how many new peers a particular peer can choose as neighbors during a period of time, and the conclusion is that during an hour there are about 26 new peers the very peer chooses as its neighbors. This is very useful to guide people to re-search the resource first appeared or the scarce resource that has not hit the right one for the first time search. And we claim that the perfect interval between two searches is about 70 minutes.

Keywords: Gnutella network, churn, measurement, degree changes, connection changes.

An Global Uneven Clustering Protocol Based on Collision Decreasing in

Environment Integrated Surveillance

Yijun Wang

School of Information

Science and Engineering,
Central South University,
ChangSha 410083, China
Junbin Liang
School of Information
Science and Engineering,
Central South University,
ChangSha, 410083, China
School of Computer and
Electronical Information,
Guangxi University, Nanning
530004,China
liangjb2002@163.com
Jianxin Wang
School of Information
Science and Engineering,
Central South University,
ChangSha, 410083, China
jxwang@mail.csu.edu.cn

Abstract

In the application of environment integrated surveillance, sensors are different in many aspects, such as category, initial energy and energy consume rate, etc. A lot of clustering protocols are proposed to distribute the energy consumption among nodes in each cluster and extend the network lifetime. However, most of them are not completely fit for environment integrated surveillance sensor network. To solve the problem, we proposed a distributed clustering protocol GUCA-CD which extends two classical clustering protocols LEACH and EEUC. Each node has a probability of becoming a tentative cluster head (TCH) to compete for final cluster heads (FCH) in each round. The probability depends on the number of consecutive rounds in which a node has not been FCH, node＇s re*sidual energy and distance to the Sink. In order to decrease the collision of TCHs, our protocol produces clusters from far to near with global uneven radius. Simulations show that our protocol can balance the energy consumption well among all sensor nodes and achieve an obvious improvement on the network lifetime.*

Keywords: Sensor networks, environment integrated surveillance, uneven clustering, collision decreasing

A Channel-Aware Scheduling Algorithm for Improving TCP Fairness

Jiawei Huang[1,2], Jianxin Wang[1], Yuhong Luo[1,2] and Jin Ye[1]
[1]School of Information Science and Engineering, Central South University, Changsha, 410083, China
[2]Department of Computer Science, Hunan Radio Television University, Changsha, 410007, China
Email: jwhuang,jxwang,yhluo,jiny@mail.csu.edu.cn

Abstract

In wireless local area networks (WLANs), the greedy closed loop control nature of TCP and the

performance anomaly of wireless channel lead to the up/down and time unfairness problems between TCP flows. To achieve the wireless channel usage time fairness between the uplink and downlink TCP flows, we propose the Up/Down Time Fair LAS (UDTFLAS) scheduling algorithm. Taking into account the transmission rate and the direction of each TCP flow, UDTFLAS gives the higher transmission probability to the TCP flows with the higher wireless data rate, as well as in the downlink direction. Analysis and simulation results show that UDTFLAS achieves the up/down time fairness, per-flow throughput protection, and great increase in total network throughput.
Keywords: TCP, WLAN, packet scheduling, up/down time fairness.

Requirement Driven Service Agent Coalition Formation and Negotiation

Liwei Zheng[1,3], Jian Tang[1,3], Zhi Jin[1,2]
[1]Academy of Mathematics and Systems Science,CAS
[2]Institute of Computing Technology,CAS
[3]Graduate University of Chinese Academy of Sciences
Beijing, China

⟨wizlw,jtang,zhijin⟩@amss.ac.cn

Abstract

With the increasing of web services in Internet, composing existing services for satisfying new requirements has gained daily expanding attentions and interests. Many efforts have been pursued for supporting the essential activities in service composition. However, the existing techniques only focus on passive services which are waiting there for being discovered and invoked. We argue that it might be more attractive when web services become active entities. This paper proposes a framework for the requirement driven agent coalition formation and negotiation. The aim of this research is trying to allow the web services to discover the requirements and interact with each other autonomously for satisfying the requirements. That will reduce the need for human mediation. With a function ontology, service agents and requirements can have the same terminology for describing their capability. Based on this ontology, we give the formulation of the problem of requirement driven service agent coalition formation and analyzed the stability of the coalition. Automated Mechanism design is used to prevent the service agents from misreporting their information and quitting a feasible coalition. A negotiation framework for the evaluation and choice of collaboration solutions is given in this paper. And a specification language is put forward to describe the execution process of generated MAS systems.
Keywords: Requirement driven, service agent, coalition formation, negotiation, collaboration.

Quality Context Composition for Management of SOA Quality

Youngkon Lee
e-Business Department, Korea Polytechnic University,
2121 Jeongwangdong, Siheung city, Korea
yklee777@kpu.ac.kr
Abstract

This paper presents the design principle for integrating quality management on Web service registry developed in UDDI specification and Web service quality management system (WSQMS). WSQMS, developed by NIA1 can measure and collect the quality information of Web services by its agency system installed on the Web service system. Web service registry is core system for registering and searching WSDL(Web Service Description Language). On the registry, there are no methods that users search Web services on the basis of quality information because the registry is operating without any relationship of WSQMS. So, it is required an integration method where WSQMS and registries share the quality data on the basis of classified quality data. For representing Web service quality information, we adopted the WSQDL(Web Service Quality Description Language), which published by WSQM technical committee in OASIS. In more detail, this paper also presents the scheme to compose the classification scheme for quality data and to modify the necessary data structure of the registry.

Research of improved QoS of Data Transmission in Bluetooth mobile P2P Networks

Hui YE1, ZhiGang CHEN1, QinHua LI2
1. School of Information Science and Engineering, Central South University 410083, China
2. Department of Communications, Yi Chun University Yichun, 344000, China
Y.hui@163.com , email.HuiYe@gmail.com

Abstract

*With the maturity of mobile application environment and the popularity of Bluetooth device, researchers focus on data transmission in Bluetooth mobile Peer-to-Peer (MP2P) network. However, QoS of data transmission becomes poor in Bluetooth mobile P2P network because of the limit communicating rate and the mobility of user. In this paper, we propose a novel cross-layer design mechanism, which controls Bluetooth communicating parameter's granularity to reduce impact of packet dropping ratio in MAC layer.Furthermore, a Rateless coding algorithm is used for optimization in application layer to improve network reliability. The results of simulation show that our mechanism can improve network throughput. Moreover, it can reduce the impact of network topology changing and the data transmission distortion.
Keywords: Mobile P2P network, packet dropping ratio,rateless coding algorithm, network reliability*

Improved Algorithm for Dynamic Web Services Composition

Liping Liu 1, 2 , Anfeng Liu 2 , Ya Gao 2
1(School of Software , Central South University ,Changsha 410083 China)
2(School of Information Science and Engineering , Central South University ,Changsha
410083 China)
E-mail:csuliu@163.com

Abstract

This paper presents a model of a web service composing based on particle swarm to resolve dynamic Web services selection with QoS global optimal in Web services composition. It can dynamically select and bind the best suitable web service to meet the requirement of different

users. The essence of the model is that the problem of dynamic Web Service selection with QoS global optimal is transformed into a multi-objective services composition optimization with QoS constraints. The theory of intelligent optimization of multi-objective genetic algorithm is utilized to produce a set of optimal Pareto services composition process with constraint principle by means of optimizing various objective functions simultaneously. Theoretical analysis and experimental results indicate the feasibility and efficiency of this algorithm.

Keywords

Web Services Composition; Services Selection;particle swarm optimization; Quality of Services

TSearch: A Self-learning Vertical Search Spider for Travel

Suke Li Zhong Chen Liyong Tang Zhao Wang
Institute of Software, School of Electronics Engineering and Computer Science, Peking University
Key Laboratory of High Confidence Software Technologies (Peking University), Ministry of Education
Beijing 100871, China
E-mail: {lisuke, chen, tangly, wangzhao}@infosec.pku.edu.cn

Abstract

A self-learning vertical search spider for travel is presented. This paper focuses on two machine learning methods SNBC (Self-learning Naive Bayes Classifier) and LQNBC (Log Quotient Naive Bayes Classifier) for improving search quality and topic relevance. A framework of designing and implementing a vertical spider TSearch with basic general search spider architecture and functions is also showed. TSearch uses SNBC to filter HTML pages and relies on LQNBC to detect unknown travel related Web sites with high precision. The recall and the precision for the classification of texts crawled by TSearch were measured experimentally. These experiments indicate that using LQNBC and SNBC, TSearch can produce promising travel related information for search.

Rate Adaptive Real-Time Video Transmission Scheme over TCP

Using Multi-Buffer Scheduling

Yonghua Xiong, Min Wu
School of Information Science and Engineering, Central South University, Changsha 410083, China
{yhxiong, min}@mail.csu.edu.cn
Weijia Jia
Department of Computer Science, City University of Hong Kong, Kowloon, Hong Kong
itjia@cityu.edu.hk

Abstract

We explore the process of transmitting real-time Internet video frames over TCP (Transmission Control Protocol) and discover that the delay of waiting in TCP sender-buffer is the critical factor that causes large end-to-end delay. We propose a multi-buffer scheduling model for decreasing the end-to-end delay by scheduling video frames among application-layer sender-buffer, TCP sender-buffer, TCP receiver-buffer and receiver playout-buffer. Based on the proposed model, we present a new rate adaptive scheme to dynamically deliver variant bit rate video frames according to available network bandwidth by adjusting frame rate as well as assuring video frames to be played at normal time. Our scheme does not require any modifications to the network infrastructure or TCP protocol stack and only needs an application-layer buffer of sender. The performance of the proposed solution is evaluated through extensive simulations using the NS-2 simulator.
Keywords: TCP, rate adaptive scheme, real-time video, transmission, multi-buffer.

Using P2P Network to Transmit Media Stream in SIP-based System

Xiuwu Zhang[1, 2], Weimin Lei[1, 2], Wei Zhang[1, 2]
[1]Department of Computer Science and Technology,
University of Science and Technology of China
[2] Networks and Communication Laboratory,
Shenyang Institute of Computer Technology, Chinese Academy of Sciences
{zhangxiuwu,leiwm, zhangwei}@sict.ac.cn

Abstract

SIP-based systems inherently have NAT traversal and QoS problems because of the limited IPV4 addresses and the best-effort service on the internet. Using relay server to relay media stream can solve NAT traversal in SIP systems, but have less scalability. In this paper, we propose a SIP+P2P architecture for SIP-based systems to solve the above problems. In this novel architecture, light weighted SIP signaling is still Client/Server based, but media stream is transmitted through P2P network. We embed relay service into some SIP UAs who can be peers, design a P2P overlay network to organize those peer nodes, and provide a fast and efficient relay nodes retrieving mechanism. We also present a detouring technology to select multi good performance paths in P2P overlay and switch real transmitting path between them according to the path performance. We implemented the whole design, and preliminary experiments show that our approach enhanced path reliability and QoS performance of endto- end communications significantly.
Keywords: SIP-based system, peer-to-peer network, nat traversal, path quality.

An Improved TCP with Cross-layer Congestion Notification over Wired/wireless Hybrid Networks

Jin Ye[1,2] Jianxin Wang[1] Qinghua Liu[2] Yuhong Luo[1]
[1] School of Information Science and Engineering, Central South University, Changsha,China, 410083
[2] College of Information Science and Engineering, Guilin university of Electronic Technology, Guilin, China,
541004
{Email : yejin@guet.edu.cn; jxwang@mail.csu.edu.cn; qhliu@guet.edu.cn; yhluo@mail.csu.edu.cn }

Abstract

Different from wired networks, TCP over wireless networks needs to be cross-layer designed which depends on information of MAC. However, it is difficult to apply existing cross-layer design into hybrid networks. Based on researches of congestion metrics from MAC layer over wireless networks, this paper proposes an cross-layer ECN scheme that TCP sender will trigger congestion control by ECN if RTS count in its receiving packet exceeds a given thresh This cross-layer design is an efficient enhancement to congestion control based on ECN, by which forms a model coupling existing TCP over wired/wireless networks. To verify this new TCP model, WLAN including multi TCP flow and multi-hop wireless/wired hybrid networks are designed in NS2. Simulation results show that it can improve network performance and can be easily extended to other TCP variants.
Key Words: *Wired-wireless Hybrid Networks, TCP,Cross Layer Design, Explicit Congestion Notification.*

Design and Implementation of a Network Behavior Analysis-oriented IP

Network Measurement System

Abstract

Analyzing the characteristic of network behavior provides scientific basis for designing, building, and managing the next generation Internet, and is especially important for monitoring network behavior. This paper establishes a system of metrics that evaluates the behavior of IP networks with respect to the need of analyzing network behavior, introduces the design and implementation of network monitoring system that focuses on the analysis of the characteristics of network behavior, analyzes crucial problems on system design, builds an experiment environment and runs tests on it. The results show that our system satisfies all requirements imposed by real time monitoring network behavior, therefore is able to help the decision making in operating and managing networks.
Keywords: *Network behavior, network measurement system, packet capture, behavior metrics.*

An Efficient Ant Colony Optimization Algorithm for QoS Anycast Routing

Taoshen Li[1,2], Meng Xiao[1], Songqiao Chen[2] , Zhihui Ge[1]
([1]School of Computer, Electronics and Information, Guangxi University, Nanning, 530004, China; [2]School of Information Science and Engineering, Central South University, Changsha, 410083, China)
E-mail:tshli@gxu.edu.cn
Abstract

Anycast communication is a new Internet service defined in IPv6, and it can make a host communication with the one "nearest" member in a group of servers. The anycast routing problem with multiple QoS constrained is known to be NP-complete problem and we can't get satisfying results when using the precise method in polynomial time. In this paper, an improved ant colony optimization algorithm for QoS anycast routing is proposed. In order to search a reasonable anycast routing path, a felicitous estimate method of the optimization path is designed and the load balance is considered. By adjusting the

pheromone in the iteration-best path and re-initializing the algorithm, this algorithm can efficiently avoid falling into local optimal path and enlarge global searching. The experimental results show that this algorithm can effectively find the global-best solution that satisfied the QoS constraint and balance the load of networks, and has better performance and efficiency.

Key words: *Ant colony optimization; anycast; QoS;network routing; load balance*

On QoS Anycast Routing Algorithm based on Particle Swarm

Optimization

Taoshen Li[1.2], Ming Yang[1], Songqiao Chen[2], Zhigang Zhao[1], Zhihui Ge[1]

([1]School of Computer, Electronics and Information, Guangxi University, Nanning, 530004, China; [2]School of Information Science and Engineering, Central South University, Changsha, 410083, China)

E-mail:tshli@gxu.edu.cn

Abstract

Anycast is a new "one-to-one-of-many" communication method in IPv6 networks. QoS anycast routing problem is a nonlinear combination optimization problem, which is proved to be a NP complete problem. Based on improved particle swarm optimization algorithm, an anycast routing algorithm with multiple QoS constraints is proposed. This algorithm uses a special add operator to make the worst path learning from the better path in order to approach to global optimal path. To guarantee the diversity of particles and improve the algorithm's ability to skip out of local optimum, a random mutation operator is designed to mutate global optima randomly. The experimental results show that the algorithm is feasible and effective, and can satisfy the need of the user for bandwidth and delay on the basic of resource reservation.

Key words: *anycast; QoS; routing; particle swam optimization; fitness function*

WSDSNM3: A Web Services-based Distributed System and Network

Management Middleware Model and Scheme

ZhiHui Lu, Yu Wu, Chuan Xiao, ShiYong Zhang, YiPing Zhong
School of Computer Science,
Fudan University, Shanghai 200433, P.R China
lzh, yuwu,cxiao,szhang,ypzhong@fudan.edu.cn

Abstract

Traditionally, system and network management software is tightly tied with the managed IT resources through their specific manageability interfaces. To loose this tie, applying Web Services technology in system and net work manage field is a reasonable way. In this paper, we propose a novel Web Services-based distributed System and Network Management Middleware Model: WSDSNM3. This model utilizes web service technologies in system and network management. We describe this middleware model architecture. Because Web Service Distributed Management specification (WSDM), as an initiative of OASIS organization, helps to build the Web Servicesbased manageability interfaces of

IT resources, we proposed a novel WSDM-based management middleware model, including Programming Model for WSDM-Based Management Middleware layer, Protocol Hierarchy of A WSDM-Based Management Middleware layer. Furthermore, we discuss MUSEJMX based system management implementation scheme - WSDSNM3-Platform, including Manager Layer, WSDM-Gateway Layer, and Agent Layer, and then analyze the experiment results. At last, from our research experiences and related survey, we analyze the prospective research direction and challenges in this field.

A P2P Network Traffic Classification Method Using SVM

Ai-min Yang[1,2] Sheng-yi Jiang[1] He Deng[3]
[1]*School of Informatics, Guangdong University of Foreign Studies, Guangzhou 510006,China*
[2]*School of Computer, National University of Defense Technology, Changsha 410073,China*
[3]*School of Computer and Communication, Hunan Industry University, Zhuzhou 412008, China*
E-mail:amyang18@163.com

Abstract

Accurate identification and claasification of network traffic according to application type is an important element of many network management tasks. In this paper,a P2P network traffic classification method using SVM classifier is proposed.By this method,the P2P network traffic can been classified according to application types with statistical characteristics of network traffic.This paper mainly introduces the network traffic classification problem on four application types of P2P,namely, BitTorrent, PPLive,Skype,MSN.The classification framework based on the SVM is introduced.The methods to gain the traffic samples and constuct classifier are described aslo. The experimental results show the validity of the proposed methods and the average classification precise rate was high.

Optimal Model of Service Discovery Architecture Based on IMS

Jie Zhang
State Key Laboratory of Networking & Switching Technology
Beijing University of Posts and Telecommunications
Beijing, China
zhangjie909@gmail.com

Abstract

IP Multimedia Subsystem (IMS) realizes the convergence of fixed and mobile networks. In virtue of providing various types of multimedia services among different kinds of access networks, IMS is considered as the core network for future Next Generation Networks. For detecting the requested services quickly and efficiently, it is necessary for IMS to adopt a valid Service Discovery function. In this paper, we propose an optimal model of Service Discovery Architecture based on IMS to support a universal Service Discovery function independent of any specific network access technology. The optimal model analyses are studied by mathematical modeling, theoretical analyses, and numerical

Towards a Self-Adaptive Super-node P2P Overlay Based on

Information

Exchange

Jiaqi Liu, Zhigang Chen, Deng Li ,
*School of Information Science and
Engineering,Central South University,
Changsha 410083, China
jiaqi1006@gmail.com*
Hui Liu
*Department of Computer Science, Missouri
State University, Springfield, MO,65897,USA
HuiLiu@missouristate.edu*

Abstract

P2P topology design is a hot topic because it is very important for solving the problems such as deficiency in scalability and effectivity of unstructured P2P overlays. A good topology can greatly improve the performance of search algorithm. The paper proposes a self-adaptive Super-node Overlay Based on Information Exchange called SOBIE. The super-node selection in the SOBIE is different from the general super-node selections which only consider physical capabilities such as bandwidth, CPU processing ability, storage space, and etc.. The SOBIE selects the super-nodes by considering the aggregation of the delay, distance, especially the information exchange frequency, exchange time and query similarity. The SOBIE also detects the free-riders and forces them to quit the system. Through experimental simulations, we prove that the SOBIE has better performance than random or standard super-node P2P topologies in terms of file query success rate, the average query hops, and the total number of query messages.

Keywords: P2P overlay, super node, information exchange, topology matching

An Approach to Checking the Compatibility for Web Services

Specification Based

on the Typed Graph Category

Xinlin ZHANG, Huaikou MIAO, Shenghong LI
School of Computer Engineering and Science; Shanghai University; Shanghai 200072;
China
zhangxl3079@shu.edu.cn

Abstract

Web services represent a challenge and an opportunity for partiers wishing to expose product and services offerings through the Internet. Because Web services are dynamic collaborations generally, one of their key problems is to how automatically match the interface specifications between requestors and provider, it is necessary to formalize interface specifications. This paper proposes a formal notion of Web services modeling according to the graph category theory, and gives a method for transforming the visual interface specification which is represented by a semi-formal, UML-based class graph, into ML language representation, a language suitable for category. A concept of the structural and behavioral compatibility of the interface specifications is established, and an approach to constructing pullback and pushout, which are the weakest possible precondition and a stronger post-condition of an operation respectively, is provided.

Symbol Time Error and Channel Estimation in Wireless OFDM LAN/MAN

Shengping Qin[1], Zhanlei Shang[2], Xin Zhang[1], Peide Liu[1], Zheng Zhou[3]
[1]*Information Management School, Shandong Economic University, Jinan, Shandong, China*
[2]*Computer and Communication Engineering School, Zhengzhou Light Industry University,*
Zhengzhou, Henan, China
[3]*Telecommunication Engineering School, Beijing University of Posts and Telecommunications,*
Beijing, China
qinshengping@sohu.com

Abstract

OFDM is a promising high-speed data transmission platform, and wireless OFDM LAN/MAN has rapidly developed since some OFDM network technologies were standardized. In this paper, the wireless OFDM LAN/MAN topological structures are described, and a novel symbol time error and channel estimation algorithm for the wireless OFDM LAN/MAN based on the PSD estimation is presented. The results of simulation prove the mean and variance of data symbol time error estimation based on the PSD estimation is low, and the channel estimation based on the PSD estimation is more precise than the LS estimation.

SBCA: Score Based Clustering Algorithm for Mobile AD-hoc Networks

Sahar Adabi
Islamic Azad University- Science and Research Branch, Tehran, Iran
sahar3138@yahoo.com

Sam Jabbehdari
Islamic Azad University - North Tehran Branch, Tehran, Iran
sjabbehdari@yahoo.com
Amir Masoud Rahmani
Islamic Azad University - Science and Research Branch,Tehran, Iran
Rahmani@sr.iau.ac.ir
Sepideh Adabi
Islamic Azad University - North Tehran Branch, Tehran, Iran
sepideh3140@yahoo.com

Abstract

This paper proposed a new Score Based Clustering Algorithm (SBCA) for Mobile Ad hoc Networks (MANETs). MANETs are multi-hop wireless packet networks in which all the nodes cooperatively maintain network connectivity without the aid of any infrastructure networks. Through simulations we have compared the performance of the proposed algorithm with that of the WCA algorithm in terms of number of clusters, lifespan of mobile nodes in the system, and end-to-end performance. Results obtained from simulation proved that the proposed algorithm achieves the goals.

Quantitative Evaluation Model for Survivability in Large-Scale

MANETs

Based on Reliability Theory

Sancheng Peng [1,2], Weijia Jia [1,2], Guojun Wang [2,*]
[1] *Department of Computer Science,*
City University of Hong Kong, Kowloon, Hong Kong
[2] *School of Information Science and Engineering,*
Central South University, Changsha 410083, China
*Corresponding author: csgjwang@mail.csu.edu.cn
http://trust.csu.edu.cn/faculty/~csgjwang

Abstract

We propose a quantitative model to evaluate survivability in large-scale Mobile Ad-hoc NETworks (MANETs). We present modeling for survivability regarding various types of faults and connection states for mobile terminals through continuous time Markov chain. We evaluate the survivability of segment-bysegment routing and multipath routing, introduce reliability theory to perform analysis and quantitative evaluation of survivability and provide a theoretical evidence for improving survivability performance. The proposed scheme is a powerful analytical model for deriving network performance much more easily than a simulation-based approach. Numerical validation shows that the proposed model can obtain a better evaluation result on the survivability of large-scale MANETs.
Keywords: Mobile ad-hoc networks, survivability, quantitative evaluation, availability, reliability.

Research on Service-oriented Lifetime and Network Density in WSN

Dayang Sun[1+,3], Yanheng Liu[1,2], Aimin Wang[1,2], Bin Ge[4]
1 College of Computer Science and Technology, Jilin University
2 Key Laboratory of Symbolic Computation and Knowledge Engineering of Ministry of Education, Jilin University
3 College of Computer Science and Technology, Harbin Engineering University
4 School of Science, Harbin Engineering University
+ Corresponding author E-mail: www.sunday@gmail.com

Abstract

In recent studies, the lifetime of Wireless Sensor Network(WSN) has been paid more attention to in order to evaluate the network performance. In this paper, service-oriented lifetime is proposed to provide a new method of assessment. The deployment of network can be guided by this assessment through placing more nodes where higher service quality is needed. In this way, the wasted energy can be reduced efficiently. To give a concrete scenario validating the feasibility of this assessment, a quantization process of network density is put forward subsequently. Both the theories and the simulations show that this method is feasible.

Keywords: WSN, lifetime, service-oriented, network density

Load Balancing Placement of Gateways in Wireless Mesh Networks with QoS Constraints

Feng Zeng, Zhigang Chen
School of Information Science and Engineering, Central South University, Changsha 410083, China
{fengzeng, czg}@mail.csu.edu.cn

Abstract

In wireless mesh networks (WMNs), load balancing placement of gateways is important to the network performance. In this paper, we address the problem of load balancing gateway placement, and propose a greedy algorithm GA-LBC to partition a WMN into load-balance and disjointed clusters, each cluster satisfies QoS requirements. Based on GA-LBC algorithm and the principles of genetic algorithm, we propose a hybrid algorithm HA-LBPG to get the near-optimal solution. Simulation results show that the number of gateways generated by HA-LBPG is nearly equal to the result from other gateway placement algorithms, and as far as the load balancing on the gateways is concerned, HALBPG performs much better than the others.
Keywords: wireless mesh network; gateway placement;load balance; genetic algorithm; greedy algorithm

FAST CASH: FAir and STable Channel ASsignment on Heterogeneous Wireless Mesh Network

Panlong Yang, *IEEE Member*
State Key Laboratory for Novel Software Technology
Nanjing University

Institute of Communication Engineering, PLAUST

Nanjing, 210093, P. R. China

plyang@computer.org

Guihai Chen, *IEEE Member*

State Key Laboratory for Novel Software Technology

Nanjing University

Nanjing, 210093, P. R. China

gchen@nju.edu.cn

Abstract—Nowadays wireless mesh routers are facilitating with more wireless channels than ever because of the advanced wireless communication technologies such as OFDM, SDR and CR(cognitive radio). With multi-radio and multichannel communication capability, spectrum heterogeneity are widely existing in multi-radio wireless systems, such that network performances usually suffer from channel bandwidth and transmission power discrepancy. Many seminar works having been proposed are generally focusing on throughput maximization in a given network configuration, which would suffer from highly dynamic network topology and variable spectrum conditions. In this paper, we prove that, heterogeneity in wireless network would lead to resource constrained regions, and unfair wireless resource allocation would deteriorate throughput on some links. In this paper, we propose a fair and stable scheduling algorithm on heterogeneous multichannel multi-radio wireless mesh network (*MCMR* WMN), balancing these two objectives between network throughput. Our scheduling algorithm is based on multiple coloring algorithm and maximum matching algorithm, where wireless channels and interference links correspond to the two node sets in bipartite graph. Multiple channels and interfaces would be effectively colored in achieving a minimal scheduling period. Analytical results show that, *max-min* fairness could optimize heterogeneous network throughput in case that the data flow is congested. Stable scheduling would degrade the throughput and fairness as well, however, it could maintain a relative high throughput as channels would possibly fail. Our algorithm is effective in achieving optimized network throughput while maintaining a relative stability. Simulation results show that , the proposed scheduling algorithm effectively balance between fairness and stability on wireless channel utilization.

A Broadcasting Retransmission Approach Based on Random Linear Network Coding

Xiao Xiao,Luming Yang,Weiping Wang,Shuai Zhang

School of Information Science and Engineering, Central South University, Changsha 410083,China

xiaogentleman@163.com

Abstract—**In wireless broadcasting retransmission, any node of multi-nodes requests the retransmission of information packets. This approach always needs large amounts of broadcasting packets. This paper presents a novel retransmission approach (RLNCBR) in wireless broadcasting networks based on random linear network coding. Firstly, source node will send linear coding packets based on the largest amounts of lost packets in received nodes. Then, received nodes will decode lost packets with network coding theory. Mathematic analysis reveals that our approach can ensure the solvability in the received nodes, and have**

optimal performance in wireless retransmission. Simulation results indicate that compared with existing approach, the approach in this paper can effectively reduce the average number of transmissions and advance the transmission efficiency.

An Energy-Aware Coverage Based Node Scheduling Scheme for Wireless Sensor Networks

Jinxia Liu[1,2], Naijie Gu[1,2], Songsong He[1,2]

1. Dept. of Computer Science and Technology, University of Science and Technology of China,
Hefei, Anhui, 230027, China
2. Anhui Province Key Laboratory of Computing and Communication Software, Hefei, Anhui,
230027, China
lmjhx@mail.ustc.edu.cn

Abstract

A fundamental issue in wireless sensor network is to extend network lifetime while maintaining network coverage and connectivity. Protection for sensors themselves is another important concern. An Energyaware Coverage based Node Scheduling scheme (ECNS) is proposed to provide protection for sensors and guarantees network connectivity and desired coverage level. ECNS enables each node to decide whether it is eligible to turn off to conserve energy through local information exchange with its neighbors. Simulation results show that ECNS improves network performance with respect to energy conservation, load balance and network lifetime.

An Algorithm for Target Localization in Sensor Networks Based on Overlap

Area Boundary of Sensor Detection

Quanlong Li, Luo Yu, Xiaofei Xu, Zhijia Zhao
School of Computer Science and Technology, Harbin Institute of Technology
liquanlong@hit.edu.cn

Abstract

A novel localization algorithm for moving target in sensor networks is proposed, which is based on overlap area boundary of sensor detection. The algorithm inherits the advantage of binary sensing model that sensor nodes only need provide 0 or information to represent whether detect a target or not, and improves the location precision compares to traditional centroid localization algorithm that can only locate a target position between intersection area of sensor nodes. According to the spatio-temporal continuity of the trajectory of a moving target, the algorithm determines a dynamic queue of sensor

nodes those have detected the target in order, and shrinks the possible location of a target into a boundary of intersection area of all nodes in the queue. In this way, the algorithm achieves better location precision than traditional centroid localization algorithm. Results of simulation experiments prove the truth of better location precision of this algorithm. Moreover, the algorithm has the features of good expansibility and robustness by avoiding whole net time synchronization instead of local communication between nodes.

Keywords: Sensor Networks; Localization   Algorithm; Target Localization; Target Tracking

Research on Energy Hole Problem for Wireless Sensor Networks

Based on Alternation between Dormancy and Work

LIU An-Feng WU Xian-You GUI Wei-Hua

(College of Information Science and Engineering, Central South University , 410083 China)

Abstract

This paper theoretically proposes a more accurate analytical method for avoiding energy hole in wireless sensor networks with nonuniform node distribution. Based on the typical energy consumption model of wireless sensor networks, we obtain the relationship of the densities of sensor nodes in different regions of network through rigorous mathematical analysis, and prove that if the densities of sensor nodes working at the same time are $\rangle$, the entire work can achieve uniform energy consumption by making the sensor nodes whose density is greater than $\rangle$ alternate between dormancy and work. Through theoretical analysis and numerical simulation, we obtain the following conclusions: 1). Under the circumstance that the parameters of network do not change, the network lifetime can increase several times by selecting appropriate transmission radius of sensor node. 2).To achieve uniform energy consumption of network, the densities of sensor nodes whose distances from the base station are different should be different. Even if the sensor nodes were in the same circular ring, the densities of sensor nodes in different places should not the same. 3). Through nonuniform node distribution and alternation between dormancy and work, the efficiency of network can increase several times and the residual energy of network is nearly zero when the network lifetime ends. Therefore, our research can give a significant guidance on the optimization of wireless sensor networks.

Keywords: wireless sensor networks; avoidance of energy hole; density of sensor nodes; uniform energy consumption; network lifetime.

A RIO Approach for Modeling Wireless Sensor Network

Ye Yao, Vincent Hilaire, Abder Koukam, Wandong Cai

School of Computer Science SeT. laboratory School of Computer Science

Northwestern Polytechnical

University.

University of Technology of

Belfort-Montbéliard

Northwestern Polytechnical

University.

710072, Xi'an - P.R.China 90010, Belfort - France 710072, Xi'an - P.R.China

yaoye@npwu.edu.cn Vincent.hilaire@utbm.fr

Abder.koukam@utbm.fr

caiwd@npwu.edu.cn

Abstract

The goal of this paper is to bring forth a model for WSNs with the support of Holonic Multi-agent systems. In this paper, we not only introduce the RIO diagram to analyze the roles of sensor nodes during different periods of building up holonic architecture, but also present a self-organization scheme to construct a holonic architecture in WSNs. At last performance analysis is proposed, including quantitative and qualitative analysis. Analysis result indicates that the hybrid architecture has the properties of scalability, distribution, long life-time and robustness.

Keywords: RIO model, self-organization, wireless sensor networks.

Semi-supervised Top-k Query in Wireless Sensor Networks

Hailan Shen, Deng Li, Pengfei Xu and Zailiang Chen

School of Information Science and Engineering, Central South University, Changsha 410083, China

hn_shl@126.com, hailansh@mail.csu.edu.cn

Abstract

This paper focuses on top-k query in wireless sensor networks and proposes a semi-supervised top-k query approach called CAV. Based on a spanning tree model, CAV adopts histogram technique and an aggregate-verify mechanism to guide query and filter the useless sensing data so as to reduce energy consumption. Besides, this paper further proposes two evaluation schemes of histogram. Compared with existing approaches, CAV is semi-supervised and needn't set any parameters in advance. Performance analysis and simulation experiment results show the performance of CAV is much superior to that of TAG and it is superior to smooth data distribution than it is to random data distribution.

Keywords: Top-k query, sensor networks, histogram, spanning tree, CAV.

Towards End-to-end Delay Bounds on WMNs Based on Statistical

Network

Calculus

Huamei Qi, Zhigang Chen

School of Information Science and Engineering, Central South University, Changsha 410083, P.R. China

{qhm, czg}@mail.csu.edu.cn

Lianming Zhang

School of Computer Science and Engineering, South China University of Technology, Guangzhou 510641, P.R. China

zlm@hunnu.edu.cn

Abstract

The transmission of data is from the mesh routers to gateway by multi-hop and then to Internet. The gateway where the traffic congregates becomes the bottleneck of the network. End-to-end delay with upper bound is one of guaranteed services, and whether the upper bound can obtain the guarantee is a key to present QoS guarantees, implement routing effectively, congestion control and load balance in WMNs. The fundamentals of network calculus, a set of recent developments which provide a deep insight into flow problems encountered in computer networks, are summarized and refined. As it can calculus the probability of the performance and the statistical bound, the statistical network calculus are applied to analyze WMNs. A practical framework of a mesh node is adopted using a scheme based on buffer queue sharing. The ideal and approximate statistical bounds on end-to-end delay are obtained by statistical network calculus in WMNs, in which mesh nodes are based on the framework. Numerical results show that the delay bound is decreased with the increase of the weight.

A Novel Approach to Mobile Positioning Tracking

Wensheng Tang
School of Computer,
National University of
Defense Technology ,
ChangSha,China
tangws@hunnu.edu.cn
Wangqiu Kuang
Department of Computer
Teaching,
Hunan Normal University,
Changsha, China
hnkuang@126.com
Dingxing Zhang
School of Computer,
National University of
Defense Technology ,
ChangSha,China
13327311970@hn165.com

Abstract

This paper presents a new approach to mobile position tracking in wireless sensor networks(WSN). The noise is modeled as the adversary of estimator that has the goal of maximizing the estimation error, and the estimator gain and adversary gain is derived to yields a saddle point so that the mobile position is estimated. The simulation results show that the new approach results in the more accurate estimation for the mobile position and velocity.

An Effective Approach for Continuous Window Query

in Wireless Sensor Networks[1]

Baoyan Song, Yanyan Cong,
Jiayang Zhang, Xiaoguang Li
School of Information, Liaoning University,
Shenyang 110036, china
E-mail: bysong@lnu.edu.cn
Ge Yu
School of Information Science and
Technology, Northeast University,
Shenyang110004, china

Abstract

In this paper, we propose FCWQE, which is effective supporting continuous window query in wireless sensor networks. And it includes FCDC (Four-color with Delay Computation) approach to color the sensors, partition the logic aggregation groups and build the query-path. In order to save the energy and prolong the networks lifetime, this paper brings forward strategy to choose group leader nodes; at the processing of data collection, DAQ (Data Aggregation based-on Query-path) is proposed to deal with the data transmission among groups.

A Distributed Power Proportional Clustering Algorithm to Improve

Energy

Efficiency for Wireless Sensor Networks

Tengfei Zhu, Jun Peng, Ying Guo, Xiaoyong Zhang, Fu Jiang, Chunming Li
School of Information Science and Engineering, Central South University, Changsha 410083,
China
pengj@mail.csu.edu.cn

Abstract

Traditional energy-balanced clustering algorithms in wireless sensor networks (WSNs) usually overlooked the different characters of energy consumption among clusters, which greatly influenced the efficiency of energy employing. To solve this problem, in this paper, a distributed power proportional clustering (DPPC) algorithm is proposed, in which the clusters are determined to be an optimal distribution by making the total power consumption of the cluster proportional to the total energy it stored. In the process of cluster formation, a distributed way is adopted. The sensors firstly compare their positions and organize themselves into the optimal clusters, then compete for the cluster heads according to their position and residual energy that are evaluated by the appropriateness function. The clustering topology formed by the DPPC makes the clusters have similar lifetimes with fully energy utilization, thus the energy efficiency can be greatly improved for the WSNs.

Keywords: *WSNs, distributed clustering, energy efficiency, power proportion, appropriateness function*

A Dynamic Spatial Backoff Algorithm Based on Channel Rate and

Transmit Power in Wireless Networks

Zhuonong Xu
[1,2]
Jianxin Wang
[1]
Yanrong Su
[2]

[1]
School of Information Science and Engineering, Central South University,
Changsha 410083

[2]
Electronics and Information Engineering School, Central South University of
Forestry and
Technology, ChangSha , China ,410004
{E-mail: xzn71@126.com; jxwang@mail.csu.edu.cn; syrdpc@163.com}

Abstract

Physical carrier sensing has been used as an effective way to avoid interference and exploit spatial reuse in wireless networks. In the meanwhile, the degree of the spatial reuse can be enhanced by adjusting transmit power to change carrier sensing range. This paper proposes a new algorithm with the joint control of transmit power and channel rate. In this algorithm, the transmitter first decides to use appropriate channel rate according to communication distance, and then adjusts its rate and transmit power adaptively based on the communication results. Simulation results show that, the proposed rate and power control algorithm yields higher throughout and decreases energy consumption effectively.

Keywords: *Wireless networks, carrier sense, spatial reuse, channel rate, transmit power.*

A Deployment Algorithm to Achieve both Connectivity and

Coverage in Grid

Sensor Networks

Diwen Wu
Dongqing Xie
Lupeng Wang

School of Computer and Communication, HuNan University, ChangSha, 410082
{E-mail: wdw@mail.csu.edu.cn dongqing_xie@hotmail.com }

Abstract

In this paper, we propose an algorithm to achieve both connectivity and coverage for multiple target points in grid sensor networks. First we deal with the local targets block, then we use the least sensors to make all the sensors connected. This algorithm has the $O(n)$ running time complexity and its result is proved closed to the optimal result.

Multipath-Based Segment-by-Segment Routing Protocol in MANETs

Yuan Lu [1], Guojun Wang [1,*], Weijia Jia [2], Sancheng Peng [1,2]
[1] *School of Information Science and Engineering,*
Central South University, Changsha 410083, China
[2] *Department of Computer Science,*
City University of Hong Kong, Kowloon, Hong Kong
*Corresponding author: csgjwang@mail.csu.edu.cn
http://trust.csu.edu.cn/faculty/~csgjwang

Abstract

We propose a Multipath-based Segment-by-Segment Routing protocol in mobile ad-hoc networks (M-SSR). In M-SSR, a path is divided into multiple segments, in each of which multiple node-disjoint paths are discovered and routing maintenance can be performed independently. The proposed protocol can decrease congestion, optimize bandwidth and improve the sharing rate of channel by using multiple paths to transmit data packets in parallel. It uses segment-bysegment scheme to decrease routing control overhead and improve the network scalability. Simulation studies show that the proposed protocol can balance the load of the network and can be adaptive to the change of the network topology effectively, and also improve the survivability, stability and success ratio for routing.

Keywords: Mobile ad-hoc networks, multipath routing, segment-by-segment routing, scalability, grid.

A Location-Based Execution Path Selection for Composite Service in MANETs

Weiyu Chen, Jingjing Wu, Weiwei Sun, Zhenying He[*]
Dept. of Computing & Information Technology Fudan University, Shanghai, China
[*]*Corresponding Author: Zhenying He*
{chwy, wjj, wwsun, zhenying }@fudan.edu.cn

Abstract

There has been great interest in service composition to exploit resources of distributed nodes in mobile ad hoc networks. During composite service execution, the execution path for composite service is very important because of its significant influence on network overhead and the percentage of failure. In this paper, we study the execution path selection problem, which focuses on selecting a short path. The short path means small amount hops the request travels during execution. Based on nodes'locations, request source estimates the hop count between two nodes and then selects a short path for execution. The simulation results show the path selected by our approach almost has the same performance as the theoretical shortest path both on the path length and the percentage of failure, especially in mobile

environments. Moreover, our approach performs better than the existing service selection approach both in the percentage of failure and average path length, especially in the network with high mobility and sparse service distribution.
Keywords: Mobile ad hoc network, path execution selection, composite service.

A Lifetime Aware Approach to Service Selection in Mobile Ad Hoc Networks

Zhuoyao Zhang ,Weiwei Sun†, Weiyu Chen, Jiaqi Dong
School of Computer Science, Fudan University, Shanghai, China
†Corresponding Author: Weiwei Sun
{ zhangzhuoyao,wwsun, chwy, dong_jiaqi}@fudan.edu.cn

Abstract

Service oriented architecture is expected to be implemented as an effective way for mobile ad hoc communications and collaboration in ubiquitous computing environments. Much effort has been devoted on the service discovery protocols, while fewer w orks focus on the problem of service selection. The approaches proposed in previous works of service selection are mostly hop based approaches which aim at reducing the average response time. However the network lifetime which measures the durability of the network is also of great importance and should be paid more attention. In this paper, we first present a definition of the network lifetime from the aspect of the service oriented architecture. Then, a heuristic approach to service selection which focuses on optimizing the network lifetime is proposed. Experiments results prove the approach can significantly prolong the network lifetime while at the same time achieve comparably short average response time.
Keywords: Service selection, lifetime aware, MANETs.

A Novel Link-Segment Storage and Query Scheme for Object Tracking Applications in Wireless Sensor Networks

Jin Zheng[1], Weijia Jia[1,2], Guojun Wang[1,*]
[1] *School of Information Science and Engineering,*
Central South University, Changsha 410083, China;
[2] *Department of Computer Science,*
City University of Hong Kong, Kowloon, Hong Kong
[*] *Corresponding author: csgjwang@mail.csu.edu.cn*
http://trust.csu.edu.cn/faculty/~csgjwang

Abstract

We investigate the data storage and query problem for object tracking applications in wireless sensor networks. We focus on how to query the object tracking and obtain the object position effectively. The main idea is to apply multiple access entries of a storage link which stores the detected events in local storage and maintain the relation of the sensed data. When an object moves across the sensing field, the

detecting sensors can construct a virtual linked list with multiple access entries along the moving path of the object. The stored events can be extracted by tracing the linked list from any access entry to get the complete or partial tracking information. Performance analysis and simulation studies show that the proposed link-segment storage and query scheme is energy efficient and it keeps high query success ratio and low query latency.

Keywords: Wireless sensor networks, object tracking, linked list, segment.

A Low Overhead Truthful Energy-Efficient Routing Protocol in Wireless Mobile Ad hoc Networks with Selfish Nodes

Xinhui Yuan, Songqiao Chen, Xinhua Jiang
School of Information Science and Engineering
Central South University, Changsha 410083, China
xhyuan@mail.csu.edu.cn

Abstract

When nodes in a wireless mobile ad hoc network belong to different users, they may act selfishly. A feasible way to stimulate cooperation among self ish nodes is to reimburse the forwarding service providers for their costs. We propose a low overhead truthful energy-efficient routing protocol called LOTER, which introduces the VCG mechanism into such a network that consists of selfish nodes. In LOTER, nodes collect their neighbors' information. The destination selects several RREP paths. If it is on the RREP path, the node sends its collected information to the source. Based on such information, the source constructs a subgraph, finds the least cost path to the destination and calculates the VCG payments to the nodes on the chosen least cost path. LOTER can provide truthful and energy-efficient routing. Furthermore, it collects the topologic information with low overhead. Simulation results show that LOTER provides better performance than other existing protocols.

Keywords: VCG mechanism, truthful routing protocol, mobile ad hoc network.

A Multipath on-Demand Routing with Path Selection Entropy for Ad Hoc Networks

Baolin Sun[1], Chao Gui[1], Qifei Zhang[1,2], Bing Yan[1], Wei Liu[2]
1. School of Computing, Hubei University of Economics, Wuhan 430205, P. R. China
E-mail: blsun@163.com
2. Department of Electronics and Information Engineering,
Huazhong University of Science and Technology
Wuhan 430074, P. R. China

Abstract

An ad hoc network is a collection of wireless mobile nodes dynamically forming a temporary network without the use of any existing network infrastructure or centralized administration. The multipath routing in mobile ad hoc networks is difficult because the network topology may change constantly, and the available alternative path is inherently unreliable. A number of routing protocols like ad hoc on demand distance vector routing (AODV), on-demand multipath distance vector protocol (AOMDV),

AODVM (AODV Multipath) have been implemented. In this paper an attempt has been made to compare the performance of three prominent on demand routing protocols for mobile ad hoc networks. An on demand node disjointed multipath routing protocol with low broadcast redundancy is proposed. Multipath routing allows the establishment of multiple paths between a single source and single destination node. The solution is based on lower layer specifics. Simulation results show that, with the proposed multipath routing protocol, packet delivery ratio, end-to-end delay, and routing overhead ratio can be improved in most of cases. It is an available approach to multipath routing decision.
Keywords: Ad hoc network; multipath routing; on demand routing, entropy

Performance Investigation of Backoff Algorithms in Multihop

Wireless Networks

Jian Li, Xianwen Zeng, Qinggang Su
School of Electronics Information, Shanghai Dianji University, ShangHai, 200240
Email:{ lijian, zengxw, suqg}@sdju.edu.cn

Abstract

In a multihop wireless network, the throughput performance decreases seriously because of inter-flow and intra-flow collision. The backoff algorithm is the de facto function to resolve collision in 802.11 networks. In this paper we study the impact of five back-off algorithms on the performance of 802.11-based multihop wireless networks with different network topology and flow patterns. Simulations show that the backoff algorithms have big influence on the performance of both UDP and TCP flows. But none of the current backoff algorithms can improve the throughput and fairness performance in multihop wireless networks efficiently. It shows that the raditional random backoff algorithms are no longer suitable for collision resolution in distributed multihop wireless networks.

Keywords: Multihop wireless network, backoff algorithm, 802.11, performance comparism, collision resolution.

Improved Algorithm for Dynamic Web Services Composition

Liping Liu [1, 2], Anfeng Liu [2], Ya Gao [2]
1(School of Software , Central South University ,Changsha 410083 China)
2(School of Information Science and Engineering , Central South
University ,Changsha
410083 China)
E-mail:csuliu@163.com

Abstract

This paper presents a model of a web service composing based on particle swarm to resolve dynamic Web services selection with QoS global optimal in Web services composition. It can dynamically select and bind the best suitable web service to meet the requirement of different users. The essence of the model is that the problem of dynamic Web Service selection with QoS global optimal is transformed into a multi-objective services composition optimization with QoS constraints. The theory of intelligent optimization of multi-objective genetic algorithm is utilized to produce a set of optimal Pareto services composition process with constraint principle by means of optimizing various objective functions simultaneously. Theoretical

analysis and experimental results indicate the feasibility and efficiency of this algorithm.

TSearch: A Self-learning Vertical Search Spider for Travel

Suke Li Zhong Chen Liyong Tang Zhao Wang

Institute of Software, School of Electronics Engineering and Computer Science, Peking University

Key Laboratory of High Confidence Software Technologies (Peking University), Ministry of Education

Beijing 100871, China

E-mail: {lisuke, chen, tangly, wangzhao}@infosec.pku.edu.cn

Abstract

A self-learning vertical search spider for travel is presented. This paper focuses on two machine learning methods SNBC (Self-learning Naive Bayes Classifier) and LQNBC (Log Quotient Naive Bayes Classifier) for improving search quality and topic relevance. A framework of designing and implementing a vertical spider TSearch with basic general search spider architecture and functions is also showed. TSearch uses SNBC to filter HTML pages and relies on LQNBC to detect unknown travel related Web sites with high precision. The recall and the precision for the classification of texts crawled by TSearch were measured experimentally. These experiments indicate that using LQNBC and SNBC, TSearch can produce promising travel related information for search.

Rate Adaptive Real-Time Video Transmission Scheme over TCP

Using Multi-Buffer Scheduling

Yonghua Xiong, Min Wu

School of Information Science and Engineering, Central South University, Changsha 410083, China

{yhxiong, min}@mail.csu.edu.cn

Weijia Jia

Department of Computer Science, City University of Hong Kong, Kowloon, Hong Kong

itjia@cityu.edu.hk

Abstract

We explore the process of transmitting real-time Internet video frames over TCP (Transmission Control Protocol) and discover that the delay of waiting in TCP sender-buffer is the critical factor that causes large end-to-end delay. We propose a multi-buffer scheduling model for decreasing the end-to-end delay by scheduling video frames among application-layer sender-buffer, TCP sender-buffer, TCP receiver-buffer and receiver playout-buffer. Based on the proposed model, we present a new rate

adaptive scheme to dynamically deliver variant bit rate video frames according to available network bandwidth by adjusting frame rate as well as assuring video frames to be played at normal time. Our scheme does not require any modifications to the network infrastructure or TCP protocol stack and only needs an application-layer buffer of sender. The performance of the proposed solution is evaluated through extensive simulations using the NS-2 simulator.
Keywords: TCP, rate adaptive scheme, real-time video, transmission, multi-buffer.

Using P2P Network to Transmit Media Stream in SIP-based System

Xiuwu Zhang[1, 2], Weimin Lei[1, 2], Wei Zhang[1, 2]
[1]Department of Computer Science and Technology,
University of Science and Technology of China
[2] Networks and Communication Laboratory,
Shenyang Institute of Computer Technology, Chinese Academy of Sciences
{zhangxiuwu,leiwm, zhangwei}@sict.ac.cn

Abstract

SIP-based systems inherently have NAT traversal and QoS problems because of the limited IPV4 addresses and the best-effort service on the internet. Using relay server to relay media stream can solve NAT traversal in SIP systems, but have less scalability. In this paper, we propose a SIP+P2P architecture for SIP-based systems to solve the above problems. In this novel architecture, light weighted SIP signaling is still Client/Server based, but media stream is transmitted through P2P network. We embed relay service into some SIP UAs who can be peers, design a P2P overlay network to organize those peer nodes, and provide a fast and efficient relay nodes retrieving mechanism. We also present a detouring technology to select multi good performance paths in P2P overlay and switch real transmitting path between them according to the path performance. We implemented the whole design, and preliminary experiments show that our approach enhanced path reliability and QoS performance of endto- end communications significantly.
Keywords: SIP-based system, peer-to-peer network, nat traversal, path quality.

An Improved TCP with Cross-layer Congestion Notification over Wired/wireless Hybrid Networks

Jin Ye[1,2] Jianxin Wang[1] Qinghua Liu[2] Yuhong Luo[1]
[1] School of Information Science and Engineering, Central South University, Changsha,China, 410083
[2] College of Information Science and Engineering, Guilin university of Electronic Technology, Guilin, China,
541004
{Email : yejin@guet.edu.cn; jxwang@mail.csu.edu.cn; qhliu@guet.edu.cn; yhluo@mail.csu.edu.cn }

Abstract

Different from wired networks, TCP over wireless networks needs to be cross-layer designed which depends on information of MAC. However, it is difficult to apply existing cross-layer design into hybrid networks. Based on researches of congestion metrics from MAC layer over wireless networks, this paper proposes an cross-layer ECN scheme that TCP sender will trigger congestion control by ECN if RTS count in its receiving packet exceeds a given thresh This cross-layer design is an efficient enhancement to congestion

control based on ECN, by which forms a model coupling existing TCP over wired/wireless networks. To verify this new TCP model, WLAN including multi TCP flow and multi-hop wireless/wired hybrid networks are designed in NS2. Simulation results show that it can improve network performance and can be easily extended to other TCP variants.

Key Words: Wired-wireless Hybrid Networks, TCP,Cross Layer Design, Explicit Congestion Notification.

Design and Implementation of a Network Behavior Analysis-oriented IP

Network Measurement System

Abstract

Analyzing the characteristic of network behavior provides scientific basis for designing, building, and managing the next generation Internet, and is especially important for monitoring network behavior. This paper establishes a system of metrics that evaluates the behavior of IP networks with respect to the need of analyzing network behavior, introduces the design and implementation of network monitoring system that focuses on the analysis of the characteristics of network behavior, analyzes crucial problems on system design, builds an experiment environment and runs tests on it. The results show that our system satisfies all requirements imposed by real time monitoring network behavior, therefore is able to help the decision making in operating and managing networks.

Keywords: Network behavior, network measurement system, packet capture, behavior metrics.

An Efficient Ant Colony Optimization Algorithm for QoS Anycast Routing

Taoshen Li[1,2], Meng Xiao[1], Songqiao Chen[2] , Zhihui Ge[1]

([1]School of Computer, Electronics and Information, Guangxi University, Nanning, 530004, China; [2]School of Information Science and Engineering, Central South University, Changsha, 410083, China)

E-mail:tshli@gxu.edu.cn

Abstract

Anycast communication is a new Internet service defined in IPv6, and it can make a host communication with the one "nearest" member in a group of servers. The anycast routing problem with multiple QoS constrained is known to be NP-complete problem and we can't get satisfying results when using the precise method in polynomial time. In this paper, an improved ant colony optimization algorithm for QoS anycast routing is proposed. In order to search a reasonable anycast routing path, a felicitous estimate method of the optimization path is designed and the load balance is considered. By adjusting the pheromone in the iteration-best path and re-initializing the algorithm, this algorithm can efficiently avoid falling into local optimal path and enlarge global searching. The experimental results show that this algorithm can effectively find the global-best solution that satisfied the QoS constraint and balance the load of networks, and has better performance and efficiency.

Key words: Ant colony optimization; anycast; QoS;network routing; load balance

On QoS Anycast Routing Algorithm based on Particle Swarm Optimization

Taoshen Li[1,2], Ming Yang[1], Songqiao Chen[2], Zhigang Zhao[1], Zhihui Ge[1]

([1]School of Computer, Electronics and Information, Guangxi University, Nanning, 530004, China;
[2]School of Information Science and Engineering, Central South University, Changsha, 410083, China)

E-mail:tshli@gxu.edu.cn

Abstract

Anycast is a new "one-to-one-of-many" communication method in IPv6 networks. QoS anycast routing problem is a nonlinear combination optimization problem, which is proved to be a NP complete problem. Based on improved particle swarm optimization algorithm, an anycast routing algorithm with multiple QoS constraints is proposed. This algorithm uses a special add operator to make the worst path learning from the better path in order to approach to global optimal path. To guarantee the diversity of particles and improve the algorithm's ability to skip out of local optimum, a random mutation operator is designed to mutate global optima randomly. The experimental results show that the algorithm is feasible and effective, and can satisfy the need of the user for bandwidth and delay on the basic of resource reservation.

Key words: anycast; QoS; routing; particle swam optimization; fitness function

WSDSNM3: A Web Services-based Distributed System and Network Management Middleware Model and Scheme

ZhiHui Lu, Yu Wu, Chuan Xiao, ShiYong Zhang, YiPing Zhong
School of Computer Science,
Fudan University, Shanghai 200433, P.R China
lzh, yuwu,cxiao,szhang,ypzhong@fudan.edu.cn

Abstract

Traditionally, system and network management software is tightly tied with the managed IT resources through their specific manageability interfaces. To loose this tie, applying Web Services technology in system and net work manage field is a reasonable way. In this paper, we propose a novel Web Services-based distributed System and Network Management Middleware Model: WSDSNM3. This model utilizes web service technologies in system and network   management. We describe this middleware model architecture. Because Web Service Distributed Management specification (WSDM), as an initiative of OASIS organization, helps to build the Web Servicesbased manageability interfaces of IT resources, we proposed a novel WSDM-based management middleware model, including Programming Model for WSDM-Based Management Middleware layer, Protocol Hierarchy of A WSDM-Based Management Middleware layer. Furthermore, we discuss MUSEJMX based system management implementation scheme - WSDSNM3-Platform, including Manager Layer, WSDM-Gateway Layer, and Agent Layer, and then analyze the experiment results. At last, from our

research experiences and related survey, we analyze the prospective research direction and challenges in this field.

A P2P Network Traffic Classification Method Using SVM

Ai-min Yang[1,2] Sheng-yi Jiang[1] He Deng[3]
[1]School of Informatics, Guangdong University of Foreign Studies, Guangzhou 510006,China
[2]School of Computer, National University of Defense Technology, Changsha 410073,China
[3]School of Computer and Communication, Hunan Industry University, Zhuzhou 412008, China
E-mail:amyang18@163.com

Abstract

Accurate identification and claasification of network traffic according to application type is an important element of many network management tasks. In this paper,a P2P network traffic classification method using SVM classifier is proposed.By this method,the P2P network traffic can been classified according to application types with statistical characteristics of network traffic.This paper mainly introduces the network traffic classification problem on four application types of P2P,namely, BitTorrent, PPLive,Skype,MSN.The classification framework based on the SVM is introduced.The methods to gain the traffic samples and constuct classifier are described aslo. The experimental results show the validity of the proposed methods and the average classification precise rate was high.

Optimal Model of Service Discovery Architecture Based on IMS

Jie Zhang
State Key Laboratory of Networking & Switching Technology
Beijing University of Posts and Telecommunications
Beijing, China
zhangjie909@gmail.com

Abstract

IP Multimedia Subsystem (IMS) realizes the convergence of fixed and mobile networks. In virtue of providing various types of multimedia services among different kinds of access networks, IMS is considered as the core network for future Next Generation Networks. For detecting the requested services quickly and efficiently, it is necessary for IMS to adopt a valid Service Discovery function. In this paper, we propose an optimal model of Service Discovery Architecture based on IMS to support a universal Service Discovery function independent of any specific network access technology. The optimal model analyses are studied by mathematical modeling, theoretical analyses, and numerical simulations.
Key words: Future next generation networks (NGN), IP multimedia subsystem (IMS), performance optimization, universal service discovery (USD).

Towards a Self-Adaptive Super-node P2P Overlay Based on

Information

Exchange

Jiaqi Liu, Zhigang Chen, Deng Li ,
School of Information Science and
Engineering,Central South University,
Changsha 410083, China
jiaqi1006@gmail.com
Hui Liu
Department of Computer Science, Missouri
State University, Springfield, MO,65897,USA
HuiLiu@missouristate.edu

Abstract

P2P topology design is a hot topic because it is very important for solving the problems such as deficiency in scalability and effectivity of unstructured P2P overlays. A good topology can greatly improve the performance of search algorithm. The paper proposes a self-adaptive Super-node Overlay Based on Information Exchange called SOBIE. The super-node selection in the SOBIE is different from the general super-node selections which only consider physical capabilities such as bandwidth, CPU processing ability, storage space, and etc.. The SOBIE selects the super-nodes by considering the aggregation of the delay, distance, especially the information exchange frequency, exchange time and query similarity. The SOBIE also detects the free-riders and forces them to quit the system. Through experimental simulations, we prove that the SOBIE has better performance than random or standard super-node P2P topologies in terms of file query success rate, the average query hops, and the total number of query messages.

Keywords: P2P overlay, super node, information exchange, topology matching

An Approach to Checking the Compatibility for Web Services

Specification Based

on the Typed Graph Category

Xinlin ZHANG, Huaikou MIAO, Shenghong LI
School of Computer Engineering and Science; Shanghai University; Shanghai 200072;
China
zhangxl3079@shu.edu.cn

Abstract

Web services represent a challenge and an opportunity for partiers wishing to expose product and services offerings through the Internet. Because Web services are dynamic collaborations generally, one of their key problems is to how automatically match the interface specifications between requestors and provider, it is necessary to formalize interface specifications. This paper proposes a formal notion of Web services modeling according to the graph category theory, and gives a method for transforming the visual interface specification which is represented by a semi-formal, UML-based class graph, into ML

language representation, a language suitable for category. A concept of the structural and behavioral compatibility of the interface specifications is established, and an approach to constructing pullback and pushout, which are the weakest possible precondition and a stronger post-condition of an operation respectively, is provided.

Symbol Time Error and Channel Estimation in Wireless OFDM LAN/MAN

Shengping Qin[1], Zhanlei Shang[2], Xin Zhang[1], Peide Liu[1], Zheng Zhou[3]
[1]Information Management School, Shandong Economic University, Jinan, Shandong, China
[2]Computer and Communication Engineering School, Zhengzhou Light Industry University,
Zhengzhou, Henan, China
[3]Telecommunication Engineering School, Beijing University of Posts and Telecommunications,
Beijing, China
qinshengping@sohu.com

Abstract

OFDM is a promising high-speed data transmission platform, and wireless OFDM LAN/MAN has rapidly developed since some OFDM network technologies were standardized. In this paper, the wireless OFDM LAN/MAN topological structures are described, and a novel symbol time error and channel estimation algorithm for the wireless OFDM LAN/MAN based on the PSD estimation is presented. The results of simulation prove the mean and variance of data symbol time error estimation based on the PSD estimation is low, and the channel estimation based on the PSD estimation is more precise than the LS estimation.

SBCA: Score Based Clustering Algorithm for Mobile AD-hoc Networks

Sahar Adabi
Islamic Azad University- Science and Research Branch, Tehran, Iran
sahar3138@yahoo.com
Sam Jabbehdari
Islamic Azad University - North Tehran Branch, Tehran, Iran
sjabbehdari@yahoo.com
Amir Masoud Rahmani
Islamic Azad University - Science and Research Branch,Tehran, Iran
Rahmani@sr.iau.ac.ir

Sepideh Adabi
Islamic Azad University - North Tehran Branch, Tehran, Iran
sepideh3140@yahoo.com

Abstract

This paper proposed a new Score Based Clustering Algorithm (SBCA) for Mobile Ad hoc Networks (MANETs). MANETs are multi-hop wireless packet networks in which all the nodes cooperatively maintain network connectivity without the aid of any infrastructure networks. Through simulations we have compared the performance of the proposed algorithm with that of the WCA algorithm in terms of number of clusters, lifespan of mobile nodes in the system, and end-to-end performance. Results obtained from simulation proved that the proposed algorithm achieves the goals.

Quantitative Evaluation Model for Survivability in Large-Scale MANETs

Based on Reliability Theory

Sancheng Peng [1,2], Weijia Jia [1,2], Guojun Wang [2,*]
[1] Department of Computer Science,
City University of Hong Kong, Kowloon, Hong Kong
[2] School of Information Science and Engineering,
Central South University, Changsha 410083, China
*Corresponding author: csgjwang@mail.csu.edu.cn
http://trust.csu.edu.cn/faculty/~csgjwang

Abstract

We propose a quantitative model to evaluate survivability in large-scale Mobile Ad-hoc NETworks (MANETs). We present modeling for survivability regarding various types of faults and connection states for mobile terminals through continuous time Markov chain. We evaluate the survivability of segment-bysegment routing and multipath routing, introduce reliability theory to perform analysis and quantitative evaluation of survivability and provide a theoretical evidence for improving survivability performance. The proposed scheme is a powerful analytical model for deriving network performance much more easily than a simulation-based approach. Numerical validation shows that the proposed model can obtain a better evaluation result on the survivability of large-scale MANETs.
Keywords: Mobile ad-hoc networks, survivability, quantitative evaluation, availability, reliability.

Research on Service-oriented Lifetime and Network Density in WSN

Dayang Sun[1+,3], Yanheng Liu[1,2], Aimin Wang[1,2], Bin Ge[4]
1 College of Computer Science and Technology, Jilin University
2 Key Laboratory of Symbolic Computation and Knowledge Engineering of Ministry of
Education, Jilin University
3 College of Computer Science and Technology, Harbin Engineering University

4 School of Science, Harbin Engineering University

+ Corresponding author E-mail: www.sunday@gmail.com

Abstract

In recent studies, the lifetime of Wireless Sensor Network(WSN) has been paid more attention to in order to evaluate the network performance. In this paper, service-oriented lifetime is proposed to provide a new method of assessment. The deployment of network can be guided by this assessment through placing more nodes where higher service quality is needed. In this way, the wasted energy can be reduced efficiently. To give a concrete scenario validating the feasibility of this assessment, a quantization process of network density is put forward subsequently. Both the theories and the simulations show that this method is feasible.

Keywords: WSN, lifetime, service-oriented, network density

Load Balancing Placement of Gateways in Wireless Mesh Networks with QoS Constraints

Feng Zeng, Zhigang Chen

School of Information Science and Engineering, Central South University, Changsha 410083, China

{fengzeng, czg}@mail.csu.edu.cn

Abstract

In wireless mesh networks (WMNs), load balancing placement of gateways is important to the network performance. In this paper, we address the problem of load balancing gateway placement, and propose a greedy algorithm GA-LBC to partition a WMN into load-balance and disjointed clusters, each cluster satisfies QoS requirements. Based on GA-LBC algorithm and the principles of genetic algorithm, we propose a hybrid algorithm HA-LBPG to get the near-optimal solution. Simulation results show that the number of gateways generated by HA-LBPG is nearly equal to the result from other gateway placement algorithms, and as far as the load balancing on the gateways is concerned, HALBPG performs much better than the others.

Keywords: wireless mesh network; gateway placement;load balance; genetic algorithm; greedy algorithm

FAST CASH: FAir and STable Channel ASsignment on Heterogeneous Wireless Mesh Network

Panlong Yang, IEEE Member

State Key Laboratory for Novel Software Technology

Nanjing University

Institute of Communication Engineering, PLAUST

Nanjing, 210093, P. R. China

plyang@computer.org

Guihai Chen, IEEE Member

State Key Laboratory for Novel Software Technology

Nanjing University

Nanjing, 210093, P. R. China

gchen@nju.edu.cn

Abstract—Nowadays wireless mesh routers are facilitating with more wireless channels than ever because of the advanced wireless communication technologies such as OFDM, SDR and CR(cognitive radio). With multi-radio and multichannel communication capability, spectrum heterogeneity are widely existing in multi-radio wireless systems, such that network performances usually suffer from channel bandwidth and transmission power discrepancy. Many seminar works having been proposed are generally focusing on throughput maximization in a given network configuration, which would suffer from highly dynamic network topology and variable spectrum conditions. In this paper, we prove that, heterogeneity in wireless network would lead to resource constrained regions, and unfair wireless resource allocation would deteriorate throughput on some links. In this paper, we propose a fair and stable scheduling algorithm on heterogeneous multichannel multi-radio wireless mesh network (MCMR WMN), balancing these two objectives between network throughput. Our scheduling algorithm is based on multiple coloring algorithm and maximum matching algorithm, where wireless channels and interference links correspond to the two node sets in bipartite graph. Multiple channels and interfaces would be effectively colored in achieving a minimal scheduling period. Analytical results show that, max-min fairness could optimize heterogeneous network throughput in case that the data flow is congested. Stable scheduling would degrade the throughput and fairness as well, however, it could maintain a relative high throughput as channels would possibly fail. Our algorithm is effective in achieving optimized network throughput while maintaining a relative stability. Simulation results show that , the proposed scheduling algorithm effectively balance between fairness and stability on wireless channel utilization.

A Broadcasting Retransmission Approach Based on Random Linear Network Coding

Xiao Xiao,Luming Yang,Weiping Wang,Shuai Zhang

School of Information Science and Engineering, Central South University, Changsha 410083,China

xiaogentleman@163.com

Abstract—**In wireless broadcasting retransmission, any node of multi-nodes requests the retransmission of information packets. This approach always needs large amounts of broadcasting packets. This paper presents a novel retransmission approach (RLNCBR) in wireless broadcasting networks based on random linear network coding. Firstly, source node will send linear coding packets based on the largest amounts of lost packets in received nodes. Then, received nodes will decode lost packets with network coding theory. Mathematic analysis reveals that our approach can ensure the solvability in the received nodes, and have optimal performance in wireless retransmission. Simulation results indicate that compared with existing approach, the approach in this paper can effectively reduce the average number of transmissions and advance the transmission efficiency.**

Keywords—**Wireless Broadcasting; Random Linear Network Coding; Network Coding; Retransmission;**

An Energy-Aware Coverage Based Node Scheduling Scheme for

Wireless Sensor Networks

Jinxia Liu[1,2], Naijie Gu[1,2], Songsong He[1,2]
1. Dept. of Computer Science and Technology, University of Science and Technology of China,
Hefei, Anhui, 230027, China
2. Anhui Province Key Laboratory of Computing and Communication Software, Hefei, Anhui,
230027, China
lmjhx@mail.ustc.edu.cn

Abstract

A fundamental issue in wireless sensor network is to extend network lifetime while maintaining network coverage and connectivity. Protection for sensors themselves is another important concern. An Energyaware Coverage based Node Scheduling scheme (ECNS) is proposed to provide protection for sensors and guarantees network connectivity and desired coverage level. ECNS enables each node to decide whether it is eligible to turn off to conserve energy through local information exchange with its neighbors. Simulation results show that ECNS improves network performance with respect to energy conservation, load balance and network lifetime.

Keywords: Sensor network, coverage, network connectivity, lifetime, node scheduling scheme.

An Algorithm for Target Localization in Sensor Networks Based on

Overlap

Area Boundary of Sensor Detection

Quanlong Li, Luo Yu, Xiaofei Xu, Zhijia Zhao
School of Computer Science and Technology, Harbin Institute of Technology
liquanlong@hit.edu.cn

Abstract

A novel localization algorithm for moving target in sensor networks is proposed, which is based on overlap area boundary of sensor detection. The algorithm inherits the advantage of binary sensing model that sensor nodes only need provide 0 or information to represent whether detect a target or not, and improves the location precision compares to traditional centroid localization algorithm that can only locate a target position between intersection area of sensor nodes. According to the spatio-temporal continuity of the trajectory of a moving target, the algorithm determines a dynamic queue of sensor nodes those have detected the target in order, and shrinks the possible location of a target into a boundary of intersection area of all nodes in the queue. In this way, the algorithm achieves better location precision than traditional centroid localization algorithm. Results of simulation experiments prove the truth of better location precision of this algorithm. Moreover, the algorithm has the features of good expansibility and robustness by avoiding whole net time synchronization instead of local communication between

nodes.

Research on Energy Hole Problem for Wireless Sensor Networks

Based on Alternation between Dormancy and Work

LIU An-Feng WU Xian-You GUI Wei-Hua

(College of Information Science and Engineering, Central South University , 410083 China)

Abstract

This paper theoretically proposes a more accurate analytical method for avoiding energy hole in wireless sensor networks with nonuniform node distribution. Based on the typical energy consumption model of wireless sensor networks, we obtain the relationship of the densities of sensor nodes in different regions of network through rigorous mathematical analysis, and prove that if the densities of sensor nodes working at the same time are $\rangle$, the entire work can achieve uniform energy consumption by making the sensor nodes whose density is greater than $\rangle$ alternate between dormancy and work. Through theoretical analysis and numerical simulation, we obtain the following conclusions: 1). Under the circumstance that the parameters of network do not change, the network lifetime can increase several times by selecting appropriate transmission radius of sensor node. 2).To achieve uniform energy consumption of network, the densities of sensor nodes whose distances from the base station are different should be different. Even if the sensor nodes were in the same circular ring, the densities of sensor nodes in different places should not the same. 3). Through nonuniform node distribution and alternation between dormancy and work, the efficiency of network can increase several times and the residual energy of network is nearly zero when the network lifetime ends. Therefore, our research can give a significant guidance on the optimization of wireless sensor networks.

A RIO Approach for Modeling Wireless Sensor Network

Ye Yao, Vincent Hilaire, Abder Koukam, Wandong Cai

School of Computer Science SeT. laboratory School of Computer Science

Northwestern Polytechnical

University.

University of Technology of

Belfort-Montbéliard

Northwestern Polytechnical

University.

710072, Xi'an - P.R.China 90010, Belfort - France 710072, Xi'an - P.R.China

yaoye@npwu.edu.cn Vincent.hilaire@utbm.fr

Abder.koukam@utbm.fr

caiwd@npwu.edu.cn

Abstract

The goal of this paper is to bring forth a model for WSNs with the support of Holonic Multi-agent systems. In this

paper, we not only introduce the RIO diagram to analyze the roles of sensor nodes during different periods of building up holonic architecture, but also present a self-organization scheme to construct a holonic architecture in WSNs. At last performance analysis is proposed, including quantitative and qualitative analysis. Analysis result indicates that the hybrid architecture has the properties of scalability, distribution, long life-time and robustness.

Semi-supervised Top-k Query in Wireless Sensor Networks

Hailan Shen, Deng Li, Pengfei Xu and Zailiang Chen
School of Information Science and Engineering, Central South University,
Changsha 410083, China
hn_shl@126.com, hailansh@mail.csu.edu.cn

Abstract

This paper focuses on top-k query in wireless sensor networks and proposes a semi-supervised top-k query approach called CAV. Based on a spanning tree model, CAV adopts histogram technique and an aggregate-verify mechanism to guide query and filter the useless sensing data so as to reduce energy consumption. Besides, this paper further proposes two evaluation schemes of histogram. Compared with existing approaches, CAV is semi-supervised and needn't set any parameters in advance. Performance analysis and simulation experiment results show the performance of CAV is much superior to that of TAG and it is superior to smooth data distribution than it is to random data distribution.

Towards End-to-end Delay Bounds on WMNs Based on Statistical

Network

Calculus

Huamei Qi, Zhigang Chen
School of Information Science and
Engineering, Central South University,
Changsha 410083, P.R. China
{qhm, czg}@mail.csu.edu.cn
Lianming Zhang
School of Computer Science and
Engineering, South China University of
Technology, Guangzhou 510641, P.R. China
zlm@hunnu.edu.cn

Abstract

The transmission of data is from the mesh routers to gateway by multi-hop and then to Internet. The gateway where the traffic congregates becomes the bottleneck of the network. End-to-end delay with upper bound is one of guaranteed services, and whether the upper bound can obtain the guarantee is a key to present QoS guarantees, implement routing effectively, congestion control and load balance in WMNs. The fundamentals of network calculus, a set of recent developments which provide a deep insight into

flow problems encountered in computer networks, are summarized and refined. As it can calculus the probability of the performance and the statistical bound, the statistical network calculus are applied to analyze WMNs. A practical framework of a mesh node is adopted using a scheme based on buffer queue sharing. The ideal and approximate statistical bounds on end-to-end delay are obtained by statistical network calculus in WMNs, in which mesh nodes are based on the framework. Numerical results show that the delay bound is decreased with the increase of the weight.

Keywords: Wireless Mesh Networks, statistics network calculus, end-to-end delay, statistics bounds.

A Novel Approach to Mobile Positioning Tracking

Wensheng Tang
School of Computer,
National University of
Defense Technology ,
ChangSha,China
tangws@hunnu.edu.cn
Wangqiu Kuang
Department of Computer
Teaching,
Hunan Normal University,
Changsha, China
hnkuang@126.com
Dingxing Zhang
School of Computer,
National University of
Defense Technology ,
ChangSha,China
13327311970@hn165.com

Abstract

This paper presents a new approach to mobile position tracking in wireless sensor networks(WSN). The noise is modeled as the adversary of estimator that has the goal of maximizing the estimation error, and the estimator gain and adversary gain is derived to yields a saddle point so that the mobile position is estimated. The simulation results show that the new approach results in the more accurate estimation for the mobile position and velocity.

Keywords: Mobile position tracking, Kalman filter, particle filter, game adversary.

An Effective Approach for Continuous Window Query

in Wireless Sensor Networks[1]

Baoyan Song, Yanyan Cong,

Jiayang Zhang, Xiaoguang Li
School of Information, Liaoning University,
Shenyang 110036, china
E-mail: bysong@lnu.edu.cn
Ge Yu
School of Information Science and
Technology, Northeast University,
Shenyang110004, china

Abstract

In this paper, we propose FCWQE, which is effective supporting continuous window query in wireless sensor networks. And it includes FCDC (Four-color with Delay Computation) approach to color the sensors, partition the logic aggregation groups and build the query-path. In order to save the energy and prolong the networks lifetime, this paper brings forward strategy to choose group leader nodes; at the processing of data collection, DAQ (Data Aggregation based-on Query-path) is proposed to deal with the data transmission among groups.

A Distributed Power Proportional Clustering Algorithm to Improve Energy

Efficiency for Wireless Sensor Networks

Tengfei Zhu, Jun Peng, Ying Guo, Xiaoyong Zhang, Fu Jiang, Chunming Li
School of Information Science and Engineering, Central South University, Changsha 410083,
China
pengj@mail.csu.edu.cn

Abstract

Traditional energy-balanced clustering algorithms in wireless sensor networks (WSNs) usually overlooked the different characters of energy consumption among clusters, which greatly influenced the efficiency of energy employing. To solve this problem, in this paper, a distributed power proportional clustering (DPPC) algorithm is proposed, in which the clusters are determined to be an optimal distribution by making the total power consumption of the cluster proportional to the total energy it stored. In the process of cluster formation, a distributed way is adopted. The sensors firstly compare their positions and organize themselves into the optimal clusters, then compete for the cluster heads according to their position and residual energy that are evaluated by the appropriateness function. The clustering topology formed by the DPPC makes the clusters have similar lifetimes with fully energy utilization, thus the energy efficiency can be greatly improved for the WSNs.

Keywords: WSNs, distributed clustering, energy efficiency, power proportion, appropriateness function

A Dynamic Spatial Backoff Algorithm Based on Channel Rate and

Transmit Power in Wireless Networks

Zhuonong Xu

[1,2]

Jianxin Wang

[1]

Yanrong Su

[2]

[1]

School of Information Science and Engineering, Central South University,
Changsha 410083

[2]

Electronics and Information Engineering School, Central South University of
Forestry and
Technology, ChangSha , China ,410004
{E-mail: xzn71@126.com; jxwang@mail.csu.edu.cn; syrdpc@163.com}

Abstract

Physical carrier sensing has been used as an effective way to avoid interference and exploit spatial reuse in wireless networks. In the meanwhile, the degree of the spatial reuse can be enhanced by adjusting transmit power to change carrier sensing range. This paper proposes a new algorithm with the joint control of transmit power and channel rate. In this algorithm, the transmitter first decides to use appropriate channel rate according to communication distance, and then adjusts its rate and transmit power adaptively based on the communication results. Simulation results show that, the proposed rate and power control algorithm yields higher throuhout and decreases energy consumption effectively.

Keywords: Wireless networks, carrier sense, spatial reuse, channel rate, transmit power.

A Deployment Algorithm to Achieve both Connectivity and

Coverage in Grid

Sensor Networks

Diwen Wu
Dongqing Xie
Lupeng Wang

School of Computer and Communication, HuNan University, ChangSha, 410082
{E-mail: wdw@mail.csu.edu.cn dongqing_xie@hotmail.com }

Abstract

In this paper, we propose an algorithm to achieve both connectivity and coverage for multiple target points in grid sensor networks. First we deal with the local targets block, then we use the least sensors to make all the sensors connected. This algorithm has the O(n) running time complexity and

its result is proved closed to the optimal result.

Multipath-Based Segment-by-Segment Routing Protocol in MANETs

Yuan Lu [1], Guojun Wang [1,*], Weijia Jia [2], Sancheng Peng [1,2]
[1] School of Information Science and Engineering,
Central South University, Changsha 410083, China
[2] Department of Computer Science,
City University of Hong Kong, Kowloon, Hong Kong
*Corresponding author: csgjwang@mail.csu.edu.cn
http://trust.csu.edu.cn/faculty/~csgjwang

Abstract

We propose a Multipath-based Segment-by-Segment Routing protocol in mobile ad-hoc networks (M-SSR). In M-SSR, a path is divided into multiple segments, in each of which multiple node-disjoint paths are discovered and routing maintenance can be performed independently. The proposed protocol can decrease congestion, optimize bandwidth and improve the sharing rate of channel by using multiple paths to transmit data packets in parallel. It uses segment-bysegment scheme to decrease routing control overhead and improve the network scalability. Simulation studies show that the proposed protocol can balance the load of the network and can be adaptive to the change of the network topology effectively, and also improve the survivability, stability and success ratio for routing.

Keywords: Mobile ad-hoc networks, multipath routing, segment-by-segment routing, scalability, grid.

A Location-Based Execution Path Selection for Composite Service in MANETs

Weiyu Chen, Jingjing Wu, Weiwei Sun, Zhenying He*
Dept. of Computing & Information Technology Fudan University, Shanghai, China
*Corresponding Author: Zhenying He
{chwy, wjj, wwsun, zhenying }@fudan.edu.cn

Abstract

There has been great interest in service composition to exploit resources of distributed nodes in mobile ad hoc networks. During composite service execution, the execution path for composite service is very important because of its significant influence on network overhead and the percentage of failure. In this paper, we study the execution path selection problem, which focuses on selecting a short path. The short path means small amount hops the request travels during execution. Based on nodes' locations, request source estimates the hop count between two nodes and then selects a short path for execution. The simulation results show the path selected by our approach almost has the same performance as the theoretical shortest path both on the path length and the percentage of failure, especially in mobile environments. Moreover, our approach performs better than the existing service selection approach both in the percentage of failure and average path length, especially in the network with high mobility and sparse service distribution.

Keywords: Mobile ad hoc network, path execution selection, composite service.

A Lifetime Aware Approach to Service Selection in Mobile Ad Hoc Networks

Zhuoyao Zhang ,Weiwei Sun†, Weiyu Chen, Jiaqi Dong
School of Computer Science, Fudan University, Shanghai, China
†Corresponding Author: Weiwei Sun
{ zhangzhuoyao,wwsun, chwy, dong_jiaqi}@fudan.edu.cn

Abstract

Service oriented architecture is expected to be implemented as an effective way for mobile ad hoc communications and collaboration in ubiquitous computing environments. Much effort has been devoted on the service discovery protocols, while fewer w orks focus on the problem of service selection. The approaches proposed in previous works of service selection are mostly hop based approaches which aim at reducing the average response time. However the network lifetime which measures the durability of the network is also of great importance and should be paid more attention. In this paper, we first present a definition of the network lifetime from the aspect of the service oriented architecture. Then, a heuristic approach to service selection which focuses on optimizing the network lifetime is proposed. Experiments results prove the approach can significantly prolong the network lifetime while at the same time achieve comparably short average response time.

Keywords: Service selection, lifetime aware, MANETs.

A Novel Link-Segment Storage and Query Scheme for Object Tracking

Applications in Wireless Sensor Networks

Jin Zheng[1], Weijia Jia[1,2], Guojun Wang[1,*]
[1] School of Information Science and Engineering,
Central South University, Changsha 410083, China;
[2] Department of Computer Science,
City University of Hong Kong, Kowloon, Hong Kong
*Corresponding author: csgjwang@mail.csu.edu.cn
http://trust.csu.edu.cn/faculty/~csgjwang

Abstract

We investigate the data storage and query problem for object tracking applications in wireless sensor networks. We focus on how to query the object tracking and obtain the object position effectively. The main idea is to apply multiple access entries of a storage link which stores the detected events in local storage and maintain the relation of the sensed data. When an object moves across the sensing field, the detecting sensors can construct a virtual linked list with multiple access entries along the moving path of the object. The stored events can be extracted by tracing the linked list from any access entry to get the complete or partial tracking information. Performance analysis and simulation studies show that the proposed link-segment storage and query scheme is energy efficient and it keeps high query success ratio

and low query latency.

A Low Overhead Truthful Energy-Efficient Routing Protocol in Wireless Mobile Ad hoc Networks with Selfish Nodes

Xinhui Yuan, Songqiao Chen, Xinhua Jiang
School of Information Science and Engineering
Central South University, Changsha 410083, China
xhyuan@mail.csu.edu.cn

Abstract

When nodes in a wireless mobile ad hoc network belong to different users, they may act selfishly. A feasible way to stimulate cooperation among self ish nodes is to reimburse the forwarding service providers for their costs. We propose a low overhead truthful energy-efficient routing protocol called LOTER, which introduces the VCG mechanism into such a network that consists of selfish nodes. In LOTER, nodes collect their neighbors' information. The destination selects several RREP paths. If it is on the RREP path, the node sends its collected information to the source. Based on such information, the source constructs a subgraph, finds the least cost path to the destination and calculates the VCG payments to the nodes on the chosen least cost path. LOTER can provide truthful and energy-efficient routing. Furthermore, it collects the topologic information with low overhead. Simulation results show that LOTER provides better performance than other existing protocols.

A Multipath on-Demand Routing with Path Selection Entropy for Ad Hoc Networks

Baolin Sun[1], Chao Gui[1], Qifei Zhang[1,2], Bing Yan[1], Wei Liu[2]
1. School of Computing, Hubei University of Economics, Wuhan 430205, P. R. China
E-mail: blsun@163.com
2. Department of Electronics and Information Engineering,
Huazhong University of Science and Technology
Wuhan 430074, P. R. China

Abstract

An ad hoc network is a collection of wireless mobile nodes dynamically forming a temporary network without the use of any existing network infrastructure or centralized administration. The multipath routing in mobile ad hoc networks is difficult because the network topology may change constantly, and the available alternative path is inherently unreliable. A number of routing protocols like ad hoc on demand distance vector routing (AODV), on-demand multipath distance vector protocol (AOMDV), AODVM (AODV Multipath) have been implemented. In this paper an attempt has been made to compare the performance of three prominent on demand routing protocols for mobile ad hoc networks. An on demand node disjointed multipath routing protocol with low broadcast redundancy is proposed. Multipath routing allows the establishment of multiple paths between a single source and single

destination node. The solution is based on lower layer specifics. Simulation results show that, with the proposed multipath routing protocol, packet delivery ratio, end-to-end delay, and routing overhead ratio can be improved in most of cases. It is an available approach to multipath routing decision.

Keywords: Ad hoc network; multipath routing; on demand routing, entropy

Performance Investigation of Backoff Algorithms in Multihop Wireless Networks

Jian Li, Xianwen Zeng, Qinggang Su
School of Electronics Information, Shanghai Dianji University, ShangHai, 200240
Email:{ lijian, zengxw, suqg}@sdju.edu.cn

Abstract

In a multihop wireless network, the throughput performance decreases seriously because of inter-flow and intra-flow collision. The backoff algorithm is the de facto function to resolve collision in 802.11 networks. In this paper we study the impact of five back-off algorithms on the performance of 802.11-based multihop wireless networks with different network topology and flow patterns. Simulations show that the backoff algorithms have big influence on the performance of both UDP and TCP flows. But none of the current backoff algorithms can improve the throughput and fairness performance in multihop wireless networks efficiently. It shows that the raditional random backoff algorithms are no longer suitable for collision resolution in distributed multihop wireless networks.

Keywords: Multihop wireless network, backoff algorithm, 802.11, performance comparism, collision resolution.

The Density Connectivity Information Bottleneck

Yongli Ren, Yangdong Ye
School of Information Engineering,
Zhengzhou University,
Zhengzhou, China
yonglitom@gmail.com, yeyd@zzu.edu.cn
Gang Li
School of Information Technology,
Deakin University, 221 Burwood
Highway, Vic 3125, Australia
gang.li@deakin.edu.au

Abstract

Clustering with the agglomerative Information Bottleneck (aIB) algorithm suffers from the sub-optimality problem, which cannot guarantee to preserve as much relative information as possible To handle this problem, we introduce a density connectivity chain, by which we consider not only th information between two data elements, but also the information among the neighbors of a data element. Based on this idea, we propose DCIB, a Density Connectivity Information Bottlenec algorithm that applies the Information Bottleneck method to quantify the relative information during

the clustering procedure. As a hierarchical algorithm, the DCIB algorithm produces a pruned clustering tree-structure and gets clustering results in different sizes in a single execution. The experiment results in the documentation clustering indicate that the DCIB algorithm can preserve more relativ information and achieve higher precision than the aIB algorithm. Keywords: The aIB algorithm, density connectivity, clustering tree-structure.

A Segment Extraction-combination Algorithm Based on Polygonal Approximation and Finite State Machines for On-Line Chinese Character Recognition

Jing Chen
China National Metals & Minerals Imp.
& Exp.Corp.Information Department.
MINMETALS PALAZA 5 Sanlihe
Road,Haidian District Beijing, 100044, China
chenjing@minmetals.com
Xinqiao Lu *, Qiaoling Luo, Ping Li, Xiaojuan Liu
School of Computer Science and Technology
HuaZhong University of Scienc & Technology
Wuhan,430074,China
xqlv@hust.edu.cn

Abstract

In this paper, a segment extraction algorithm based on polygonal approximation for On-Line Chinese Characters Recognition (OLCCR) is presented. With this method, the point with the smallest interior angle is detected and the whole stroke is split into two adjacent curves by this point，which is called as a cut-off point or an inflexion. To each of the two curves, the same step is performed to detect the cut-off points respectively. The same operations are performed iteratively until the smallest interior angle in all the curves is larger than an appointed threshold value. All the cut-off points and the start-end points compose the stroke and every pair of adjacent points constructs a segment. After segments have been extracted, Finite State Machines is used to check whether the adjacent segments need combination thus redundant segments can be reduced. Experiments proved that this method has the advantages of less computing complexity and better approximating effect than other methods. An OLCCR system with this segment extraction and combination algorithm has achieved the speed of 20/s and the recognition rate of 97.2%. Keywords：Segment extraction, cut-off point, on-line chinese character recognition (OLCCR), interior angle, polygonal approximation, stroke

Multi-text Fusion Computation Based on Flexible Interval Control

Lingyu Xu Na Zhang Wentao Huang Shijie Sun
School of Computer Engineering & Science, Shanghai University,
Shanghai, 200072, China
xly@shu.edu.cn zhangna@shu.edu.cn

Abstract

A method of Multi-Text fusion computation is discussed in this paper which extracts the common features automatically by using text fusion. When search the information in a special domain, the keywords are picked out by using relative sample muster fusion, keywords' flexible control is realized by regulating the sample muster, in final searchspace's Conditioning control and result tropism are achieved. This method, to a certain extent, avoids the either-choice windage, makes the probability of search-completely d the result amount reach a best harmony, finally realizes the optimal cost performance. Keywords: Text filtration，sample fusion， similarity computation， interval regulation，result feedback

A Novel Simplex Hybrid Genetic Algorithm

Hongfeng Xiao
School of Information Science and
Engineering, Central South University,
Changsha 410083, China.
E-mail: xhf71@hunnu.edu.cn
Guanzheng Tan
School of Information Science and
Engineering, Central South University,
Changsha 410083, China.

Abstract

In simplex hybrid genetic algorithm, widely using Nelder-Mead simplex method (NMSM) would lead to precocity of genetic algorithm and increase in computation quantity, so a novel simplex hybrid genetic algorithm is proposed in this paper. First, we propose a new efficient simplex crossover operator Second, using the successful experiences of dividing the vertexes in NMSM into the best vertex, the worst vertex and worse vertex, the population in genetic algorithm also is divided into three niches: the best niches, the worst niche and worse niches, into which NMSM, simplex multiple-direction search and the efficient simplex crossover operator are embedded respectively. By these means, the main idea of "classifying niche and then treating them by their categories" is implemented and then the novel simplex hybrid genetic algorithm (Simplex-NHGA) is built up. At last, five standard test functions are used to verify the correctness and efficiency of simplex-NHGA. KeyWords: Nelder-Mead simplex method, simplex crossover operator, category process, niche, hybrid genetic algorithm.

Particle Clonal Genetic Algorithm Using Sequence Coding for Solving Distribution Network Reconfiguration

Yemei Qin[1,2], Ji Wang[1],Weihua Gui[1],Guojun Wang[1]
1. School of Information Science and Engineering, Central South
University,410083,China
2. Swan College of Central South University of Forestry and Technology,410004, China
E-mail: qinyemei@yeah.net, wangji@mail.csu.edu.cn

Abstract

To handle massive binary-coding infeasible solutions in distribution network reconfiguration, a sequence coding is presented. A loop is a gene and the switch sequence in the loop is the gene value. To resolve mutation probability and slow later-period convergence in clonal genetic algorithm(CGA), particle clonal genetic algorithm(PCGA) is proposed. It builds particle swarm algorithm(PSO) mutation operator, and

makes up premature convergence of PSO and blindness of CGA. It ensures evolution direction and range based on historical records and swarm records. Global optimal solution is found with fewer generations and shorter searching time. IEEE69 example shows that the method can save calculation time and promote search efficiency obviously. Keywords: sequence coding, distribution network reconfiguration, infeasible solution, PCGA

An Improved Genetic Algorithm Based on Variable Step-Size Search

Guannan Zhu[1,2], Ning Xu
[1]Wuhan University of Technology
Guannan.zhu@gmail.com
xuning@whut.edu.cn
Zhulin An, Yongjun Xu
[2]Institute of Computing Technology
Chinese Academy of Sciences
{anzhulin, xyj}@ict.ac.cn

Abstract

Genetic algorithms (GAs) are global optimization algorithms which can be used to solve different kinds of problems. However, in the situation that the size of feasible solution space is far less than that of search space, GAs may degrade to random searches. This paper presents an improved genetic algorithm, which adopts variable step-size algorithm to obtain a feasible solution, and reduce search space during the same process. The theoretical analysis and experiments in comparison with the random search are also presented, which indicate that this improved algorithm would reduce the search time in solving problems that have a large search space. Keywords: Genetic algorithms, variable step-size, search space reduction.

Hybrid Algorithm Combining Ant Colony Algorithm with Genetic Algorithm

for Continuous Domain

Bo Liu, Peisheng Meng
Department of Mechanics, Huazhong University of Science and Technology, Wuhan, Hubei,
China, 430074
lbjack9fdxixi@163.com

Abstract

Ant Colony Algorithm is a kind of new heuristic biological modeling method which has the ability of parallel processing and global searching. By use of the properties of Ant Colony Algorithm and Genetic Algorithm, the hybrid algorithm which adopts Genetic Algorithm to distribute the original pheromone is proposed to solve the continuous optimization problem. Several solutions are obtained using the Ant Colony Algorithm through pheromone accumulation and renewal. Finally, by using crossover and mutation operation of Genetic Algorithm, some effective solutions are obtained. The results of experiments show better performances of the new algorithm based on six continuous test functions compared with the methods available in literature.

A Parameter-Free Clustering Algorithm Based on Density Model

Jun Mu, Hongxiao Fei, Xin Dong
School of Information Science and Engineering,
Central South University, Changsha 410083, China
hxfei@csu.edu.cn

Abstract

As a fundamental problem in data mining, pattern recognition and machine learning, clustering algorithm has been studied for decades, and has been improved in many aspects. However, parameter-free clustering algorithms are still quite weak, which makes their potential generalization to a lot of promising applications rather difficult. A parameter-free clustering algorithm based on density model is proposed in this paper. This algorithm explores in a dynamically constructed nearest neighbor graph to detect which points are of the same density model, and then agglomerates them into the same cluster. It requires neither previously nor interactively setting of pivotal parameters via range scaling and proportional criterion technique. Its overall computational complexity is $\notin(\mathrm{nlogn})$. And the experimental results demonstrate that the proposed algorithm can correctly recognize the arbitrary shaped clusters. Keywords: Clustering algorithm, parameter-free, density model, dynamically constructed NN graph.

A Extended Grid-based Clustering Algorithm with Referential Value of Parameters

Yantao Zhou[1,2] ,Zhengguo Wu[2],Xingdong Yi[1]
([1]College of Electrical and Information Engineering, Hunan University, Changsha 410082,

China；[2]Information and Electrical Engineering College, Naval Engineering

University, Wuhan
430033, China)

E-mail：yantao_z@hnu.cn

Abstract

GRPC algorithm (a grid-based clustering algorithm with referential parameters) had put forward by authors of this paper,and the algorithm provided user with a feasible technology for reducing the blindness of parameter assignment. The work of this paper is to develop GRPC algorithm in the aspects of scalability and high-dimensionality. We process large-scale data set by means of random sampling technique a transform the clustering of high-dimensional data into the clustering of two-dimensional data. Experimental results confirmed that this algorithm(EGRPC) could effectively cluster vast data set whose data is threedimensional or other high-dimensional.

A Clustering Algorithm for Mixed data Based on Lattice Theory

Zhi-fang LIAO[(1)], Xiaoping FAN[(2)], Yun ZHOU[(2)], Kezhun LIU[(2)]
(1) School of Software, Central South University, Changsha 410083, China

(2) School of Information Science and Engineering, Central South University,
Changsha 410083,
China

Abstract

Hybrid data clustering analysis is an important issue in data mining. Compared with the clustering Algorithm for pure numerical data, the methods can process the data together with numerical and categorical value are quite few although the hybrid data exist in a lot of fields. After analyzing the traditional clustering algorithms, the paper presents a new algorithm to cluster the hybrid data based on lattice. The method changes the object's attributes to lattice based on the conception of simple tuples and hyper tuples in lattice, use the numbers of covers to measure the similarity between labels, and choose the clustering mean-point according to the rule of high covers to high similarity. Experiments show that the new algorithm is more efficiently than the other classical ones.

Parallel Job Scheduling with Time-varying Constraints for

Heterogeneous

Multiple-Cluster Systems

Weizhe Zhang[a, c], Hongli Zhang[a], Xinran Liu[b], Xuemai Gu[c]
[a] School of Computer Science and Technology, Harbin Institute of Technology,
Harbin,150001,
China
{zwz , zhl}@pact518.hit.edu.cn
[b] National Computer Network Emergency Response Technical Team/Coordination
Center of
China, Beijing 100029, China
lxr@mail.nisac.gov.cn
[c] Communication Research Center, Harbin Institute of Technology, Harbin 150001,
China
xmgu@hitcrc.hit.edu.cn

Abstract

Parallel job scheduling in multiple cluster system is a critical aspect to facilitate the processor cooperation. However, co-allocation, heterogeneity and time-varying emerge as tough challenges for the design of multiple cluster job scheduling models and algorithms. This paper presents a new multiple cluster job scheduling scheme based on the time-varying job performance model for a dynamic, heterogeneous multiple cluster environment. Four multiple cluster scheduling algorithms based on different heuristic resource selection strategies are introduced. Experiments indicate that the scheduler and the algorithms are effective and perform better than t single cluster and other multiple cluster scheduling algorithms.

Concept Semilattice: Construction and Complexity

Chengming Qi
Beijing Union University
100101, Beijing, China

qicm@163.com
Yingjie Tian
Chinese Academy of Sciences Research Center
on Fictitious Economy & Data Science
100081, Beijing, China
tianyingjie1213@163.com
Shoumei Cui
Capital Normal University
100037, Beijing, China
cuishm@163.com
Yunchuan Sun *
School of Economics and Business Administration
Beijing Normal University
100875, Beijing, China
yunch@bnu.edu.cn

Abstract

Concept lattice is widely used in data analysis. This paper aims to reduce redundant nodes from concept lattice by replacing lattice with join-semilattice. We develop an algorithm based on gradual insertion of concepts into partially hasse diagram. An example is proposed to illustrate the constructing procedure of concept semilattice. Experimental results show effectiveness and efficiency of the proposed algorithm.

A Dynamic Weighted Ensemble to Cope With Concept Drifting

Classification

Dengyuan Wu Kai Wang Tao He Jicheng Ren
Institute of Computing Technology Zhongke Fulong Computer Technology Co.
Chinese Academy of Sciences Beijing, China
{wudengyuan,wangkai}@ gucas.ac.cn {hetao,renjicheng}@ fulong.com.cn

Abstract

In the real world concepts are not stable and change with time and a lot of other hidden factors. Stream classifiers should be sensitive to the drifting of concept in an automatic way. In this paper, we proposed a new weighted majority strategy for the ensemble classifier. We periodically created and evaluated component classifiers that constitute the ensemble then we used the weighted ensemble to make global prediction. We empirically evaluated two kinds of concept drifting: the SEA concept drifting and the moving hyper-plane problem. Experiment results showed that our proposed method was very effective deal with concept drifting.

Concept Granular System and Granular Concept Lattice

Hong Li
Research Lab of Artificial Intelligence And Data Mining,Department of Computer Science and
Technology, Suzhou University, Suzhou234000, Anhui, P. R. China
Email:lih65@163.com

Abstract

This paper, based on the author's new model of granular computing—— the theory of granular set, puts forward the concept of granular family, granular system, concept granular system, granular concept, through upgrading the mapping to the Power Set and mapping from one-way to two-way. And, they are described respectively, the concept of which is the description of concept granular system in the form offive-tuple array, that is, (U, D, L, H, J), where U is the universe of the problem discussed, D describes all the elements in U, L is the operator from 2_U to 2_D, H is the operator from 2_D to 2_U, and J restricts the L and H, its restrict form goes as follows: From this model, some basic mathematical laws of the concept granular system are given, it proves that all of the granular concepts constitute a complete lattice 一 concept granular lattice, thus extending the granular set theory and improving the granular set theory.

FSMBO: Fast Time Series Similarity Matching Based on Bit Operation

Kaifu Lu Shukuan Lin Jianzhong Qiao Ge Yu Hualei Liu
College of Information Science and Engineering, Northeastern
University, Shenyang 110004, Liaoning, China
lukaifu2002@yahoo.cn, linshukuan@ise.neu.edu.cn

Abstract

In many domains, such as meteorology, space physics, geography, multimedia, and economics, there are a lot of time series data. People often use similarity matching to deal with time series data in practical application. DTW (Dynamic Time Warping) can provide the stretch ability along the time axis. Therefore, it becomes one of several popular similarity matching algorithms. But DTW incurs a heavy computation cost. Although several improved methods of DTW have been proposed in some literatures, it still can not meet the actual needs. This paper proposes FSMBO (Fast time series Similarity Matching based on Bit Operation). FSMBO algorithm efficientlyprunes a significant number of the matching candidates, which leads to a direct reduction in the matching cost. Experiments reveal that FSMBO is significantly faster than the popular methods. Keywords: Similarity matching, time series, dynamic

Algorithm for Fast Spatial Outlier Detection

Anrong Xue, Lin Yao, Shiguang Ju, Weihe Chen, Handa Ma
School of Computer Science and Telecommunication Engineering, Jiangsu University,
Zhenjiang,
China 212013
xuear@ujs.edu.cn

Abstract

Because spatial data are usually high-dimensional, complex and mass, we categorize the attributes of eac spatial data object as spatial attributes and non-spatial attributes. We use spatial attributes to construct spatial index and determine spatial neighborhood, and use nonspatial attributes to compute outlying degree and spatial outlying degree factor, so as to solve the problem of index and the measurement of outlying degree. In addition, we propose two heuristic pruning strategies to realize fast pruning away those can not be candidate outliers in the data set. According to spatial self-correlation, the impact extent of neighborhood is added to compute attribute weighted values. At the same time, the weighted values are added to calculate pair-wise distance of each spatial object. In this paper, we

propose a novel measure, spatial outlying degree factor (SODF), which captures the local behavior of datum in its spatial neighborhood. The experimental results show that the proposed SODF algorithm outperforms the other existing algorithms in detection accuracy, scalability, user dependency and efficiency.

An Earthquake Sequential Pattern Mining Algorithm Based On General Constraint

Shaochun Wu Minfu Fang Yinyin Li Bofeng Zhang
School of Computer Engineering and Science, Shanghai University
Shanghai, 200072, P.R. China
scwu@shu.edu.cn, fangminfu@shu.edu.cn

Abstract

In recent years, time series data mining has already been an important branch of data mining. In

this paper, an improved sequential pattern mining algorithm PBGC(Sequential Pattern mining algorithm Based on General Constraint) is presented, in which seismic knowledge is used as general constraint to restrict the sequential patterns, and eventually enhances the suitability and the value of the result. Its application is to discover general earthquake sequence from earthquake catalogue data and to study the similarity of earthquake sequence.

Multi-Stage Partner Selection Based on Genetic-Ant Colony Algorithm

in Agile Supply Chain Network

Zheng Lin
Central University of Finance and Economics
linzheng@cufe.edu.cn
Lubin Wang
Central University of Finance and Economics
wanglubin@cufe.edu.cn

Abstract

It is shown that partner selection in agile supply chain network can be represented as a directed graph model. This paper considers multi-stages in this process instead of one. The natures of the propose model enable us to design a meta-heuristic algorithm - - GACA which combined the pros part of ACOA and GA for solving the good path search problem. Computational results show the efficiency of our algorithm in compare to the other techniques.

Fractal Image Compression by Ant Colony Algorithm

Jinjiang Li[1,2], Da Yuan[2], Qingsong Xie[2], Caiming Zhang[1]
1. School of Computer Science and Technology, Shandong University, Jinan, 250061
2. School of Computer Science and Technology, Shandong Institute of Economic & Techonlogy,
Yantai, 264005
lijinjiang@gmail.com

Abstract

A fast fractal encoding algorithm based on ant colony algorithm is proposed to reduce coding time. The algorithm produces a completely identical fractal encoding to that of the conventional full search

in reduced time. Using ant-based clustering algorithm and kernel method, we propose in this paper a kernel function clustering based on ant colony algorithm. It automatically realizes classification of the domain block. Our method eliminates much search on domain blocks but keep the same image quantity. The experimental results show that the algorithm can realize fractal image coding very well and also it has better PSNR, and it gets more compress ratio than traditional block-based partition.

Dynamic Keys Based Sensitive Information System

Xianping Wu, Phu Dung Le and Balasubramaniam Srinivasan
School of Information Technology
Monash University
Melbourne, Victoria, AUSTRALIA
wping@beast.csse.monash.edu.au, phu.dung.le@infotech.monash.edu.au,
bala.srinivasan@infotech.monash.edu.au

Abstract

Protecting sensitive information systems from security threats such as unauthorised access, information eavesdropping and information interfering, is significant. Most of the natural approaches employ strong authentication or cryptography systems to protect critical data. But those approaches do not stress on the potential amount of risks associated with sensitive information, especially the vulnerability from compromising of longterm cryptographic keys and the lack of fine gained access control. Therefore, in this paper, a dynamic key theory based secure sensitive information system is proposed, which integrates dynamic keys with raw data to protect sensitive information; and the system also uses the keys to secure communication and enhance access control. A formal analysis is provided to verify the security of the proposed work. It shows that the proposed system guarantees critical information data security and access control flexibility. In addition, by using two sets of dynamic keys, fraud detection and prevention is achievedin the proposed system.

A Time-Related Trust Model Based on Subjective Logic Theory

Yueming Deng [1, 2], Guojun Wang [1,*]
[1] School of Information Science and Engineering,
Central South University, Changsha 410083, China;
[2] School of Physics and Information Science,
Hunan Normal University, Changsha 410081, China;
*Corresponding author: csgjwang@mail.csu.edu.cn
http://trust.csu.edu.cn/faculty/~csgjwang

Abstract

Traditional subjective logic provides a specific belief calculus that uses opinion to express beliefs, but it does not support the time property. In the heterogeneous, dynamic, and open networks such as the Internet, we propose a time-related trust model based on subjective logic theory. The proposed model consists of two additional factors compared with the traditional one: a time-related attenuation factor tha is defined to improve evidence mapping function, and a time-related weight factor that is defined to calculate trust using both direct trust and indirect trust. Simulation studies show that the proposed model has greater improvement on restraining malicious entities from increasing their trust by spurious behaviors than traditional subjective logic trust model.

Propagation Model of Active Worms in P2P Networks

Chaosheng Feng, Zhiguang Qin
School of Computer Science & Engineering
University of Electronic Science and
Technology of China
Chengdu, China
jamesjiangfeng@163.com
Laurence Cuthbet, Laurissa Tokarchuk
Department of the Electronic Engineering
Queen Mary, University of London
London, UK

Abstract

P2P worms pose heavy threatens to P2P networks. P2P worms exploit common vulnerabilities in member hosts of a P2P network and spread topologically in the P2P network, a potentially more effective strategy than random scanning for locating victims. Considering that the topology of P2P networks has important effect on P2P active worm spreading, it is very difficult to model propagation of P2P active worms. For this reason, so far few propagation models are proposed. In this paper, we propose a propagation model of active worms in P2P networks based the discrete-time method. The analysis on simulation results shows that there exists some threshold value during spreading of active worms and different infection strategies result in different infection results in P2P networks.

Timed CSP for Safety Specification of Hybrid System

Jinzhao Wu
School of Computer and Information Technology
Beijing Jiaotong University, China
himrwujz@yahoo.com.cn
Shihan Yang
Chengdu Institute of Computer Application
Chinese Academy of Sciences, China
dr.yangsh@gmail.com

Abstract

We propose a process algebra TCSP$_{hs}$ obtained by extending process algebra Timed CSP (Timed Communicating Sequential Processes[10, 11]) with a new propositional signal operator _, inspired by [2]. The proposed process algebra makes it possible to deal well with behaviors and security features of hybrid system. Motivation is twofold. On the one hand we offer structural operational semantics of the proposed process algebra language. On the other hand we concentrate on investigating safety specification aspects of hybrid system within that language.

Behavior-Aware Role Based Trust Management

Lan Li, Shaojun Zhang, Lei Fan
School of Information Security Engineering, Shanghai Jiao Tong University,
Shanghai, China, 200240
E-mail:{lanli, zshaojun, fanlei}@sjtu.edu.cn

Abstract

In role based trust management, a trust domain will decide the trustworthiness of a user by assigning

roles to the user according to submitted certificates. However, the users' trustworthiness should be different after they enforced different behaviors although being assigned the same role. A behavior-aware role based trust management model is presented in this paper. Role is extended to include variables that represent cumulative behaviors. Behavior-aware credentials are introduced to describe the trust movement policy driven by enforced behaviors. Role Reputation and domain reputation are also defined using Behavior Variables (BV) that represent the current trust status. The reputation-aware credentials describe the trust movement policy driven by the change of reputation. Some optimization mechanisms of implementing the model are discussed finally.

Trustworthiness and Quality of Context Information

Ricardo Neisse∗, Maarten Wegdam∗,_, and Marten van Sinderen∗
∗CTIT, University of Twente, Enschede, The Netherlands
Email: {r.neisse, m.wegdam, m.j.vansinderen}@utwente.nl
_Telematica Instituut, P.O.Box 589, 7500 AN, Enschede, The Netherlands
Email: maarten.wegdam@telin.nl

Abstract

Context-aware service platforms use context information to customize their services to the currenusers' situation. Due to technical limitations in sensors and context reasoning algorithms, context information does not always represent accurately the reality, and Quality of Context (QoC) models have been proposed to quantify this inaccuracy. The problems we have identified with existing QoC models is that they do not follow a standard terminology and none of them clearly differentiate quality attribute related to instances of context information (e.g. accuracy and precision) from trustworthiness, which is a quality attribute related to the context information provider. In this paper we propose a QoC model and management architecture that supports the management of QoC trustworthiness and also contributes to the terminology alignment of existing QoC models. In our QoC model, trustworthiness is a measurement of the reliability of a context information provider to provide context information abou a specific entity accordin to a certain quality level. This trustworthiness value is used in our QoC management architecture to support contextaware service providers in the selection of trustworth context providers. As a proof of concept to demonstrate the feasibility of our work we show prototype implementation of our QoC model and management architecture.

A Search Method for the Network of Interpersonal Trust

Zhenhai Yang
School of Computer Science
and Technology, Beihang
University, Beijing, China
E-mail: yzh0709@gmail.com
Sheng Ge
School of Computer Science
and Technology, Beihang
University, Beijing, China
E-mail: gs@buaa.edu.cn
Gang Li
School of Computer Science

and Technology, Beihang
University, Beijing, China
E-mail: lg.muzi@gmail.com

Abstract

It is diff icult to effectively search for online cooperation because of the complex structure and information asymmetry of the interpersonal trust network. A search method designed in this paper is aiming at finding appropriate persons and their trust related information through the trust ties. Considering the features of the interpersonal trust network, this method extended a search algorithm of the complex network. And the method designed the transition trust formulas to provide the values of trust and trust incidents of the results in order to establish the quick trust between the search sponsor and results. This method adopted a private data protection to ensure the privacy of the search information. The search method could find out credit people and relevant trust information through th trust ties in the network of interpersonal trust, to promote the trust ties growth and the online corporation.

An affair-based interpersonal Trust Metric Calculation Method

Gang Li
School of Computer Science
and Technology, Beihang
University, Beijing, China
E-mail: lg.muzi@gmail.com

Sheng Ge
School of Computer Science
and Technology, Beihang
University, Beijing, China
E-mail: gs@buaa.edu.cn

Zhenhai Yang
School of Computer Science
and Technology, Beihang
University, Beijing, China
E-mail: yzh0709@gmail.com

Abstract

For trust is subjective, ambiguous, and has other characteristics, this paper proposed an Affair-based Interpersonal Trust Metric Calculation Method t quantify the value of trust. The method defined two trees one is "Trust Performance Tree" in which the mai factors affecting trust are abstractively subdivided int different levels of trust performance, and the other I "Affair Behavior Tree" in which the affairs of dail lives are subdivided into different types and each affair has one or more behavior details. Supported by a Affair- based Trust Logical Data Model, this metho can establish mapping of the two trees' nodes an obtain appraisement data. Based on the large amount of appraisement data, this method acquired the trus value by iterative calculation. An Affair-Based Trus Metric Calculation Model was built according to th method above.

DBTG: Demand-driven Backtracking Test Generation

Shaoyin Cheng[1] , Fan Jiang[1] , Jiajie Wang[1] , Tao Zhang [2] , Xuezhi Xing[1]

1 University of Science and Technology of China,
{sycheng, fjiang}@ustc.edu.cn, {jjwang4, xxzh}@mail.ustc.edu.cn
2 China Information Technology Security Certification Center, zhangt@itsec.gov.cn

Abstract

Test generation techniques are still weak, especially to large or complex programs. This paper presents a new test generation method, which can automatically generate inputs triggering bugs with greatly mitigating the path explosion problem. The method performs intraprocedural analysis to find potential bugs using a combined symbolic and concrete execution with simplifying callee functions; then backtracks from the bug statement to program entry to find interprocedural paths with pruning infeasible paths in due course; finally expands callee functions of these paths to prune infeasible paths again. Demand-driven means that as few paths as possible are explored in order to find feasible paths triggering bugs. We have implemented a tool based on Phoenix framework and Z3 solver. To the best of our knowledge, it is the first security analysis tool working on intermediate representation between source and binary using a combined symbolic and concrete execution. Preliminary experiments on real code of nbsmtp SMTP client are promising.

Trusted Transmission Protocol for Content Security

Li Li Guosun Zeng Bo Chen

Dept. of Computer Science and Technology, Tongji University, Shanghai 201804, China
Tongji Branch, National Engineering and Technology Center of High Performance Computer,
Shanghai 201804, China
snopy-xj@163.com gszeng@mail.tongji.edu.cn cb31@sina.com

Abstract

Classic message exchange based on asymmetric cryptography can protect message content from tampering and authenticate terminal by signing with the private key. Keys are communication endpoint s' improperly managed keys can result in loss of securi during content transmission. Additionally, improperly configured endpoints may also threaten contents ecurity of storage. Certainly the security can be enhanced by providing both security key management and terminal's security authentication mechanisms. Those mechanisms can be obtained from trusted PC architecture specified by Trusted Computing Group. So based on the new development of those mechanisms, such as property-based sealing, we adopted some cryptography schemes and initiated a security provably trusted transmission protocol, which not only enhances the content security during transmission, but also ensures content security of storage.

Constructing Trust Networks Based on Small-World Theories

Jun Zheng1, Yan Qin2, Jianyong Zhu3, Xinyou Li4
1Beijing Institute of Technology, Beijing, China
2,3National Computer System Engineering Research Institute of China, Beijing, China
4 State Information Center, Beijing, China
1 zhengjun_bit@sina.com, {2qinyan, 3zhujy}@ncse.com.cn, 4lixinyou@mx.cei.gov.cn

Abstract

Trust relationships between agents provide a strong foundation for realizing security in ubiquitous

computing environments. This approach is inspired by real-life networks. Furthermore, many studies show that real-life networks have the "small-world phenomenon". Small-world networks are networks with high clustering and short average path length. These two properties often mean that we can easily find a short path between any two agents in such networks, which is an expected property of trust networks. In this paper, based on the existing smallworld theories, we research how to construct smallworld trust network. Analyses demonstrate that the approach in this paper is efficient an effective.

FCTrust: A Robust and Efficient Feedback Credibility-Based

Distributed P2P Trust Model[1]

Jianli Hu, Quanyuan Wu, Bin Zhou
Institute of Networks & Information Security, School of Computer,
National University of Defense Technology, Changsha, 410073, China
lxman82@gmail.com

Abstract

The open, sharing and anonymous nature of peer-to-peer (P2P) network has offered opportunities and threats. One feasible way to minimize threats is to establish the reputation-based global trust model. Previ work about the global trust model is almost based on the assumption that the peer with higher trust value will provide more honest feedbacks, and make the quality of feedback of a peer approximately equal to that of service of the peer. However, this is not always true. As for this problem, this paper proposes a robust feedback credibility (FC) based distributed P2P global trust model (FCTrust), used for quantifying and evaluating the trustworthiness of participants. Theoretical analysis and simulation experiments show that, FCTrust has advantages in combating various malicious behaviors such as dishonest feedbacks and collusions, over the current global trust models, and demonstrates more robustness and effectiveness. Moreover, we find more performance gains in convergence speed and message overhead than previous models.

A Cost Model Analysis of a Secure Key Distribution Centre

Yishi Zhao

School of computing science

Newcastle University,UK

Yishi.Zhao@ncl.ac.uk

Nigel Thomas

School of computing science

Newcastle University,UK

Nigel.Thomas@ncl.ac.uk

Abstract

In this paper we evaluate a cost function of a secure key distribution centre. A queueing network model has been established for this protocol. Due to the complex calculation of original equations with large scale system, more efficient asymptotic bounds approach have been introduced to implement a hybrid solution which has the advantage of efficiency and accuracy. Based on the cost function, three questions have been proposed; how many clients can a given KDC configure support? how much service capacity must we provide at a KDC to satisfy a given number of clients? and what is the maximum rate at which keys can be refreshed before the KDC performance begins to degrade in a given demand on a given system? Answers of these three questions are illustrated through numerical examples.

Trust Path-Searching Algorithm Based on PSO

Zhiwen Zeng, Ya Gao, Zhigang Chen, Xiaoheng Deng
School of Information Science and Engineering,
Central South University, Changsha 410083, China,
School of Software, Central South University, Changsha 410083, ChinaNational
E-mail:gaoyacrystal@gmail.com

Abstract

As there are many malicious nodes spreading false information in P2P networks, it is of great importance to build a sound mechanism of trust in the P2P enviroments. To avoid the shortage of the existing trust model, this paper provides a Trust Path- Searching Algorithm based on PSO. In this algorithm, after initializing the particle swarm, each particle can update its speed and location according to its information, and then produce a new particle with better value. Doing that process continuously, implementing the global search of the space, finally, we can get a better overall value, which is the better trust path in the networks. The simulation results showthat it can get the overall optimum solution in a relatively short time after many times of iteration, and the more times it iterates, the better the trust path is. It can be proved that to a certain extent, the algorithm can prevent the fraud.

Efficient Hardware for Modular Exponentiation using the

Sliding-Window Method with Variable-Length Partitioning

Nadia Nedjah_
_Dept. of Electronics Engineering and Telecommunications
State University of Rio de Janeiro, Brazil
Luiza de Macedo Mourelle
Dept. of Systems Engineering and Computation
State University of Rio de Janeiro, Brazil

Abstract

Modular exponentiation is an essential arithmetic operation for various applications, such as cryptogra- phy. The performance of this operations has a tremen- dous impact on the efficiency of the whole application. Therefore, many researchers devoted special interest t providing smart methods and efficient implementation for that operation. One of these methods is the sliding- window method,

which pre-processes the exponent into zero and non-zero partitions. Zero partitions allow for a reduction of the number of modular multiplications required in the exponentiation process. In this paper, we devise two novel harwdare designs for computing mod- ular exponentiation using the sliding-window method: one uses the constant-length non-zero partitions strat- egy (CLNZ) and the other uses the variable-length non- zero partitions strategy (VLNZ). The implementations are compared to existing hardware implementations of the modular exponentiation using the performace factor area $\times$ time.

Attacks vs. Countermeasures of SSL Protected Trust Model

Fang Qi, Zhe Tang, Guojun Wang*
School of Information Science and Engineering,
Central South University, Changsha 410083, China
*Corresponding author: csgjwang@mail.csu.edu.cn
http://trust.csu.edu.cn/faculty/~csgjwang

Abstract

This paper analyzes the problems within current anti-spoofing mechanisms and proposes a new SSL protected trust model. Then, this paper describes the attacks on SSL protected trust model. This paper also proposes the new Automatic Detecting Security Indicator (ADSI) scheme to defend agains spoofing attacks on SSL protected Web servers. This paper describes the ADSI-based trust model. In a secure transaction, ADSI may randomly generate a picture and embed it into the current Web browser. This can be triggered by any security relevant events occurred on the browser, and then performs automatic checking on current active security status. When a mismatch of embedded images is detected, an alarm goes off to alert the users. Since an adversary is hard to replace or mimic the randomly generated picture, the Webspoofing attack can not be mounted easily. I comparison with existin proposals, the proposed scheme has the following advantages: (1) weak security assumption and very low burden on the customer by automating the process of detection and recognition of the Web-spoofing for SSL-enabledcommunications, (2) little intrusive on the browser, and (3) easy implementation in trusted PC at Internet Cafe requiring neither Logo Certification Authority, nor th scheme of personalization.

Trust in business processes

Nicolai Kuntze, Andreas U.Schmidt, Zaharina Velikova, Carsten Rudolph
Fraunhofer Institute for Secure Information Technology SIT
Rheinstrasse 75, 64295 Darmstadt, Germany

{nicolai.kuntze|andreas.schmidt|zaharina.velikova|carsten.rudolph}@sit.fraunhofer.de

Abstract

The service oriented architectures (SOA) approach designing the interaction between various business entities leads to complex and highly automated relations between formerly separate organisations. In particular the automation of these processes demands a high level of trust of each partner in the underlying IT infrastructure and the results produced. This paper discusses the security and trust implications and shows how to utilize Trusted Computing within the SOA approach introducing means for integrity and authenticity.

A New Approach to Securing Broadcast data in Sensor

Networks

A.S.Poornima

Dept. of Computer Science and Engg

Siddaganga Institute of Technology, Tumkur,

Karnataka, India.

aspoornima@sit.ac.in

B.B.Amberker

Dept. of Computer Science and Engg

National Institute of Technology, Warangal,

Andhra Pradesh, India.

bba@nitw.ac.in

Abstract

Wireless Sensor Networks have a wide spectrum of applications ranging from health care to war fare. Application like network query, software updates, time synchronization and network management demand for broadcast security. In these applications if same key is used to encrypt every packet that we send, then various attacks can be launched to derive the key. In order to avoid this it is required to encrypt every packet using different key. In this paper we are proposing a method that is based on Shamir's secret sharing scheme, which ensures the freshness of the key. In the proposed method every packet is encrypted using different key and the key used for encryption is derived by the receiver using the additional information sent along with the

packet.

A Trust-Enabling Support for Goal-Based Services

Luiz Olavo Bonino da Silva Santos, Luis Ferreira Pires, and Marten van Sinderen

Centre for Telematics and Information Technology, University of Twente

P.O. Box 217, 7500AE, Enschede, The Netherlands

E-mail: fl.o.bonino,l.ferreirapires,m..j.vansindereng@ewi.utwente.nl

Abstract

Service–Oriented Computing allows new applications to be developed by using and/or combining services offered by different providers. In several cases a service needs sensitive information from the clients in order to execute. The existence of a trust relationship between the client and the provider determines which restrictions the service has concerning the use of this information by the service. In this paper we present a metamodel for services computing tha incorporates the support for trust relationships. The metamodel provides the means for specifying services and service requests including trust requirements and constraints. The proposed metamodel is encompassed in a framework for goal–based service discovery and composition.

Developing a Trusted System for Tracking Asset on the Move

Tianle Zhang 1), Zongwei Luo 2), Feng Zhou 1), Xudong Yang 1)
1) Beijing Key Laboratory of Intelligent Telecommunications Software and Multimedia, School
of Computer Science and Technology, Beijing University of Posts and Telecommunications,
China
tlezhang@bupt.edu.cn
2) E-Business Technology Institute, the University of Hong Kong, Pokfulam, Hong Kong
zwluo@eti.hku.hk

Abstract

With the advances of technologies in RFID, sensors, GPS, GPRS, IP networks and wireless networks, monitoring asset on move is becoming feasible. In this paper, we develop a trusted system for tracking asset on the move based on an integrated service network. Challenges and requirements for tracking asset on the move are discussed. An RFID based sensor data integration is proposed with integrated service network for reliable information access and delivery. We illustrate the feasibility of this system via food delivery tracking. Approach evaluation is presented to help understand the approach's uniqueness.

Study and Implementation of a Solution to Security Management for

Mobile

Environments Based on Tuple

Desire Nguessan1 and Jose Sidnei Colombo Martini2
Computing and Digital System Engineering Department, POLI-USP - Polytechnic School of the
University of São Paulo, Brazil
1nguessan.desire@poli.usp.br
2sidnei.martini@poli.usp.br

Abstract

This work exploits the security management and the cooperation of applications in mobile distributed systems. In this context a reflection on different mobile middlewares is made: their capacities to face the challenges of mobility and security issues. The analyses show that the existing middlewares have very few approaches on security problems; security is still a complex issue to be managed in all the levels of a mobile distributed system including new mechanisms. Based on these analyses we propose a security management model that implements a mechanism of authentication, confidentiality and access control of mobile agents in total diffuse environment. The idea is based on interceptor agents and security authorities that distribute security tickets and control the access to resources and Tuple spaces in mobile environment. The proposed model presents good performance and is integrated to an e-health system: Relationship Management with Chronic Patient GRPC [16].

A Number Theoretic Memory Bounded Function and Its Applications

Qi Cheng and Yu-Hsin Li

School of Computer Science

The University of Oklahoma

Norman, OK 73019, USA.

Email: qcheng@cs.ou.edu and yli@ou.edu

Abstract

Memory bounded functions have been designed to combat email spams in a sequence of papers [1, 2, 4]. The cost of computing the functions is usually dominated by random walks over large tables that cannot be put in CPU cache. In this paper, we propose a simple number theoretic way of generating such tables based on exponentiations of sparse polynomials modulo sparse irreducible polynomials over finite fields. We also present a formal definition of memory bounded functions that can be used to construct such tables.

Protection against Mobile Adversaries in Mobile Ad-Hoc Networks

Ronghua Shi, Yanhua Yan

School of Information Science and Engineering, Central South University, Changsha 410083,

China

shirh@mail.csu.edu.cn

Abstract

A proactive secret sharing scheme (PSS) is very important to withstand mobile adversary in mobile adhoc networks (MANETs). It allows a set of nodes to update all shares by generating a new set of shares for the same secret key from the old shares without reconstructing the secret key and it allows the nodes   recovery the lost shares. After periodical renewal, it makes the mobile adversary which wants to get the secret key of the system to attack another set of nodes in a new period. In this paper, we presented a PSS synchronization structure in an MANET environment and we supply the scheme with the improved share recovery procedure for perfection. Finally we analyze the protocol and outline our future work.

Trusting Anomaly and Intrusion Claims for Cooperative Distributed

Intrusion

Detection Schemes of Wireless Sensor Networks

Riaz Ahmed Shaikh, Hassan Jameel, Brian J. d'Auriol, Sungyoung Lee, Young-Jae Song
Dept. of Comp. Eng., Kyung Hee University, Global Campus, Suwon, Korea.

{riaz, hassan, dauriol, sylee}@oslab.khu.ac.kr, yjsong@khu.ac.kr

Heejo Lee
Dept. of Comp. Sci. & Eng., Korea University, Seoul, Korea.
heejo@korea.ac.kr

Abstract

Any unidentified malicious nodes in the network could send faulty anomaly and intrusion claims about the legitimate nodes to the other nodes. Verifying the validity of such claims is a critical and challenging issue that is not considered in existing cooperative-based distributed anomaly and intrusion detection schemes of wireless sensor networks. In this paper, we propose a validation algorithm that addresses this problem. This algorithm utilizes the concept of intrusion-aware reliability that helps to provide adequate reliability at the modest communication cost.

A Credit Mechanism Based on Automatic Audit in P2P File Sharing

Systems

Ruixuan Li, Cuihua Zuo, Yuntian He, Zhengding Lu
College of Computer Science and Technology,
Huazhong University of Science and Technology,
Wuhan 430074, Hubei, P. R. China
E-mail: rxli@hust.edu.cn; zuocuihua@163.com;
heyuntian1982@sohu.com; zdlu@hust.edu.cn

Abstract

Peer-to-peer (P2P) network provides an efficient way for resource sharing. However, due to lacking centralized control, free-riding phenomenon becomes a serious problem in P2P network, especially in P2P file-sharing network. This heavily restricts the development of P2P file-sharing systems. Most existing approaches need the manual intervention, such as providing credit scores. This paper proposes a credit mechanism based on automatic audit, which captures malicious behaviors through automatic detection. In this mechanism, peers can detect malicious acts spontaneously without human intervention. The simulation experiments are carried out to evaluate the performance and validity of the credit mechanism in a P2P file-sharing system. The result shows that it is effective to prevent the malicious actions in P2P
network.

Copyright Protection Using A Computational Watermarking Scheme

Qi Jiang, Dongfeng Han, Yi Li, Wenhui Li
Key Laboratory of Symbol Computation and Knowledge Engineering of the Ministry of Education
College of Computer Science and Technology, Jilin University, Changchun, China
liwh@jlu.edu.cn

Abstract: In this paper an efficient copyright protection watermarking algorithm is proposed. By embedding orthogonal

vector into the wavelet-tree structure of the host image, we get the watermarked image. At the same time human vision system is considered to get perceptual results. We design an elaborate function for blind watermarking scheme. This function can dynamically determine the embedding position. The theory and experimental results show that our method successfully survives image processing operation, noise adding, the JPEG lossy compression and image cropping Especially, the scheme is robust towards image sharpening and image enhancement.

Validating X.509 Certificates Based on Their Quality

Ahmad Samer Wazan, Romain Laborde, François Barrère, Abdelmalek Benzekri
IRIT Laboratory, Toulouse, France
wazan@irit.fr, laborde@irit.fr, barrere@irit.fr, benzekri@irit.fr

Abstract

The growing number of PKIs (Public Key Infastructure) and the increasing number of situations where partners of a transaction may carry certificates signed by different CAs (Certification Authority) poinout the problematic of trust between the different CAs. The degree to which a relying party can trust a CA depends upon the quality of its announced policy and its commitment to this policy. In this paper, we presen an approach that helps a relying party to assess the quality of a certificate that is related to the qualit o CA policy and its commitment to it.

A New Biometric Identity Based Encryption Scheme

Neyire Deniz Sarier
Bonn-Aachen International Center for Information Technology
Computer Security Group
Dahlmannstr. 2, D-53113 Bonn Germany
denizsarier@yahoo.com

Abstract

In this paper, we present a new and efficient biometri identity based encryption scheme (BIO-IBE) using the Sakai Kasahara Key Construction and prove its security in the random oracle model based on the well-exploited κ- BDHI computational problem. Our new scheme achieves better efficiency in terms of the key generation and decryption algorithms compared to the existing fuzzy IBE schemes. The main difference of the new BIO-IBE scheme is the structure of the key generation algorithm, where a unique biometric identity string ID obtained from the biometric attributes is used instead of picking a different polynomial for each user as in other fuzzy IBE schemes.

Correlation Power Analysis Attack against Synchronous Stream Ciphers

Keke Wu[1], Huiyun Li[1], Bo Peng[2], Fengqi Yu[1]
1. Department of Integrated Electronics,
Shenzhen Institute of Advanced Technology (CAS), Shenzhen, China
2. Side Channel Security Technology Laboratory
ZTEIC Design Co., Ltd, Shenzhen, China
{kk.wu, hy.li, fq.yu}@siat.ac.cn, peng.bo@zte.com.cn

Abstract

Power analysis attacks as side channel analysis techniques of cryptographic devices have been mounted against block ciphers and public key but rarely against stream ciphers. There are no reports on Correlation Power Analysis (CPA) attack against stream ciphers so far. This paper proposes a novel

CPA against synchronous stream ciphers. Then we present two experiments of CPA attacks on stream ciphers A5/1 and E0. The experimental results indicate that CPA of synchronous stream ciphers I feasible.

A Byte-Filtered String Matching Algorithm for Fast Deep Packet

Inspection

Kun Huang[1] and Dafang Zhang[2]
[1]School of Computer and Communication, [2]School of Software
Hunan University
Changsha, Hunan Province 410082, P.R. China
{huangkun, dfzhang}@hunu.edu.cn

Abstract

As link rates and traffic volumes of Internet are constantly growing, string matching using the Deterministic Finite Automaton (DFA) will be the performance bottleneck of Deep Packet Inspection (DPI). The recently proposed bit-split string matching algorithm suffers from the unnecessary state transitions problem, limiting the efficiency of DPI. The root cause lies in the fact that each tiny DFA of the bit-split algorithm only processes a k-bit substring of each input character, but can't check whether the entire character belongs to the original alphabet for a set of signature rules or no. This paper proposes a byte-filtered string matching algorithm, where Bloom filters are used to preprocess each byte of every incoming packet payload to check whether the input byte belongs to the original alphabet or not, before performing bit-split string matching. Our experimental results show that compared to the bit-split algorithm, our byte-filtered algorithm enormously decreases the time of string matching as well as the number of state transitions of tiny DFAs on both synthetic and real signature rule sets.

Analysis of Electronic Commerce Protocols Based on Extended Rubin Logic

Yang Xu[1, 2], Xiaoyao Xie[* 2], Member, IEEE
1. School of Computer Science and Technology, Guizhou University, China
2. Key Laboratory of Information and Computing Science of Guizhou Province, China
kyxy3465@sina.com.cn, xyx@gznu.edu.cn

Abstract

Electronic commerce protocols are the basis of security in electronic commerce. Therefore, it is essential to ensure these protocols correctly. However, most current protocol analysis methods can only be used to analyze part of properties required by electronic commerce protocols. Rubin logic is a good method for analyzing security protocols. Rubin logic has been extended to analyze electronic commerce protocols. In this paper, Zhou-Gollman protocol is chosen to illustrate how an electronic commerce protocol is analyzed using the extended Rubin logic. Not only the basic security properties but also nonrepudiation, accountability and fairness of Zhou- Gollman protocol are analyzed. These are stunning confirmations of the validity of the extended Rubin logic for analyzing electronic commerce protocols.

On The Linear Structures of Cryptographic Rotation Symmetric

Boolean

Functions

Esam Elsheh
Department of Electrical and Computer Engineering
Concordia University, Montreal, Quebec, Canada
e_elsh@ece.concordia.ca

Abstract

Due to its richness in terms of
cryptographically properties along with its small
search space $2^{2^\square}$ $\square$ comparable to the whole
space $2^{2^\square}$
, the class of Rotation Symmetric Boolean functions (RSBFs) has become the main focus on searching for a Boolean function with good properties. Additionally, there are some other characteristics these functions might have which considered failure and should be avoided. For instance, the linear structure in Boolean function other than all-zero is regarded as a weakness and the function posses this characteristic is considered fragile and should be excluded from using in the cryptographic algorithms. Therefore, in thi paper we examine the existence of linear structures in RSBFs, and then we categorize th based on the number of input variables and their algebraic degree.

Modified Huang—Wang's Convertible Nominative Signature Scheme

Wei Zhao, Dingfeng Ye

State Key Laboratory of Information Security

Graduate University of Chinese Academy of Sciences

Beijing 100049, P. R. China

{wzh,ydf}@is.ac.cn

Abstract

At ACISP 2004, Huang and Wang first introduced the concept of convertible nominative signatures and also propose a concrete scheme. However, it was pointed out b many works that Huang—Wang's scheme is in fact not a nominative signature. In this paper, we first present a security model for convertible nominative signatures. The properties of Unforgeability, Invisibility, Non—impersonation and Nonrepudiation in the setting of convertible nominative signatures are defined formally. Then we modify Huang—Wang's scheme into a secure one. Formal proofs are provided to show that the modified Huang—Wang's scheme satisfies all the security properties under some conventional assumptions in the random oracle model.

A CDH-Based Multi-signature Scheme with Tight Security Reduction

Zecheng Wang
Dept. of Computer Sci. & Tech.
Anhui University of Finance and Economics
Bengbu 233041, China
w52051201006@hotmail.com
Taozhi Si
Computer & Information Institute
Shanghai Second Polytechnic University
Shanghai 201209, China
sitaozhi@smmail.cn
Haifeng Qian
Dept. of Computer Sci. & Tech.
East China Normal University
Shanghai 200062, China
hfqian@cs.ecnu.edu.cn
Zhibin Li
Dept. of Computer Sci. & Tech.
East China Normal University
Shanghai 200062, China
lizb@cs.ecnu.edu.cn

Abstract

An efficient multi-signature scheme secure in the random oracle model is proposed, which is the first multisignature scheme with tight security reduction to the hardness of computational Diffie-Hellman (CDH) problem. The scheme only needs the proof-of-possession (POP) key registration assumption to prevent the notorious rogue key attacks and obtain existentially unforgeable security against the adaptively chosen message and signing group attack. Given current state of the art, it is as difficult to solve the CDH problem as it is to solve the DL problem in many groups of cryptographic interest. Thus the scheme with tight security reduction offers substantially better efficiency (for a given level of provable security) than other schemes in the discrete logarithm setting. Moreover, both the size of multi-signature and the computational cost of verification do not increase with the number of actual signers increasng. Therefore, the proposed scheme is efficient and can be conveniently implemented in the current public key infrastructure (PKI) environment.

Certificateless Concurrent Signature Scheme

Zhenjie Huang, Xuanzhi Lin, Rufen Huang
Department of Computer Science and Engineering,
Zhangzhou Normal University, Zhangzhou, Fujian, 363000, P. R. China

Abstract

Certificateless public key cryptography was introduced to remove the use of certificate to ensure the authentication of the user's public key in the traditional certificate-based public key cryptography and overcome the key escrow problem in the identity-based public key cryptography. Concurrent signatures were introduced as an alternative approach to solving the problem of fair exchange of signatures. Combining the concept of certificateless cryptography with the concept of concurrent signature, in this paper, we present a notion of certificateless concurrent signature with a formal security model and

propee a provably secure scheme assuming the hardness of Computational Diffie-Hellman Problem.

Enforcement of Spatial Separation of Duty Constraint

Weihe Chen, Zhu Tang, Shiguang Ju

Department of Computer Science, Jiangsu University, Zhenjiang, 212013, P.R. China

(Email:chenweiheujs@yahoo.com.cn)

Abstract

Securing access to data in location-based services and mobile applications pose interesting security requirements against spatially aware access control systems. In particular, the permissions assigned to users depend on their physical positions in a reference space. When a session is established in a spatial region by users, some spatial constraints related to this session will be triggered and control the session process during its life automatically. There are often multiple Mutually Exclusive Spatial Roles (MESR) constraints that can enforce the same Spatial Separation of Duty policy (SSoD). Although the different MESR constraints can enforce the same effect on the same session, we have found that the different MESR constraints are varying greatly in the enforcement efficiency. The more precise the MESR sets are defined for enforcing an SSoD policy, the less overhead the system is suffered. In this paper, we argue that enforcement of SSoD policies is realized by specifying minimal MESR constraints. By comparing the different MESR constraints which can enforce the same SSoD, we conclude the minimal MESR constraints can avoid redundant restrictiveness effectively and enforce the SSoD polic precisely. We also present an algorithm that generates all minimal MESR constraints that are precise fo enforcing one SSoD policy.

Hierarchical Identity-Based Online/Offline Encryption

Zhongren Liu1, Li Xu1, Zhide Chen1, Yi Mu2 and Fuchun Guo1

1 School of Mathematics and Computer Science

Fujian Normal University, Fuzhou, China

zhongren88@163.com

2 School of Computer Science and Software Engineering

University of Wollongong, Wollongong NSW 2522, Australia

ymu@uow.edu.au

Abstract

The notion of Identity-Based Online/Offline Encryption (IBOOE) was recently introduced by Guo, Mu and Chen I FC 2008. In an IBOOE system, the encryption is split into online and offline phases. The offline phase is performed prior to the arrival of a message and the recipient's public key (or, identity). The online phase is performed very efficiently after knowing the message and public key. The IBOO scheme is particularly useful for devices that have very low computation power since part o computation is conducted while the device is not busy. In this paper, we extend the notion of IBOOE to the Hierarchical Identity- Based Online/Offline Encryption (HIBOOE), and propose a "selective-ID" secure HIBOOE scheme from Boneh, Boyen and Goh's HIBE, where the online phase in HIBOOE I very efficient.

Performance Analysis of the HLLACF

Xin Chen#, Huaping Hu#*, Bo Liu#, Fengtao Xiao#, Zunguo Huang#

#School of Computer Science, National University of Defense Technology

Chang Sha, Hu Nan, China

*The 61070 Army Fu Zhou, Fu Jian, China

Email:cxin917@21cn.com,hphu@nudt.edu.cn,boliu615@yahoo.com.c,myfri2001@126.com, zghuang@nudt.edu.cn

Abstract

With the popular using of anonymous communication systems, security and overhead traffic attract more attention.HLLCAF was presented to improve the performance of anonymous communication systems. This paper analyzes HLLACF's security and an evaluation algorithm for security is presented. In the end, a simulation experiment and result analysis is given. The theoretic analysis and simulation experiment indicate that the HLLACF can prevent AS-Level passive attack and other similar attacks well while decreasing communication delay and HLLACF also scales well. Keywords: information security; anonymous communication; malicious router detection; location-diversity;low-delay

Towards Trusted Broadcast Encryption

Emanuele Cesena

Universit`a degli Studi RomaTre

Dip. di Matematica

Roma, Italy

cesena@mat.uniroma3.it

Gianluca Ramunno Davide Vernizzi

Politecnico di Torino

Dip. di Automatica e Informatica

Torino, Italy

framunno,davide.vernizzig@polito.it

Abstract

A Broadcast Encryption (BE) system allows a center to send encrypted messages over a public broadcast channel towards many users. The use of BE has been proposed for different scenarios: multimedia broadcasting, encrypted file systems, secure mailing lists and peer−to−peer applications.BE protects the communication channel, but not the platforms where the contents are created, distributed or received; in this early work we outline a system where the protection of the communication channel offered by the BE is extended to the platforms using Trusted Computing (TC) techniques. We call such coupling of TC and BE Trusted Broadcast Encryption (TBE).

Deniable Proxy-Anonymous Signatures

Chengyu Fan, Shijie Zhou and Fagen Li
School of Computer Science & Engineering
University of Electronic Science and Technology of China
Chengdu, Sichuan, China
fancy198189@163.com, sjzhou@uestc.edu.cn, fagenli@uestc.edu.cn

Abstract

In this paper, we describe a proxy signature scheme where a signer can delegate his signing right to a party who can then sign on behave of the original signer to generate a proxy signature. Our proxy signature scheme possesses the features of deniability and anonymity. It allows the signer to send messages to another while the latter can not prove to a third party the fact of communication and insures no one can determine the identity of the proxy signer without the help of original signer. Through the analysis, it shows our scheme meets correctness, deniability and other security requirements such as, anonymity, unforgeability and traceability.

A Secure and Reliable Platform Configuration Change Reporting Mechanism for Trusted Computing Enhanced Secure Channels

Institute for Applied Information Processing and Communications

Microcomputing Laboratory

Inffeldgasse 16a, 8010 Graz, Austria

Kurt.Dietrich@iaik.tugraz.at

Abstract The security of well established secure channel technologies like transport layer security (TLS) or IP security (IPSec) can be significantly improved by emerging concepts like Trusted Computing. The use of trusted platform modules (TPMs) offers new methods for improving the security of these well established technologies. How secure channel technologies can be adapted to use trusted computing concepts is subject to current research. A major part of this research addresses the integration of the TCG's specified remote attestation. Remote attestation enables a platform to provide a trustworthy proof of its current configuration (i.e. software that has been loaded on the platform)Hence, based on this proof, a remote platform can decide whether to open a channel tanother platform or not. In current approaches, the proof of the platform configuration is processed before a secure channel is established, which is not opened if the reported configuration is not accepted by the hosts. However, one important problem has not been solved yet. Currently, no satisfying solution how the change of a platform's configuration can be securely and reliably reported to the remote platform whilst a channel is open, exists.

A reliable method to provide a proof for a configuration change can be implemented with only minor modifications of the TPM specification and the TLS protocol Experimental results show that it is possible to implement this proof mechanism with only a fe additional TPM commands.

Enhanced Correlation Power Analysis Attack on Smart Card

Huiyun Li[1], Keke Wu[1], Bo Peng[2], Yiwei Zhang[2],

Abstract

Power analysis attack has been widely used against cryptographic devices such as smart cards. Compared to the origin differential power analysis (DPA) attack, the later developed correlation power analysis (CPA) is advantageous due to its robustness and efficiency. However, the existing CPA power models are defective in principle as they are either based on a power model using Hamming weight or simplified Hamming distance, both are much deviated from the CMOS circuit power consumption theory. This paper presents an improved power model based on probability distribution of Hamming distance. The experiment of CPA analysis on a smart card chip demonstrates that the proposed model can achieve 10% better results compared to existing models.

Analysis on the 'Robust yet fragile' nature of Internet:

Load, Capacity and the Cascading failure Avalanche Effect

Chi Guo[*], Lina Wang[*†], Furong Zhou[*], Lainv Huang[*], and Zhen Peng[*]

*Computer School of Wuhan University, Wuhan, P.R.China, 430079

E-mails:{guochi,zfr,huanglv,pz}@mail.whu.edu.cn

[†]The Key Laboratory of Aerospace Information Security and Trust Computing of Ministry of Education, Wuhan University, Wuhan, P.R.China, 430079

E-mail:lnwang@whu.edu.cn

Abstract

'Robusyet fragile (RYF)' is a major feature of Internet survivability. The cascading failure, which is caused by attacks or configuration mistakes, is one of the most serious incidents impact on the network survivability. Taking aim at this incident, this paper proposes a simple 'load-capacity' model based on the 'self-organized criticality' and the 'highly optimized tolerance' theories in complex system. The model is the abstract of the network topology, the dynamics in network protocols and the complex patterns of network behaviors (load). In this model, the network capacity reflects the expectation of survivability. Our research shows that the RYF nature in network is closely related to abnormal network load pattern.

A Route Flap Suppression Mechanism Based on Dynamic Timers in

OSPF

Network

Fang Wang

State key Lab of

Networking &

Switching, Beijing
University of Posts
and
Telecommunications
, Beijing 100876,
China
wangfang0530@126
.com
Shanzhi Chen
State key Lab of
Wireless Mobile
Communication,
China Academy of
Telecommunication
Technology, Beijing
100083, China
chenshanzhi@yahoo
.com.cn
Xin Li
State key Lab of
Networking &
Switching, Beijing
University of Posts
and
Telecommunications
, Beijing 100876,
China
cplalx@gmail.com
Yuhong Li
State key Lab of
Networking &
Switching, Beijing
University of Posts
and
Telecommunications
, Beijing 100876,
China
hoyli@bupt.edu.cn

Abstract Route flap caused by link flap in OSPF always leads to network instability and unreliability. Most of the prevailing solutions are network-wide and require all routers to participate in the route flap suppressing process, which not only lack flexibility and scalability but also occupy additional computation resources across the network. In this paper, a localized approach is proposed to suppress the routing flap through dynamically tuning the hello interval of OSPF. To support the real-time adjustment of the hello timer, an analytical model is also established to investigate the relationship

between link flap and route flap. Simulation results show that our approach can achieve better performance in eliminating routing flap and at the same time consume much less computation resources than the network-wide method.

A PIN-Based Dynamic Software Fault Injection System

Ang Jin, Jianhui Jiang, Jiawei Hu, Jungang Lou
(Department of Computer Science and Technology, Tongji University, Shanghai 201804,
China)
jin_ang02@hotmail.com, jhjiang@mail.tongji.edu.cn, {hjw040606, loujungang0210}@hotmail.com

Abstract Fault injection plays a critical role in the verification of fault-tolerant mechanism, software testing and dependability benchmarking for computer systems. In this paper, according to the characteristics of software faults, we propose a new fault injection design pattern based on the PIN framework provided by Intel Company, and develop a PIN-based dynamic software fault injection system (PDSFIS). Faults can be injected by PDSFIS without the source code of target applications under assessment, nor does the injection process involve interruption or stware traps. Experimental assessment results of an Apache web server obtained by the dependability benchmarking are presented to demonstrate the potentials of PDSFIS.

A Formal Approach to Robustness Testing of Network Protocol with Time
Constraints

Chuanming Jing [1,2], Xia Yin[1,2], Zhiliang Wang[1,3], Jianping Wu[1,2,3]
[1] Tsinghua National Laboratory for Information Science and Technology, Beijing, P. R. China, 100084
[2] Department of Computer Science & Technology, Tsinghua University, Beijing, P. R. China, 100084
[3] Network Research Center of Tsinghua University, Beijing, P. R. China, 100084
{jcm,yxia,wzl}@csnet1.cs.tsinghua.edu.cn, jianping@cernet.edu.cn

Abstract Network protocols often have time constraints. Robustness testing of protocol with time constraints aims to detect vulnerabilities of its implementation. However, related theory is not wel developed. This paper proposes a novel Timed NPEFSM model containing sufficient inputs wit various time values and their processing rules to formalize protocol with time constraints. In order to test delay transitions, Grid Timed NPEFSM is proposed which can be generated by state characterization of Timed NPEFSM using time sampling. Thus, these two models jointly guide robustness testing of protocol with time constraints. For test generation, we propose timed anomalous test case in which only state under test is characterized by time sampling and this method can simplif test sequences largely without compromising test coverage. We also propose several strategies to construct timed test sequences. To inject test data efficiently and effectively, three types of timed compound anomalous test cases are proposed. Standard test specification language TTCN-3 is extended to describe test generation. We illustrate our method using a routing protocol: OSPFv2.

A Highly Efficient DAG Task Scheduling Algorithm for Wireless

Sensor

Networks

Zhiwen Zeng, Anfeng Liu, Deng Li, Jun Long
School of Information Science and Engineering,Central South University, Changsha 410083,
China
zengliu@public.cs.hn.cn

Abstract
The task scheduling in the network demands as faras possible the shortest task completion time, the lowest energy consumption and the highest balanceduse of energy under limited energy of nodes. Therefore,traditional multiprocessor Directed Acyclic Graph(DAG) scheduling algorithm can not be directlyapplied to sensor task scheduling. This paper proposesan Energy Balanced DAG Task Scheduling algorithmfor Wireless sensor network (EBDAG_WSN). Its mainidea is to get initial Chromosome by heuristicoptimization algorithms. By redefinition of operationsin the Genetic Algorithm (GA), the task scheduling inWSN is optimized synthetically. Through simulations based on randomly generated task graphs, experimentresults show that combining heuristic optimizationalgorithm with bionic algorithm, the optimizationtechnology has good real-time performance and high
efficiency of energy.
Keywords: wireless sensor network, DAG scheduling, genetic algorithm, schedule length

A Self-adaptive Service Discovery Approach in Mobile Ad Hoc

Networks

Bo Peng, Weiwei Sun*, Jiaqi Dong, Ping Yu
Dept. of Computing and Information Technology, Fudan University, Shanghai, China
Corresponding author: Weiwei Sun
{bo_peng, wwsun, dong_jiaqi, yuping }@fudan.edu.cn

Abstract
Mobile ad hoc networks (MANETs) are receivingmore and more attention for the extensive field of applications. However, due to the topology dynamicand limitations on resources, the discovery of servicesis a challenging issue in MANETs. Without consideringthe different utilization rates of discovered servicesduring executing, existing solutions mostly focus on amaximized service discovery rate, which incurs theunnecessary overhead of discovering superfluouservices. This paper presents a novel self-adaptiveservice discovery approach (SSD) in MANETs. TheSSD approach avoids searching relatively uselessservices by self-adaptively restricting the range ofservice discovery. Simulation results show that the SSDapproach reduces by about 40 percent of the network
traffic load and by about 50 percent of the averageresponse time.
Keywords: Mobile ad hoc network, service discovery,self-adaptive approach.

A Dynamic Time Synchronization Scheme for Multihop Sensor Networks

Wei Dong, Chun Chen, Jiajun Bu

Kougen Zheng, Xiaofan Wu, Guodong Teng

College of Computer Science, Zhejiang University, Hangzhou, China

{dongw, chenc, bjj, zkg, wuxiaofan, teng}@zju.edu.cn

Abstract

Time synchronization plays a crucial role in many sensornetwork applications. Existing time synchronizationmethods proposed in the literature mainly focus on reducingsingle-hop (pair-wise) uncertainties to improve synchronizationaccuracy. Based on this, network-wide synchronizationis usually achieved via a predetermined spanningtree. In this paper, we employ the Bayesian inference
method to analyze the synchronization noises introducedby all upstream nodes in a multi-hop scenario. In addition,we propose a novel network-wide synchronization schemein which one node can dynamically select the optimal upstreamnode to synchronize with based on its local decision.
The proposed method is distributed, robust, and can adaptto the high dynamics of the network.Keywords: Time synchronization, sensor networks, spanning tree, Bayesian inference method.

An Optimal Local Reputation System in Mobile Ad Hoc Networks

Changgeng Tan,Songqiao Chen,Wenyan Luo
School of Information Science and Engineering,Central South University
ChangSha,410083,China
cgtan@163.com

Abstract
In mobile ad hoc networks (MANETs), a source nodemust rely on other nodes to forward its packets on multi-hop routes to the destination.Therefore,thecooperation of nodes is very important. With lack of a prior trust relationship, misbehavior caused by selfishnessor malice may severely degrade the performance of thenetwork.The cooperative security schemes offer areasonable effective solution to resolve the uncooperativebehavior which launched by the malicious and selfishnodes in mobile ad hoc networks. This paper analyses thetypical cooperation schemes, and then presents that anOptimal Local Reputation System (OLRS),which can beused in Mobile Ad hoc networks. In this approach,thereputation of node combines of subjective reputationand indirect reputation.The reputation was onlyexchanged in k-hopneighborhood,which not only canreduce the cost of system but also can fully learn theexperiences from its neighbors. The

simulation resultsshow that our approach can effectively stimulate nodes tocooperate and enhance the performance of mobile ad hocnetworks.

An Improved Scheme for Reducing the Latency of AODV

in Mobile Ad Hoc Networks

Ronghua Shi, Yongyan Deng
*School of Information Science and Engineering, Central South University,
Changsha, 410083, China*

Abstract

Because of the flexibility and convenience, themobile ad hoc networks have become a very hot research topic. This paper begins with an introductionabout the characteristics of mobile ad hoc networksand the existing routing protocols. Then an analysis ofthe latency of AODV in mobile ad hoc networks isrepresented and a new mechanism is provided. Theimproved protocol forecasts the latency in the stage ofroute discovery and uses an improved local repairingscheme in the stage of route repairing. At last,simulations are done using NS2 for the improvedprotocol. According to the result, the improvedprotocol can reduce the delay of the routing in mobilead hoc networks.

Keywords: AODV, manet, latency, routing,improved AODV.

EMDF－A Broadcast Scheduling Policy for Wireless Multi-hop

Networks

with Interference Constraint

Luobei Kuang, Ming Xu, Wei Yu
*Computer school, National university of Defense Technology, Changsha, China
{silencejimmy, xuming-64}@hotmail.com, yuwei@nudt.edu.cn*

Abstract

Wireless interference is a key issue affectingnetwork performance. In this paper, we address the broadcast scheduling problem in wireless multi-hopnetworks with interference. We propose a policy calledEMDF (Evolved Minimum Degree First) which assignsdifferent transmission slots for nodes within a threehopneighborhood to effectively decrease the conflictscaused by both hidden terminal problem and wirelessinterference. EMDF can increase high throughput andhigh slot reuse. Meanwhile, the policy can obtain aminimum slot number for transmission. Based on theEMDF, this paper also discusses the schedulingproblem when a new node joins the network. Weevaluate network throughput

and slots utilization of thepolicy by comparison with other existing algorithms insimulation. The result shows that EMDF outperformsothers.

Keywords: Broadcast scheduling, interference, multihopwireless network, throughput, slot utilization

Research and Improvement on Expected Throughput Metric in

Wireless

Mesh Network

Xiaoli Xiao, Min Huang, Weiping Zhang
College of Computer and Communication Engineering, Changsha University of Science and
Technology, Changsha 410076
E-mail: ttxxli@163.com

Abstract

*This paper studied and analyzed ExpectedThroughPut metric(ETP), found out that it made a conservative estimate for long path, and it didn't takeinto account the impact of node's loading on the performance of path. In view to the problem, this paperassumed the interference range of links as two hops,and proposed the definition of node's loading inwireless mesh network, and combined the two withETP metric and obtained the improved ETP metric, i.e.the METPLB. The METPLB metric can provide a morecorrect link and path performance estimate than ETPmetric. So route protocol based on METPLB canchoose the path which is more disjoint and has lessinterference of links that operate on the same channelas its route. By simulating experiments the authorsstudied the influence of parameter β of METPLBmetric to network performance and analyzed andcompared the performance between ETP andMETPLB. The simulating results show that in themulti-radio and multi-channel wireless mesh networkwith heavy traffic and loading, by using METPLB toselect path, the throughput can be improved and theend-to-end delay can be reduced, then the loadingbalance of network can be achieved effectively.***Key words:** *Wireless mesh network, routing metric,*
expected throughput, loading balance, end-to-enddelay.

Preemptive Scheduling for Multi-item Queries in On-demand Data

Broadcast

Zhuoyao Zhang, Weiwei Sun†, Ping Yu, Yongrui Qin
School of Computer Science, Fudan University, Shanghai, China
†Corresponding Author: Weiwei Sun
{wwsun, zhangzhuoyao, yuping, yrqin}@fudan.edu.cn

Abstract

Scheduling for multi-item queries is a problem ofpractical importance in the field of data broadcast.

Most previous works solve the problem under thepattern that at each broadcast moment, the server broadcasts a number of data items which constructs abroadcast cycle with fixed length. *Within this pattern,*if a query is not scheduled in the current cycle, itusually has to wait for quite a long time whichprolongs the average access time. In this paper, wepropose a preemptive scheduling method formulti-item queries in on-demand data broadcast. Itbreaks through the previous pattern. *Simulationexperiments show comparative improvements ofaverage access time through our approach compared*

with the existing approaches.
Keywords: Data broadcast, multi-item query,preemptive

A Review of Personal Communications Services

Hui Cheng[1], Xingwei Wang[2], Min Huang[2], Shengxiang Yang[1]
[1]Dept of Computer Science, University of Leicester, University Road, Leicester LE1 7RH, UK
[2]College of Information Science and Engineering, Northeastern University, Shenyang, China
{hc118,sy11}@mcs.le.ac.uk, {wangxw,mhuang}@mail.neu.edu.cn

Abstract

PCS is an acronym for Personal CommunicationsService. Ubiquitous PCS can be implemented by integrating the wireless and wireline systems on thebasis of intelligent network (IN), which provides network functions of terminal and personal mobility. Inthis chapter, we focus on various aspects of PCS. Firstwe describe the motivation and technological evolutionfor personal communications. Then we introduce threekey issues related to PCS: spectrum allocation,mobility, and standardization efforts. Since PCSinvolves several different communication technologies,we introduce its heterogeneous and distributed systemarchitecture. Finally, IN is described in detail becauseit plays a critical role in the development of PCS.
Keywords: Personal communications services,personal communication networks, intelligent network.

An Algorithm for Computing 4$_M$-Point DFT Based on 4-Point DFT

Block

Haijun Li, Hongbo Zou, Peirong Ji, and Xuejun Zhou
Electrical and Information College, China Three Gorge University, Yichang 443002, China
lihaijun@ctgu.edu.cn, zhbhorace@163.com, jpr@ctgu.edu.cn, and Zhouxj@ctgu.edu.cn

Abstract

An algorithm for computing 4$_M$-point DFT basedon 4-point DFT block is developed. The new algorithm,in comparison to radix-4 FFT algorithm, requires thesame number of additions and multiplications, butemploys a dissimilar flow-graph. In the flow-graph ofthe new algorithm, the 4-point

DFT blocks replace the accustomed butterfly computational networks. The new algorithm permits one 4M-point DFT to be computed using a 4-point DFT block, and the block requirements is $M \times 4^{M-1}$. Because the total number of computational requirements of directly computing a 4-point DFT is only 16 real additions, a command block and hardware block for computing 4-point DFT may be obtained. When using a processor which integrates with a fast 4-point DFT block to compute 4M-point DFT, the speed of DFT will be faster than that of radix-4 FFT. The algorithm based on 4-point DFT block will be helpful to improve the DSP technology and speed.

Throughput Bounds of Unslotted CDMA Packet Networks

Xiaoding Liao*Institute of Communications Engineering PLA University of Science and Technology, Nanjing, Chinagoldenyears86@163.com*
Jingnan Nie*Institute of Communications Engineering PLA University of Science and Technology, Nanjing, China &National Mobile Communications Research Lab, Southeast University, Nanjing, China jnnie66@yahoo.com.cn*
Lei Zhang*Institute of CommunicationsEngineering PLA University of Science and Technology, Nanjing, Chinaliaoxd80@163.com*

Abstract

In this paper, the lower and upper bound of throughput of unslotted CDMA packet networks are considered. A theoretical model for describing multiple access interference (MAI) in unslotted CDMA packet networks is presented, and a novel recursive method for throughput analysis is proposed. Then the lower and upper bound of the throughput are analyzed, respectively. Moreover, the impact of spreading gain on throughput performance is discussed.

Controlled Clipper Method to Reduce PAPR by Tone Reservation in OFDM System

Ning Chen, Xuzhi Lai, Changbing Lu
School of Information Science and Engineering, Central South University, Changsha 410083,

China
E-mail: ningchen@mail.csu.edu.cn

Abstract

An improved reducing peak-to-average power ratio(PAPR) method which called Controller Clipper is presented for the problem of high PAPR of OrthogonalFrequency Division Multiplexing (OFDM). Based onthe kernel formed on the tone reservation, the kernel is

circular shifted to the maximum peak value, which willbe reduced. Code error rate is not increased in theprocess, and the result is obvious in reducing PAPR.The effectiveness of the proposed scheme is demonstrated by simulations.

Fibonacci Jacket Linear Network Codes

Ying Guo
School of Information Science & Engineering
Central South University
Changsha 410083, P.R. China
sdguoying@gmail.com
Zhigang Chen
School of Information Science & Engineering
Central South University
Changsha 410083, P.R. China
czg@mail.csu.edu.com

Abstract

Motivated by the elegant relationships of the row vectorsof the Jacket matrix J_n and it inverse matrix J^{-1}_n, which areboth consisted of Fibonacci number sequence over the finitefield $GF(p)$, a novel network work code is constructedstructurally with efficiency. The present network codes have advantages of eavesdropper-preventing and error-detectingability, which are decided by the properly selected vectorsfrom two respective matrices for the process of encoding secure messages.

Keywords: *Jacket Matrix, linear network codes, errorcorrectioncodes.*

A Covert Communication Model Based on Least Significant Bits

Steganography in Voice over IP

Hui Tian[1], Ke Zhou[1], Yongfeng Huang[2], Dan Feng[1], Jin Liu[1]
[1]Wuhan National Laboratory for Optoelectronics, School of Computer Science and Technology,
Huazhong University of Science and Technology, Wuhan, China
[2]Network and Human-machine Communication Research Institute, Department of Electronic
Engineering and Technology, Tsinghua University, Beijing, China

{huitian, jinliu}@smail.hust.edu.cn, {k.zhou, dfeng}@hust.edu.cn,
yfhuang@tsinghua.edu.cn

Abstract

Steganography, as one of alternative techniques forsecure communications, has drawn more and more attentions. This paper presents a covert communicationmodel based on least significant bits (LSB) steganography in Voice over IP (VoIP). The modelaims at providing nice security of secret messages and

real-time performance that is vital for VoIP. Therefore,we employ a simple encryption of secret messagesbefore embedding them. This encryption strikes a goodbalance between adequate short-term protection forsecret messages and low latency for VoIP. Furthermore,we design a structure of embedded messages. Itcan provide flexible length and avoid effectually bothextraction attack and deceptive attack. We evaluate themodel with ITU-T G.729a as the codec of the coverspeech in StegTalk, our platform for study on covertcommunications theory in VoIP. In this case, the proposed model can provide two optional coverttransmission speeds, i.e. 0.8kb/s and 2.6 kb/s, where the maximum payload ratio is 99.98%. The experimentalresults show that our method has negligible effects on speech quality and well meets the real-timerequirement of VoIP.

Keywords: Covert communication, steganography,least significant bits, voice over IP.

Probabilistic Event-driven Heuristic Fault Localization using

Incremental

Bayesian Suspected Degree

Cheng Zhang, Jianxin Liao, Xiaomin Zhu

State Key Laboratory of Networking and Switching Technology, Beijing Univ. of Posts and Telecommunications

P.O. Box 296, Beijing University of Posts and Telecommunications, Beijing, P.R. China, P.C.: 100876

Email: {zhangcheng, liaojianxin, zhuxiaomin}@ebupt.com

Abstract

Most fault localization techniques are based on timewindows. The size of time windows impacts on the accuracy of the algorithms greatly. This paper tookweighted bipartite graph as fault propagation modeland proposed a heuristic fault localization algorithmbased on Incremental Bayesian Suspected Degree(IBSD) to eliminate the above shortcomings. IBSDsequentially analyzes the incoming symptoms in anevent-driven way and incrementally computes theBayesian Suspected Degree and determines themostprobable fault set for the current observed symptoms.Simulation results show that the algorithm has highfault detection rate as well as low false positive rateand has a good performanceeven in the presence ofunobserved alarms. The algorithm which has apolynomial computational complexity can be applied to large scale communication network.

Keywords: Fault localization, fault propagation model,fault diagnosis, fault management

Multi-Agent Automated Intelligent Shopping System (MAISS)

Lasheng Yu, Emmanuel Masabo, Lian Tan, Manqing He

(School of Information Science and Engineering, Central South University, Changsha, 410083, China)

Abstract

*The use of Agent Technology to support Ecommerceoperations, especially in automating the buying andselling process is so promising and is worth of success.Electronic commerce grows rapidly over the Internet. The information on internet becomes moredynamic and heterogeneous. Thus, software agents arerequired to provide a strong working structure as theyhelp build powerful distributed systems.The approach proposed in this paper is a multagentautomated intelligent shopping system whoseaim is to present optimal solutions to enhance andfacilitate e-commerce transactions (including automated price negotiations).It is a distributed system, where human users(buyers and sellers) are able to delegate their tasks toagents, which will then do the shopping job on theirbehalf and present them the results. Buyer users(customers) and the seller users (suppliers) can be organizations, companies or individuals. The proposedapproach is demonstrated by a sample implementationdone using JADE.***Keywords**: Multi-agents systems, middleware, ecommerce, automated negotiations.*

Performance Analysis of Resource Allocation Algorithms Using Cache

Technology for Pervasive Computing System

Mianxiong Dong, Minyi Guo, Long Zheng and Song Guo
School of Computer Science and Engineering, The University of Aizu
Aizu-Wakamatsu, Fukushima, 965-8580, Japan
{d8101104, minyi, m5112105, sguo}@u-aizu.ac.jp

Abstract

With the great progress of the InformationTechnologies, micro-processors are embedded into everywhere to make our daily life convenient, efficientand comfortable. However, how to integrate distributedresources existing among heterogeneous devices tobuild pervasive applications that can constantly adaptto the highly dynamic computing environment is still achallenge. On our previous work, by analyzing thepipelining feature within a user task and exploiting theparallelism among the ubiquitous processors, we haveproposed UMP-Percomp, which is a UbiquitousMultiprocessor-based pipeline processing architectureto support high performance pervasive applicationdevelopment. As a case study of the UMP (UbiquitousMulti-Processor) system, we have implemented arototype system of the JPEG encoding. In thisresearch, we have studied three different schedulingpolicies to the prototype system and proposed the bestarchitecture of the UMP system. We have alsointroduced the cache technology to the proposedresource allocation algorithm. To prove our ideas, asimulation based system was implemented. Theexperience results revealed that the proposedalgorithms made a

significant progress over theexisting solution.
Keywords: Resource allocation algorithm, caching,pervasive computing.

A Novel Statistic-based Relaxed Grid Resource Reservation Strategy

Peng Xiao, Zhigang Hu, Xi Li, Liu Yang
School of Information Science and Engineering,
Central South University, Changsha 410083, China
xpeng4623@yahoo.com.cn, {zghu, lixi, yangliu}@mail.csu.edu.cn

Abstract

In Grid environments, advance reservationmechanism is to provide reliable resource coallocation and scheduling for applications. However,excessive advance reservation will bring about manynegative effects for system's performance, such aslower resource utilization and higher rejection rate. Tomitigate these negative effects of advance reservation,a relaxed reservation strategy is proposed, in whichthe reservation admission criteria is more relaxing
than that of conventional reservation. The strategy isbased on the facts that grid applications tend to overestimate reservation duration to ensure theircompletion. In the proposed relaxed reservationstrategy, reservation manager might accept thosereservations that are overlapping with existing ones.Experimental results show that the strategy can bring
about remarkably higher resource utilization andlower rejection rate at the price of a slightly increasingof reservation violations.
Keywords: advance reservation, grid computing,reservation violation, conditional probability

Digital Product Information Sharing Based on STEP and XML

Xiaoli Qiu[1] Xun Xu[2] Ni Zhonghua[1]
[1] Department of Mechanical Engineering, Southeast University, Nanjing, Jiangsu, P. R. China,
210096
email: qiuxiaoli@seu.edu.cn
[2] Department of Mechanical Engineering, School of Engineering, University of Auckland, Private
Bag 92019, New Zealand
email: x.xu@auckland.ac.nz

Abstract

The additional requirement imposed on any ''neutral dataformat'' such as STEP (Standard for the Exchange of Productdata), has been a Web-enabled data representation. STEP allowdynamic sharing of data between different systems with thestandard data accessing interfaces. A method for STEP andXML to be combined in presenting product information wasstudied. EXPRESS language (i.e. SCHEMA) is used fordefining the data structure and DTD is used for XMLtransactions and presentations. Technologies on integrating
STEP with XML have been discussed. A prototype system hasbeen developed making use of STEP and XML as the datamodelling and presentation tools.

Digital Product Information Sharing Based on STEP and XML

Xiaoli Qiu1 Xun Xu2 Ni Zhonghua1
1 Department of Mechanical Engineering, Southeast University, Nanjing, Jiangsu, P.
R. China,
210096
email: qiuxiaoli@seu.edu.cn
2 Department of Mechanical Engineering, School of Engineering, University of
Auckland, Private
Bag 92019, New Zealand
email: x.xu@auckland.ac.nz

Abstract

The additional requirement imposed on any ''neutral dataformat'' such as STEP (Standard for the Exchange of Productdata), has been a Web-enabled data representation. STEP allowsdynamic sharing of data between different systems with thestandard data accessing interfaces. A method for STEP andXML to be combined in presenting product information wasstudied. EXPRESS language (i.e. SCHEMA) is used fordefining the data structure and DTD is used for XMLtransactions and presentations. Technologies on integratingSTEP with XML have been discussed. A prototype system hasbeen developed making use of STEP and XML as the datamodelling and presentation tools.

Privacy Preserving Spatial Outlier Detection

Anrong Xue, Xiqiang Duan, Handa Ma, Weihe Chen, Shiguang Ju
School of Computer Science and Telecommunication Engineering, Jiangsu University,
Zhenjiang,
China 212013
xuear@ujs.edu.cn

Abstract

Spatial outlier detection can be applied in the findingof terrorist activities and the forecast of abnormal climateactivity etc. For protecting privacy information andmining spatial outliers, we presented privacy preservingspatial outlier mining algorithm. By the definition andapplication of secure multiparty computation protocolsbased on semi-honest model, we realized the preservingof the privacy information. We utilized data miningoutlier factor (PPSLOF) to solve the mining of the spatial outlier, and used the resident linear list in memory andimproved R*-tree index to decrease the communicationamount, reduce the number of the input/output (I/O), andimprove the retrieval velocity, so the algorithm efficiencyis improved. The theory analysis shows that privacy preserving spatial outlier mining algorithm can efficientlypreserve the privacy data, and efficiently mine spatialoutliers.

Keywords: Privacy preserving, semi-honest model,outlier mining, R*-tree, spatial outlier.

A Fast Algorithm to Estimate Mutual Information for Image

Registration

Yongxiang Hu [1,2], Jingtian Tang [1], Hong Jiang [2], Sancheng Peng [2]
1. Institute of Biomedical Engineering, Central South University, Changsha 410083.
2. Institute of Computer & Communication, Hunan University of Technology, Zhuzhou 412008.
huyx506@163.com

Abstract

We propose an extension of mutual information anda new fast algorithm to accelerate the evaluation of mutual information of images. This algorithm adoptsgauss function as kernel function, and then uses fastgauss transform to reduce time complexity andimproves the fast gauss transform by adaptive k-centerclustering. The new algorithm can estimate smoothercurves of mutual information function with registrationparameter than original mutual information andevaluate the mutual information in linear timecomplexity. Experiments show it is very efficient.

Keywords: Image registration, mutual information,fast gauss transform, k-center clustering.

Business Process Mining Based on Simulated Annealing

Wei Song ShaoZhuo Liu Qiang Liu

School of Software, Tsinghua University

Beijing 100084, P.R.China

{w-song06, liusz04}@mails.tsinghua.edu.cn

liuqiang@mail.tsinghua.edu.cn

Abstract

In order to identify business processes effectively, historicaldata, such as event log, can be used as a base to retrieveabstract process model. The result of process miningcan provide necessary information to deploy process-awareinformation systems. Process structure patterns disclosing
the relationship among activities is one of the most importantaspects. To retrieve the process model comprehensivelyand quickly, this paper propose a simulated annealing processmining approach to address this issue.Main contribution of the work includes:(1)Apply the simulatedannealing approach under the setting of process mining.(2)Represent events as "causal matrix". (3)Evaluatethe mining result with a quantitative measurement, incorporatethe ideas above into existing simulated annealing algorithmto form an integrated solution. We give experimentalresults which created by the ProM, a platform for businessprocess mining, with the data it provides.

Keywords: Petri-net, process mining, simulate annealing

Simulation on Kinematics Law of Pedestrian

in Vehicle/Pedestrian Contacting Phase

Yanhui Fan Hongguo Xu Xibo Liu
Department of Transportation and School of Transportation School of Automobile
Logistics Engineering Jilin University Chang'an University
Shandong Jiao Tong University xhg@email.jlu.edu.cn lw3843@163.com
School of Transportation
Jilin University
fyh1989@163.com

Abstract

Based on the coupling of PC-Crash and embeddedMADYMO, the multi-body system models of vehicle andpedestrian involved in a vehicle/pedestrian collision areestablished and validated. Main factors influencing onpedestrian kinematics in vehicle/pedestrian contactingphase are extensively analyzed; furthermore, thesimulation test scheme is constructed from these factors.The kinematics laws of pedestrian such as motionposture, vehicle/pedestrian speed relationship andvehicle impact speed thresholds in vehicle/pedestriancontacting phase under different collision circumstancesare in depth studied by selecting these main influencingfactors as independent variables for simulation tests. The comparisons of simulation results with real worldand staged vehicle/pedestrian collisions have verified agood harmony and consistency of kinematics law ofpedestrian between them. The results in this paper willbe of an important value in analysis of pedestriankinematics in a vehicle/pedestrian collision.

Keywords: Vehicle/Pedestrian collision, contactingphase, kinematics law, modeling, simulation.

A Data Sharing Platform for Materials Service Safety Appraisement

Peng Shi Lianhong Ding
Scientific Center for Material Service Safety, School of Information,
University of Science and Technology Beijing Beijing Wuzi University
shipengustb@sina.com lhding_ict@hotmail.com

Abstract

Service safety appraisement of engineeringmaterials is important for public security. This paper describes a data sharing platform for safetyappraisement based on material scientific data. The data sharing platform consists of three layers: datacollection layer, data organization layer and data application layer. The data collection layer integratesthe methods, standards and data, including physicaland simulation experiment data, material basicproperties and service environment parameters. Thedata organization layer constructs the relationshipsamong data objects and properties through uniformdata models, based on ontology and the objectorientedtechnology. The data application layer satisfies the demands of research and application suchas intelligent materials selection, service life prediction and maintenance strategy making.Researchers can attain new rules of materials service

safety and engineers can also make optimal decisionsbased on the data sharing platform. An applicationcase is presented to show the intelligent procedure ofmaterials selection based on the platform withmaterials data.

Institute of Computer Science and Engineering, University of Electronic Science and Technology of
China, Chengdu, Sichuan, China
cn_caoyong@126.com

Abstract

The contribution of metrics to the overall objectiveof software quality is understood and fully recognizedby the software engineering community in general. In
the design and development of object-oriented softwarewe should keep information such as attributes andmethods in a module or class invisible to externalenvironment as possible. Although Method HidingFactor (MHF) and Attribute Hiding Factor (AHF) in asuite of metrics MOOD have been adopted to measurethe degree of information hiding. They are not sufficient,because they are method and attribute level that areonly finely granular and they are incomplete. Theinformation hiding metrics of class and system whichare coarsely granular and medium granular should beneeded. In this paper, improved metrics forencapsulation based on information hiding is proposedto satisfy the above need of different grains. The newmeasures are applied in an experiment to obtain results,and its validity, completeness and accuracy are proved.The new metrics will be impact on design anddevelopment of object-oriented software.

Simulation on Kinematics Law of Pedestrian

in Vehicle/Pedestrian Contacting Phase

Yanhui Fan Hongguo Xu Xibo Liu
Department of Transportation and School of Transportation School of Automobile
Logistics Engineering Jilin University Chang'an University
Shandong Jiao Tong University xhg@email.jlu.edu.cn lw3843@163.com
School of Transportation
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fyh1989@163.com

Abstract

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Keywords: Vehicle/Pedestrian collision, contactingphase, kinematics law, modeling, simulation.

A Data Sharing Platform for Materials Service Safety Appraisement

Peng Shi Lianhong Ding
Scientific Center for Material Service Safety, School of Information,
University of Science and Technology Beijing Beijing Wuzi University
shipengustb@sina.com lhding_ict@hotmail.com

Abstract
Service safety appraisement of engineeringmaterials is important for public security. This paper describes a data sharing platform for safetyappraisement based on material scientific data. Thedata sharing platform consists of three layers: datacollection layer, data organization layer and dataapplication layer. The data collection layer integratesthe methods, standards and data, including physicaland simulation experiment data, material basicproperties and service environment parameters. Thedata organization layer constructs the relationshipsamong data objects and properties through uniformdata models, based on ontology and the objectorientedtechnology. The data application layersatisfies the demands of research and application suchas intelligent materials selection, service lifeprediction and maintenance strategy making.Researchers can attain new rules of materials service safety and engineers can also make optimal decisionsbased on the data sharing platform. An applicationcase is presented to show the intelligent procedure ofmaterials selection based on the platform withmaterials data.
Keywords: Data sharing, engineering materials,service safety appraisement

Improved Metrics for Encapsulation Based on Information Hiding

Yong Cao Qingxin Zhu
Institute of Computer Science and Engineering, University of Electronic Science and Technology of
China, Chengdu, Sichuan, China
cn_caoyong@126.com

Abstract
The contribution of metrics to the overall objectiveof software quality is understood and fully recognizedby the software engineering community in general. Inthe design and development of object-oriented softwarewe should keep information such as attributes anmethods in a module or class invisible to externalenvironment as possible. Although Method HidingFactor (MHF) and Attribute Hiding Factor (AHF) in asuite of metrics MOOD have been adopted to measurethe degree of

information hiding. They are not sufficient,because they are method and attribute level that areonly finely granular and they are incomplete. Theinformation hiding metrics of class and system whichare coarsely granular and medium granular should beneeded. In this paper, improved metrics forencapsulation based on information hiding is proposedto satisfy the above need of different grains. The newmeasures are applied in an experiment to obtain results,and its validity, completeness andaccuracy are proved.The new metrics will be impact on design and development of object-oriented software.

Keywords: metrics, information hiding, encapsulation,object-oriented software

An Adaptive Watermarking Scheme Based on Nonsubsampled Contourlet

Transform for Color Image Authentication

Dongyan Liu, Wenbo Liu, Gong Zhang
College of Automation Engineering, Nanjing University of Aeronautics and Astronautics
Nanjing, 210016, China
E-mail address: dy030230305@163.com (D. Liu), wenboliu@nuaa.edu.cn (W. Liu), gzhang@nuaa.edu.cn (G. Zhang)

Abstract

In this paper, a new semi-fragile watermarkingscheme based on Nonsubsampled Contourlet Transform(NSCT) for color image authentication isproposed, in which the watermarking is embedded inthe SVs(singular values)of the blocks within NSCTsubbands by an adaptive quantized method. The eye isinsensitive to the blue color so the transform is used inthe blue segment of the color image. NSCT is aredundant transform that can increase the capacity ofthe watermarking and improve the tampering localization capability without causing noticeableartifacts. In order to improve the security of the scheme, a new two-dimensional transformed networkgenerated by the low-dimensional Tent chaotic map isused to encrypt the embedded watermarking. Theresults of the experiments show that the proposedscheme is robust to JPEG compression but extremelysensitive to malicious manipulations such astranslation and rotation.

Keywords—Watermarking, authentication, svd,nonsubsampled contourlet transform, chaos

Image Retrieval Based on MPEG-7 Dominant Color Descriptor

Hong Shao, Yueshu Wu, Wencheng Cui, Jinxia Zhang
School of Information Science & Engineering, Shenyang University of Technology, Shenyang

110178, P. R. China
E-mail: shaoh1974@hotmail.com

Abstract

The dominant color descriptor (DCD) is widelyapplied in the image retrieval taken as one of MPEG-7 color descriptors. DCD describes the representativecolor distributions and features in an image or a region of interest through an effective, compact andintuitive format. A novel image retrieval method basedon the fixed number's MPEG-7 dominant colordescriptor is proposed. The feature extraction processdoes not need the intervention of the threshold valueand the dominant color number is fixed as eight. Thehistogram intersection algorithm is used to measurefeatures, simplifies the similarity computation complexity.The experiment results show that the precisionand recall rate of this method is higher than that of
non-fixed number's dominant color retrieval method.

Pre-Processing of X-Ray Medical Image Based on Improved

Temporal

Recursive Self-Adaptive Filter

Hong Zhu, Weizhen Sun, Minhua Wu, Guixia Guan, Yong Guan
College of Information Engineering, Capital Normal University, Beijing 100037, China
E-mail: zhuh_coie@sina.com

Abstract

The random noises caused by different devices inthe process of X-ray imaging make images degraded, which results in incomplete or even incorrect medicaldiagnoses. The image pre-processing is the primaryprocedure of digital X-ray imaging device. Due to thefeatures of X-ray medical image, the temporalrecursive filter can be used, whose filtering coefficientdecreases exponentially with the difference of twoadjacent frames. However, considering the hardwareimplementation complexity in real-time dynamicprocessing, an improved self-adaptive filteringalgorithm is proposed, of which the filtering coefficientis generated by a linear decay function. We use a FieldProgrammable Gate Array (FPGA) and otherperipherals to design and implement the X-ray medicalimage pre-processing system based on the improvedself-adaptive filter. The design fundamentals andmethods are discussed in details, including videodecoder, encoder, processing, and display. The
experiment results show that the proposed algorithmand system improve the image's signal-noise-ratio effectively, after 4 to 8 frame recursions. The preprocessingsystem can be practically used in digital Xrayimaging device.

A Compression Framework for Personal Image Used in Mobile

RFID System

Wei Jiang, Dong Xiang
School of Software, Tsinghua University, Beijing, 100084, P.R.China
jiang-w06@mails.tsinghua.edu.cn, dxiang@tsinghua.edu.cn

Abstract

Radio Frequency Identification (RFID), a novelautomatic identification technology, has been widely used in modern society. To improve the security ofRFID card, a novel idea of inserting personal image tothe card and restoring it rapidly on the mobile deviceis proposed in this paper. A compression frameworkbased on facial feature is proposed to solve the keyproblem caused by memory limitation of RFID cardand resource limitations of the mobile system. In thisframework, the facial region is detected and extractedat first, and then compressed with high compression
ratio using fast lifting wavelet transform. After that, thecompressed data is encoded and saved in the card.Experimental results indicate that higher compressionratio, better image quality and rapid decompressioncan be achieved by using this framework.
Keywords: Image compression, fast lifting wavelettransform, face detection, RFID system.

A Method for Surface Reconstruction from Cloud Points Based on Segmented Support
Vector Machine

Lianwei Zhang, Yan Li, Jinze Song, Meiping Shi, Xiaolin Liu, Hangen He
College of Mechatronics Engineering and Automation
National University of Defence Technology
Changsha, Hunan, China
zhanglianwee@yahoo.com.cn

Abstract

Surface reconstruction based on Support Vector Machine(SVM) is a hot topic in the field of 3-dimension surfaceconstruction. But it is difficult to apply this method to cloudpoints. A reconstruction method based on segmented data isproposed to accelerate SVM regression process from clouddata. First, by *partitioning the original sampling data set,several training data subsets and testing data subsets aregenerated. Some segmentation technique is adopted to keep thecontinuity on the borders. Then regression calculation is executed on every training subset to generate a SVM model,from which a segmented mesh is obtained according to thetesting data subset. Finally, all the mesh surfaces are stitchedinto one whole surface. Theoretical analysis and experimentalresult show that the segmentation technique presented in thispaper is efficient to improve the performance of the SVMregression, as well as keeps the continuity of the subsetborders.*
Keywords: Surface reconstruction, support vector machine,segmentation

An Evaluation Index Based on Parameter Weight

for Image Inpainting Quality

Song Wang Hong Li Xia Zhu Ping Li

(School of Information Science and Engineering, Central South University, Changsha 410083, China)

E-mail: 3.141592654wangs@163.com

(School of Information Science and Engineering, Central South University, Changsha 410083, China)

E-mail: lihongcsu@mail.csu.edu.cn

(School of Information Science and Engineering, Central South University, Changsha 410083, China)

E-mail: vip_zhuxiasada@163.com

(School of Information Science and Engineering, Central South University, Changsha 410083, China)

E-mail: tncuslp@126.com

Abstract

Traditional image quality evaluation index cannotexplicitly reflect image inpainting quality. In order to make more reasonable measures on image inpainting,this paper proposed an evaluation method based onparameter weight through analyzing the reason forsubjective distortion feeling after image inpainting. Thenew method synthetically evaluates image inpaintingquality from three aspects: luminance, definition andgradient similarity. Experimental results demonstrate that the novel index can evaluate image inpainting qualitymore comprehensive and more similar to human eyesfeeling than traditional index.

Keywords: Image quality evaluation index, imageinpainting, parameter weight.

Main Feature Extraction and Expression for Religious Portrait

Thangka

Image

Jianjun Qian
*Information Technology Institute, Northwest
University for Nationalities, Lanzhou
730030, China
q_jianjun830@yahoo.com.cn*
Weilan Wang
*Information Technology Institute, Northwest
University for Nationalities, Lanzhou
730030, China
wangweilan@xbmu.edu.cn*

Abstract*A method based on the least-squares curve fitting
of orthogonal multinomial to express image contourcharacteristic was proposed in this paper, which
obtained successful application in head ornamentsfeature extraction and expression of Buddha,
Bodhisattva, Spiritual teacher of Thangka portraitimage. First, according to image components'
graylevelhistogram, chooses an appropriate thresholdvalue for further thresholding; Second,
transform pixelpoint of the image to coordinate points underrectangular coordinate system, then
extract typicalcontour and eliminate the imaginary point. Third, thecontour point which fits a
multinomial with the leastsquaresorthogonal multinomial distance fittingmethod, compares three data
with its square coefficientand four powers coefficient as well as goal object'sproportion of high and
width of Thangka image toexpress the image characteristic as feature vector.Experiments show that the
method is simple andeffective.*

Keywords: Thangka image, feature extraction,coordinate transformation, curve fitting.

An Efficient Spectral Method for Document Cluster Ensemble

Sen Xu [1], Zhimao Lu [2], Guochang Gu [1]
*[1] College of Computer Science and Technology, Harbin Engineering University,
Harbin 150001,
China
[2] College of Information and Communication Engineering, Harbin Engineering
University, Harbin
150001, China*

{xusen, lzm, guguochang}@hrbeu.edu.cn

Abstract

Cluster ensemble techniques have been recently shownto be effective in improving the accuracy and stability ofsingle clustering algorithms. A critical problem in clusterensemble is how to combine multiple clusterers to yield afinal superior clustering result. In this paper, we present an efficient spectral graph theory-based ensembleclustering method feasible for large scale applicationssuch as document clustering. Since the EigenValueDecomposition (EVD) of Laplacian is formidable forlarge document sets, we first transform it to a SingularValue Decomposition (SVD) problem, and then anequivalent EVD is performed. Experiments show that ourspectral algorithm yields better clustering results thanother cluster ensemble techniques without highcomputational cost.

Keywords: Clustering analysis, cluster ensemble, spectralclustering, document clustering.

A Method of Region-based Calculating Image Similarity for RBIR

System

Yong-mei Zhou[1] Jin-kuang Wang[1] Ai-min Yang[1,2]

[1]*School of Informatics, Guangdong University of Foreign Studies, Guangzhou 510006,China*
[2]*School of Computer, National University of Defense Technology, Changsha 410073,China*
E-mail:yongmeizhou@163.com

Abstract

Calculatation of image similarities is one of the keytechnologies for RBIR (Region-Based Image Retrieval)system.In this paper, a method of region-basedcalculatating image similarity was proposed. For thismethod, firstly, the similarity of two regions with thecombination features(color, texture and position),histogram and region shape features, was computed,respectively. Then, the similarity of two regions wascomputed by the weight product method. At last, theverage similarity of all regions was regarded as thesimilarity between two images. Three retrieval models and the implementation of image retrieval system wereintroduced also. This RBIR system can make personcomprehend the process of image retrieval and reducethe semantic gap to some extent. It can also overcomethe lack of region segmented imprecisely. Theproposed method and implementation system are testedusing the corel natural image database, and the resultsshowed that the retrieval performance was greatlyimproved

Multi-source Color Transfer Based on Multi-labeled Decision Tree

Yuejian Guo Hong Li Wei Zhang Yao Xiang
*(School of
Information Science
and Engineering,
Central South*

*University, Changsha
410083, China)
E-mail:
tianyahongqi@126.co
m
(School of
Information Science
and Engineering,
Central South
University, Changsha
410083, China)
E-mail:
lihongcsu@mail.csu.e
du.cn
(School of
Architecture
Engineering, Hunan
University, Changsha
410082, China)
E-mail:
Zhangweilh@yahoo.c
om
(School of
Information Science
and Engineering,
Central South
University, Changsha
410083, China)
E-mail:
xysy_221@sina.com*

Abstract

At present, most color transfer algorithms are basedon single source image, failing to meet reference colordemand of object image. This paper proposes aMulti-source Color Transfer algorithm based onMulti-labeled Decision Tree. At first, we define an imageas a multi-labeled set since it contains multiple objects.Then every source image is divided into severalsub-images to form the training samples for the DecisionTree. Through extracting color and texture features fromsub-image, training dataset is formed and theorresponding label set is obtained by amended K-meanclustering. After that, a multi-labeled decision tree isconstructed using SCC_SP. Finally, color transfer isperformed on object image based on its predicted labelset by the built tree. Experiment results demonstrate that the proposed algorithm works well on multi-source colortransfer, making up the shortage of color transfer basedon single source image.

Keywords: Color transfer, classification, multi-source,multi-labeled, decision tree.

A Novel Method for Image Spam Filtering

Hailing Huang, Weiqiang Guo, Yu Zhang
Research Institution of Computer Application,
South China University of Technology,China 510640
helly505@vip.sina.com, {wqguo, yzhang}@cellcom.com.cn

Abstract

As spamming morphs from text-only to multi-media incontent, the existing text-based spam filters are no longereffective for the task. Image analysis technology willprovide an effective tool to solve the above problem. Thispaper proposes a novel filter approach that focuses on thespam which change the content text to image files, orembed the spam message into attached images. Spam images are analyzed and specific features are selected forinspection based on Components-basedMethod. Then thenetwork junk-mail-filter system can use these features to identify whether to filter the mail or not by featurematching. Experiments show that our method is efficientin inspecting document images with different geometricstructure. The proposed method has potentialapplications in document image information extractionand filtering.

Keywords: Specific features, connected components,classifying scheme, keypoint descriptor, feature matching.

Precise Depth Perception in Projective Stereoscopic Display

Liping Lin, Pingdong Wu, Jie Huang, Jian Li
School of Mechanical and Vehicular Engineering,
Beijing Institute of Technology, Beijing,100081, China
E-mail: linliping@bit.edu.cn

Abstract

There is deviation between perceived depth andtheoretical depth of virtual object in stereoscopic virtual environment. This paper analyzes its possiblecauses with optical geometry. In addition, a correctingmethod performed by setting synthetic viewpointdynamically is proposed. Experimental results showthat this method can reduce the depth deviation to lessthan 10 millimeter, meeting the requirements forlocating and direct manipulation in virtualenvironment.

Keywords: Virtual reality, depth perception,stereoscopic display, head tracking display

Role-oriented Workflow Modeling Based on Object Petri Net

Zhijiao Xiao, Zhong Ming, Jianfei Yin
College of Information Engineering, Shenzhen University, Shenzhen, 518060, P R China
cindyxzj@yahoo.com.cn

Abstract

Using effective modeling ways can improve the quality of workflow models. A new role-oriented modeling way is presented to set up workflow process

models based on object Petri net. The details of each role are encapsulated in a role object net. The interfaces are provided for it to communicate with other roles. The cooperative relationships of roles are described in control object nets. An example is given to show the process of the presented modeling method.

Keywords: Workflow modeling, role-oriented, object petri net.

Explicit Model Checking Based on Integer Pointer and Fibonacci Hash

WanXia Qu, Tun Li, Yang Guo, XiaoDong Yang
National University of Defense Technology, P. R. China
quwanxia@nudt.edu.cn

Abstract

As the size of the formal model grows, the reachablestate space grows exponentially thereby creating statespace explosion problem. To alleviate the efficiencyand memory bottleneck of explicit model checking, wepresent a technique that efficiently organizes thereachable state space, and implement an efficientexplicit model checking system. The new method couldnot only effectively shorten verification cycle, but alsogenerates counter example in cases systemspecification is unsatisfiable, which helps systemdesigner to locate error rapidly. Experiments on somereal-world models are conducted. Analysis andexperiment results prove the effectiveness of ourmethod.

Research on Web Services Maiden Business Trust Metrics, Appraisal and Filtration Model

Lei Jiang [a, b *], Jianxun Liu [a, b]
[a] *Knowledge Grid Laboratory, Hunan University of Science and Technology,*
Xiangtan, 411201,
China
[b] *Institute of Computer Science and Engineering, Hunan University of Science and Technology,*
Xiangtan, 411201, China
E-MAIL: jleihn@hotmail.com

Abstract

Internet gives small and medium-sized enterprisesand individuals an easy way to set up web sites toprovide Web services throughout the world. But goodWeb services vendors are always intermingled

withbad ones. When we seek an unknown Web serviceprovider in an unfamiliar field, we must quantify trustbefore transaction and select the best vendor to assurethat everything works as we expected. In this paper, wesuggest an evaluation model of trust. We extract fivemaiden trust metrics from the vendors' web sites anduse a determinant matrix to appraise the trust. Finally,we show how to filter the best vendor by using fuzzylogic.
Keywords: Determinant matrix, fuzzy logic, maidentrust metrics, trust model.

An Effective Approach for Multi-rectangle Detection

Yueping He, Ziqiang Li
School of information and Engineering, Xiangtan University, Xiangtan 411105
(*E-mail:xtulzq@hotmail.com*)

Abstract

For multi-rectangle detection, this paper proposes anew approach using Restricted Group Hough Transform(RGHT) and rectangle's properties. Every image pixel isgrouped and used RGHT firstly. Then the Hough peaks areextracted and used to find possible rectangles. And the
possible rectangles are affirmed true by mechanism ofevidence collection at last. Numerical experimentsdemonstrate that this approach has better performancecompared with other existing algorithms.
Keywords: geometry graphics recognition; overlappedrectangle; multi-rectangle detection; Hough transforms;detection precision.

Research on Motion Vector Accuracy in

OvercompleteWavelet-Domain Scalable

Video Coding Based on Human Visual System Characteristics

Chuanming Song
Department of Computer Science & Technology
Nanjing University
Nanjing, 210093, China
chmsong@graphics.nju.edu.cn
Xianghai Wang
College of Computer & Information Technol.
Liaoning Normal University
Dalian, 116029, China
xhwang@graphics.nju.edu.cn
Fuyan Zhang
State Key Laboratory for Novel Software Technology
Nanjing University
Nanjing, 210093, China

fyzhang@nju.edu.cn
Abstract

This paper proposes an accuracy-distortion model forovercomplete wavelet-based scalable motion estimation byexploiting the theory of stationary random process. We firstestimate the motion compensation errors in spatial domaindue to inaccurate motion vectors, then extend the results to overcomplete wavelet domain, and further derive the errorscaused by fraction-pixel motion vectors. Finally, combiningwith a visibility model of wavelet coefficient errors, this paperproposes a novel algorithm to estimate the motion vectoraccuracy with which the motion compensation errors will be invisible. Experimental results show that the proposedalgorithm is effective in estimating the visually losslessaccuracy threshold of motion vectors. The proposedalgorithm can be used in scalable coding of motion vectors.Also it can accelerate the motion estimation speed by stoppinghalfway at the accuracy that will not cause any visibleerrors.

Keywords: Scalable video coding, scalable motion vector,human visual system, wavelet.

A Spreadsheet-like Construct for Streamlining and Reusing Mashups

Guiling Wang[1], Shaohua Yang[1,2], Yanbo Han[1]

[1]Research Center for Grid and Service Computing,
Institute of Computing Technology, Chinese Academy of Sciences,
[2]Graduate University of Chinese Academy of Sciences
Beijing, 100190, P.R. China
{wangguiling, yangshaohua}@software.ict.ac.cn, yhan@ict.ac.cn

Abstract

It is challenging to provide end users an easy-to-useproblem-solving tool to combine data from differentsources and reuse the results. Inspired byspreadsheets, we argue that spreadsheet-like programming paradigm can help to reduce thecomplexity and to improve user experience in building mashups. In this paper, we propose a spreadsheet-likeconstruct as the basis of this mashup building paradigm. The construct includes a data model, a"nested table" view structure and a set of carefully chosen mashup operators. Data from a variety ofsources is structured like a spreadsheet, and end-usersare not necessarily aware of the underlining data flow.SpiderCharlotte, a tool to help end users to buildsituational applications for their daily uses, wasdeveloped to demonstrate the characteristics of thisconstruct.

Keywords: Situational applications, mashups, nestedtable, end-user programming

A New Method for Camera Motion Estimation in Video

Lin Liu
Infromation & Electronics Engineering college of Zhejiang Gongshang university
Hangzhou, Zhejiang, China, 310018
LiuLin@zjgsu.edu.cn

Abstract

Camera motion estimation is important for videosemantic analysis and video classification. Cameramotion can be classified into several classes: camerarotation, camera translation, and camera

zoom, butordinarily we consider only camera translation andcamera zoom. Traditional approaches for cameramotion parameters estimation is features-based, andthey are dependent on the image quality and imagefeatures' characteristic. Traditional approaches arenot valid in the low-density texture images anddeformed images. In this paper we consider image'salgebraic character, and introduce a robust approachfor video camera motion parameters estimation. Scaleparameter is extracted based on edge images' singularvalue decomposition, and the translation parametersare extracted based on their phase difference of crosspowerspectral in frequency domain. Experimentsshow that this method is simple and efficient, and it isindependent of image features and robust in mostcases.
Keywords: Camera motion estimation, videoanalysis, translation parameters, scale parameters

A Novel Approach for Classifying Human Cancers

Shuqin Wang[1,2], Chunbao Zhou[1], Yingsi Wu[1], Jianxin Wang[3], Chunguang Zhou[1], Yanchun Liang[1*]

[1]*College of Computer Science and Technology, Jilin University, Key Laboratory of Symbol Computation and Knowledge Engineering of the Ministry of Education, Changchun 130012, China*

[2]*School of Mathematics & Statistics, Northeast Normal University, Changchun, 130024, China*

[3]*Department of Computer Science, Central South University, Changsha 410083, China*

E-mail: ycliang@jlu.edu.cn, wangsq562@nenu.edu.cn

Abstract

Various researches have shown that machine learning approaches can be successfully used to detect and classify cancer tissue samples by their gene expression patterns. In this paper, an entropy-based improved k-TSP method (Ik-TSP) is proposed. We calculate the entropy for each gene based on the gene expression profile, and then find the best threshold of entropy depending on LOOCV accuracy for each gene expression dataset. Finally we select key genes for each gene expression dataset according to the best threshold and use them to implement Ik-TSP method to classify the cancer. Compared to 7 cancer classifiers mentioned in this paper in 9 binary public gene expression datasets of human cancers, the Ik-TSP method achieves an average LOOCV accuracy of 95.39%, and improves 3% better than the k-TSP method. Simulated experimental results show that the proposed Ik-TSP method is applicable to classify human cancers.
Keywords: Entropy, classifying cancers, key gene, k-TSP, gene expression profile.

SVM Learning from Imbalanced Data by GA Sampling

for Protein Domain Prediction

Shuxue Zou[1], Yanxin Huang[1], Yan Wang[1], Jianxin Wang[2], Chunguang Zhou[1]

1. College of Computer Science and Technology, Jilin University, China, 130012
Key Laboratory of Symbol Computation and Knowledge Engineering of Ministry of Education
2. School of Information Science and Engineering, Central South University, Changsha,China,
410083
Shuxue Zou, sandror@163.com; Chunguang Zhou, cgzhou@jlu.edu.cn

Abstract

The performance of Support Vector Machines (SVM) drops significantly while facing imbalanced datasets, though it has been extensively studied and has shown remarkable success in many applications. Some researchers have pointed out that it is difficult to avoid such decrease when trying to improve the efficient of SVM on imbalanced datasets by modifying the algorithm itself only. Therefore, as the pretreatment of data, sampling is a popular strategy to handle the class imbalance problem since it re-balances the dataset directly. In this paper, we proposed a novel sampling method based on Genetic Algorithms (GA) to rebalance the imbalanced training dataset for SVM. In order to evaluating the final classifiers more impartiality, AUC (Area Under ROC Curve) is employed as the fitness function in GA. The experimental results show that the sampling strategy based on GA outperforms the random sampling method. And our method is prior to individual SVM for imbalanced protein domain boundary prediction. The accuracy of the prediction is about 70% with the AUC value 0.905.

Fast Mutation Operator Applied in Detector Generating Strategy

Xingbao Liu[1,2], Zixing Cai[1], Chixin Xiao[1]

1. School of Information Science and Engineering, Central South University,
Changsha 410083, China
2. Center of Modern Education Technology, Hunan Business College, Changsha
410025, China.
liuxb0608@gmail.com

Abstract

Inspired by the stimulated-responding mutation process of gene segment, a new mutation operator is proposed. The main characteristic is its mutation method, when one bit is mutated then the following contiguous bits are to be mutated according to the mutated, which make it owns better capability of local search. At the same time a new algorithm, named Contiguous somatic stimulated mutation algorithm (CSSMA), is given based on the novel mutation operator. Experiments showed, the CSSMA outperforms than some classical algorithms in term of the detective rate and time cost.

Keywords: artificial immune systems, negative selection algorithm, detection, B-cell algorithm, contiguous somatic stimulated mutation.

Research on Signaling Pathway Reconstruction Based on HMM

Shanhong ZHENG[1,2] , Chunguang ZHOU[1], Yanwen LI[3,1] and Guixia LIU[1]

1 Computer Science and Technology College, JiLin University, ChangChun, JiLin Province
130012, China
2 Computer Science and Engineering College, ChangChun University of Technology, ChangChun, JiLin Province 130012,China
3 School of Computer Science, Northeast Normal University, ChangChun, JiLin Province
130012,China
cgzhou@jlu.edu.cn

Abstract

Signaling pathway is a fundamental basis to understand the complex life process and the pathogenesis of disease. Developing a computing technology for deducing a signaling pathway is an active research area. NICO is a method of network reconstruction based on the co-occurrence genes. However, this method when applied to signaling pathway reconstruction can not effectively express the regulation directions between the genes. In this article, an improved method based on NICO method is proposed, called D-NICO method, where HMM is used as a model for reconstructing the signaling pathway. This method not only is capable of predicting gene regulation relationships, but also is capable of identifying gene regulation directions, which provide necessary information for further understanding the function of the signaling pathway and life process. At last, this article takes a PKA and MAPK signaling pathway reconstruction as an example to verify this method.

Keywords: pathway reconstruction, D-NICO method, signaling pathway, HMM model, regulation direction

Improved GVF Based Left Ventricle Segmentation from Cardiac MR

Images

Using Radial B-Snake Model

Jia Liang[1] and Yuanquan Wang[1,2]
[1]Beijing Laboratory of Intelligent Information Technology, School of Computer Science &
Technology, Beijing Institute of Technology, Beijing 100081, CHINA
[2] School of Computer Science, Tianjin University of Technology, Tianjin 300191, CHINA

Abstract

Segmentation of the left ventricle (LV) is a hot topic in cardiac magnetic resonance (MR) images analysis and still remains an open issue. In this paper, we propose a novel method, radial B-Snake model based on improved gradient vector flow (GVF), to segment LV automatically. Due to the left ventricle's circle-like shape prior in short-axis view, the region of interest (ROI) of LV could be transformed into polar coordinates by taking its centroid as an origin. In the transform image,

myocardium appears to be a horizontal band which enables snake to evolve towards 1D radial direction instead of 2D image plane simplifying the model and a line-shape constraint is incorporated to maintain the global features. For endocardium extraction, two-phase improved GVF strategy is developed to overcome image noise, artifacts and papillary muscles. For epicardium segmentation, GVF remodeled skillfully reactivates the resultant internal contour forward to epicardial boundary successively. Several experiments are presented to demonstrate the effectiveness and robustness of the proposed method.

Keywords: Left ventricle, image segmentation, Bsnake, GVF, polar coordinate transformation.

A Novel Approach of Face Detection Based on Skin Color Segmentation and PCA

Jing Zhang[1,2] Yang Liu[2] Seok-wun Ha[1]
zhj2004cn@hotmail.com liuyang@asust.edu.cn swha@gsnu.ac.kr
[1] *Dept. of Computer science, Gyeongsang National University, Korea*
[2] *School of Computer science and engineering,University of Science & Technology Liaoning,China*

Abstract

Nowadays, face detection and recognition have gained importance in security and information access. In this paper, an efficient method of face detection based on skin color segmentation and principal components analysis(PCA) is proposed. Firstly, segmenting image using color model to filter candidate faces roughly; And then Eye-analogue segments at a given scale are discovered by finding regions which are darker than their neighborhoods to filter candidate faces farther; at the end, PCA method is used to extract the relevant information in human faces.

Keywords: face detection, PCA, segmentation, eigenface, color space

A Genetic Algorithm for Single Individual SNP Haplotype Assembly

Jingli Wu[1,2], Jianxin Wang[1], Jian'er Chen[1]

[1]School of Information Science and Engineering, Central South University,

Changsha, 410083, China

[2]Department of Computer Science, Guangxi Normal University, Guilin, 541004,

China

Abstract

The minimum error correction (MEC) model is one of the widely accepted computational model for single individual haplotype reconstruction problem, and it has been proved to be NP-complete by Lippert et al.. Qian et al. presented a particle swarm optimization (PSO) algorithm to solve the model, and the length of a particle code is equal to the number of fragments. However, there are hundreds and thousands of fragments in practical applications, the PSO algorithm based on this kind of long particle code can not obtain high reconstruction rate efficiently. In this paper, a practical heuristic algorithm based on genetic algorithm (GA) is presented to solve the problem. A kind of short chromosome code and an effective climb operator are designed for the algorithm. Experimental results indicate that the algorithm designed in this paper can get higher reconstruction rate than the PSO algorithm.

Keywords: Single nucleotide polymorphisms, haplotype, the minimum error correction, genetic algorithm, climb operator

Greedily Mining *l*-dense Subgraphs in Protein Interaction Networks

Min Li, Jianxin Wang, Jian'er Chen, and Bin Hu

School of Information Science and Engineering

Central South University,

Changsha,410083,China.

Abstract

Dense subgraphs of protein interaction networks are believed to be potential protein complexes and play an important role in analyzing cellular organization and predicting functions of proteins. In this paper, we present a new algorithm LD-Miner for mining l-dense subgraphs in protein interaction networks. We apply algorithm LD-Miner to the protein interaction network of Saccharomyces cerevisiae collected from MIPS. Many well known protein complexes annotated by manually are detected. We also match our predicted clusters to the known complexes systematicly analyzed by Given et al., Ho et al., and Krogan et al.. Compared to other previous density-based algorithms, LDMiner matches much more experimentally determined complexes and known complexes by systematic analysis. Moreover, LD-Miner is very fast, which can be used in even larger biological networks.

***Keywords:** Protein interaction network, graph, dense subgraph, protein complexes.*

Dataflow Visual Programming Language Debugger

Supported by Fisheye View

Yangyi Sui, Lili Pang, Jun Lin

College of Instrument Science and Electronic

Engineering, Jilin University, Changchun,

China, 130061

Xiaotuo Zhang

School of Communication Engineering, Jilin
University, Changchun, China, 130022

Abstract

Programs developed by Dataflow Visual Programming Languages (DFVPLs) often contain lots of visual information. If more useful information could be displayed in the limited range of screen, the efficiency of debugging would be improved. We took full advantage of the characteristic of fisheye view that can display both "local detail" and "global context" simultaneously, improved the previous implementation models and algorithms, and solved the problems of using fisheye view on DFVPL such as nest hierarchy, the difference in nodes' size is big and wires are complex. We combined the debugger with fisheye view and proved its practicability and feasibility by some contrastive experiments.

Keywords: Dataflow visual programming language, debugger, fisheye view, information visualization, program visualization.

A Comparison of C/C++-based Software/Hardware

Co-design Description Languages

Ge Hu, Shengbing Ren, Xie Wang
School of Information Science and Engineering, Central South University, Changsha 410083, China

Abstract

Many description languages are used in hardware/software co-design of embedded systems. This paper presents the programming characteristics, structure peculiarities and design flow of three kinds of co-design description language based on C/C++: SystemC, ImpulseC and SpecC, which are quite effective in system-level design. This paper also introduces a co-design method based on Model Driven Architecture so that the mapping between UML and different design languages can be implemented by model transformation automatically. Then the abstraction level of the system design can be improved when the dimensions and complication be reduced. On the other hand, the advantages of various co-design languages can be utilized synthetically.

Keywords: co-design, SystemC, ImpulseC, SpecC, model transformation

Research on Model of Dual Core Aspectual Middleware & Dynamic

WeavingTechnology

Bin Wang, Jian Ding, Wei Zhu, Yunqiao Tan, Jinfang Sheng
School of Information Science and Engineering, Central South University, Changsha 410083, China

Abstract

This paper introduces the architecture and implementation of three typical middleware platforms, and analyzes their common deficiencies. As an improvement, this paper presents a new model of aspectual middleware called DCAM. DCAM is a hierarchical model, which introduces aspect-oriented functional support into the core layer as well as extension mechanisms of services and container. Compared with current models, DCAM has better architecture extensibility, greater manageability of dependency relationships and finer supporting granularity of AOP. Then the implementation of a dynamic aspect weaver (DAWeaver) based on BCEL classes library is presented. At last, this paper conducts a performance analysis of DCAM and DAWeaver.
Keywords: On-Demand Computing, aspectual middleware, DCAM, BCEL, dynamic weaving

Efficient Top-k Keyword Search on XML Streams

Lingli Li Hongzhi Wang Jianzhong Li Jizhou Luo
Harbin Institute of Technology

Abstract

Keywords can be used to query XML data without schema information. In this paper, a novel kind of query is proposed, top-k keyword search over XML streams. According to the set of keywords and the number of results, such query can retrieve the top-k XML data fragments most related to the keyword set. A novel ranking strategy for search result is proposed to represent the relativity of XML segments and the query. In order to efficiently and effectively process the top-k keyword query on XML streams, based on this ranking strategy, a stack-based algorithm is proposed to dynamically obtain the top-k results with the highest ranks at any time, with a filtering method to delete redundant elements. Extensive experiments are performed to verify the effectiveness and efficiency of the algorithms presented in this paper.
Keywords: XML streams, keyword search, top-k.

Low Power Optimization for MPI Collective Operations

Yong Dong, Juan Chen, Xuejun Yang, Canqun Yang, Lin Peng
School of Computer, National University of Defense Technology, China

Abstract

*DVFS-available (Dynamic Voltage/Frequency Scaling) processors make it possible for a system to reduce the energy consumption by scaling down the frequency/voltage of the processors in high performance computing. For MPI collective operations, network communication time occupies the most of the whole time. Scaling down CPU voltage/frequency in non-critical path can effectively reduce energy consumption. This paper proposes **Low-Power MPI_Gather algorithm (LPMG)** and **Low-Power MPI_Scatter algorithm (LPMS)** and extend them to almost all the MPI collective operations. We evaluate the effectiveness of our low-power MPI collective operation algorithm using Intel MPI benchmark IMB on 128-processor cluster system connected by a 1000Mbps Ethernet. Experimental results show that different MPI collective operations can achieve different energy saving. With 128 processes, average 45.9% and 55.7% energy savings can be reached through **LPMG** and **LPMS**, respectively. But MPI_Alltoall only gets 2.2% energy saving.*

Scheduling Real-Time Nested Transactions in Mobile Broadcast Environments

Xiangdong Lei Wuke Li Xiaoli Yuan

School of Information Science and Engineering, Central South University, Hunan Changsha 410083, P.R. of China

Abstract

This paper presents MVOCC-NT protocol for processing mobile real-time nested transaction in mobile broadcast environments. The protocol can eliminate conflicts between mobile read-only and mobile update nested transactions, and resolve data conflicts flexibly using multiversion dynamic adjustment of serialization order to avoid unnecessary restarts of transactions. Transaction validation is performed at two phases: pre-validation and final validation. At the MHs, all mobile transactions perform pre-validation of transactions. At MHs Transactions that survive in pre-validation must be submitted to the server for final validation. Such an early data conflict detect detection feature can save processing and communication resources. For a ready-only nested transaction at the MH, it can be committed locally if it passes all the pre-validation in the course of it execution. The simulation results show that the new concurrency control protocol proposed offers better performance than other protocols.
Keywords: Mobile real-time database systems; nested transaction; muliversion optimistic concurrency control; multiversion dynamic adjustment; pre-validation; multiversion data broadcast

A Subsystem Division Method by Clustering

Zhijian Wang

Information Science School, Guangdong University of Business Studies,

Guanzhou 510320，China

Abstract

State explosion problem is the primary obstacle to model complex system with Petri nets; modularization and hierarchy provide ways to solve this problem. When the bottom-up method is adopted, system functions in the lower layers are combined to obtain sub systems. The idea of clustering is introduced to decide which functions should be combined. The operation to combine two functions is defined; the distance between two functions is calculated by the degree of relevancy; a clustering algorithm with the idea of nearest-neighbor-first is designed to divide functions into sub systems. The function clustering method presented in this paper facilitates the Petri nets based system developing process.
Keywords: Petri nets, clustering, nearest-neighborfirst, algorithm, modularization.

Energy-Saving Service Scheduling for Low-End Cyber-Physical Systems

Wei Jiang, Guangze Xiong, Xuyang Ding
School of Computer Science and Engineering,
University of Electronic Science and Technology of China, Chengdu, 610054, P.R.
China

Abstract

Energy consumption and timely requirements are two key factors affecting the performance of missioncritical cyber-physical systems. Little work deals with scheduling a set of time-sensitive services in a finite time interval. We consider a server serving N users in time interval [0, T]. Each user demands its service to be completed in a strict deadline. Based on convex power-speed relationship, a lazy schedule policy is designed to minimize energy expenditure of N missioncritical services without violating temporal constraints. Simulations show its significant energy efficiency comparing to a non-lazy schedule.

Keywords: Cyber-physical systems, mission-critical, service schedule, energy-saving.

An Approach to Software Architecture Testing

Lijun Lun
College of Computer Science and
Information Engineering
Harbin Normal University, Harbin 150080
Hui Xu
College of Computer Science and
Information Engineering
Harbin Normal University, Harbin 150080

Abstract

Software architecture has emerged as an important sub-discipline of software engineering. This paper proposes a novel software architecture testing technology using π calculus. π calculus is of rigorous mathematical foundation and well-defined semantics. Petri net provides a graphical description technique that is easy to understand and carry on analysis. We make π calculus combined with Petri net and propose mapping relationship based on them. Then we will introduce π Behavior Graph using the mapping relationship and π-ADL that takes its roots in previous works concerning the use of π calculus as semantic foundation for architecture description languages. We propose seven testing coverage criteria from black-box and white-box perspectives and give its formal description in πBG respectively. At last, we build a prototype tool that implements the π-ADL approach to the specification of software architecture and generates test paths. We use TRMCS as a typical architecture model to illustrate our testing technology.

Keywords: Software architecture, software testing, □ calculus, testing criteria, test paths.

Research on Translucent Mechanism-Based Infeasible Path

Lili Pan
School of Computer and Communication,
Hunan University, Changsha, Hunan, China
lily_pan@163.com
Beiji Zou
School of information science and engineering,
Central South University, Changsha, Hunan,
China
Hao Chen
Software school, Hunan University, Changsha,
Hunan, China
Haoyu Zhou
School of information science and engineering,
Central South University, Changsha, Hunan

Abstract

Infeasible paths increase program complexity and program redundancy, generate useless DU(def-use) chains, and affect the result of program static analysis. Based on the valid information produced in the process of program compilation, this paper presents a translucent technique to analyze infeasible paths. It first requires the complier construct an information pool for each judge node and variables used in the node, and find out key infeasible branches of infeasible paths with these information, which is transparent to the tester; then the tester can judge if the tested path is infeasible or not with these key infeasible branches, which is opaque to the tester. By analyzing infeasible paths, we can refine the DU chain information. In our experiment, we analyze infeasible paths in multi SPEC95 benchmark programs with the translucent method and the demand-driven method. The result shows that time consumption is fewer with our method.

Keywords: Data flow, infeasible path, key branch, DU chain, translucent mechanism.