A Possibilistic Mean Absolute Deviation Portfolio Selection Model

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Abstract: This paper deals with a mean absolute deviation portfolio selection problem with fuzzy return rates under fuzzy liquidity constraint, a new possibilistic programming approach based on possibilistic mean and fuzzy liquidity has been proposed, the problem can be reduced to a linear programming by possibility theory. A numerical example of portfolio selection problem is given to illustrate our proposed approach.

Keywords: Portfolio selection, absolute deviation, possibilistic mean, possibility theory, fuzzy liquidity.

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Abstract:

In this paper a new weighted-path-following method is presented, to solve the monotone horizontal linear complementarity problem. The algorithm is based on a new technique for finding a class of search directions and the strategy of the central path. At each iteration, we only use full-Newton step. Finally, the currently best known iteration bound for the algorithm with small-update method, namely, $O(\sqrt{n} \log \frac{2}{\epsilon})$ is deserved, which is as good as the linear analogue.

Keywords:

Horizontal linear complementarity problems, interior-point methods, small-update method, iteration bound.
Application of System NCF method to ice flood prediction of 
the Yellow River

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Abstract: Combined forecasts is a well-established procedure for improving forecasting accuracy which takes advantage of the availability of both multiple information and computing resources for data-intensive forecasting. Therefore, based on the combination of engineering fuzzy set theory and artificial neural network theory as well as genetic algorithms and combined forecast theory, the system Non-linear Combined Forecast (NCF) method is established for accuracy enhancement of prediction, especially of ice flood prediction. The NCF values from single forecast model for Inner Mongolia Reach of the Yellow River are given. The case shows that the method has clear physical meanings and precise consequences. Compared with any single model, the system NCF method is more rational, effective and accurate.

Keywords: Intelligent forecast, system NCF, ice flood of the Yellow River

Logistic Randomized Response Model

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Abstract: Sensitive topics or highly personal questions are often faced in medical psychological and socio-economic survey. Warner’s pioneering randomized response (RR) device, as a method for reducing evasive answer bias while estimating the proportion of people in a community bearing a sensitive attribute, has been studied extensively over the last four decades. This paper proposes a new model (named the logistic model) for survey sampling with sensitive characteristics, and provides the suitable estimators for estimating an unknown proportion of people bearing a sensitive characteristic in a given community. That is a development for some existing research results concerning the randomized response theory. A numerical study comparing the performance of the proposed procedure and Warner’s (1965)[10]procedure is reported.

Keywords: Warner’s randomized response technique; Sensitive variable; Auxiliary variable; Estimation of proportion.
New Modification of Fuzzy c-means Clustering Algorithm

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Abstract: In this paper we propose a new distance to replace the Euclidean distance in fuzzy c-means (FCM) clustering algorithm. Two examples are given to show that the new FCM algorithm is suitable to deal with clustering problems.

Keywords: FCM algorithm, Euclidean distance, Mahalanobis distance, Friedman test

Autonomous Mobile Intelligent Robots on Fuzzy System with Optimal Theories

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Abstract: A dynamical model for autonomous mobile intelligent robots is presented. Based on the local information of the swarm, a fuzzy logical controller (FLC) of the attraction/repulsion function is built. Combining with the rate consensus algorithm, the swarming of the separation, cohesion and alignment is achieved. Based on the optimal controller theories, a performance target is used to measure the states of the system. By applying the connected network from the individual local perceived information, the aggregation of the multi-agent systems can swarm following a whole consensus in the computer simulation.

Keywords: Autonomous Mobile Robots; Alignment; Fuzzy System; Dynamical Model.
Dynamical Fluid Control Model on Fuzzy Control

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Abstract: Network congestion control algorithm decides the quality of service (QoS) of network. Based on the mechanism of TCP windows control, a fuzzy logical controller (FLC) is presented as a substitute for active queue management (AQM) algorithm to control the fluids. The FLC is applied to realize the switch between a sliding-mode controller (SMC) and a state feedback controller (SFC). Finally, the stability of the new algorithm is proved.

Keywords: Fluid control; fuzzy control; switch; quality of service.

Entropy for Interval-valued Fuzzy Sets

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Abstract: A non-probabilistic-type entropy measure for interval-valued fuzzy set (IVFS) is proposed. It is a result of a geometric interpretation of IVFS and uses a ratio of distances between them. It is also shown that the proposed measure can be defined in terms of the ratio of interval-valued fuzzy cardinalities: of $F \cap F^c$ and $F \cup F^c$.

Keywords: Distance between IVFSs; Cardinality between IVFSs; Entropy between IVFSs.
\( \omega \theta \)-convergence theory of nets in \( L\omega \)-spaces

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**Abstract:** In this paper, the \( \omega \theta \)-convergence theory of fuzzy nets in \( L\omega \)-spaces is introduced. Some properties of the \( \omega \theta \)-convergence theory are discussed. It can be used to characterize the weakly \((\omega_1, \omega_2)\) continuous functions in \( L\omega \)-spaces.

**Keywords:** \( L\omega \)-space; \( \omega \theta \)-convergence; \( \omega \theta \)-limit point; \( \omega \theta \)-cluster point; weakly \((\omega_1, \omega_2)\) continuous function.

Some single machine scheduling problems with an actual time-dependent and position-dependent learning effect

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**Abstract:** In this paper, we introduce an actual time-dependent and position-dependent learning effect into single-machine scheduling problems. The learning effect of a job is assumed to be a function of the sum of actual processing times of the jobs already processed and the job’s scheduled position. We show that under certain conditions, the problems with classical objectives such as make-span, sum of \( k \)th power of the completion times, total weighted completion time, maximum lateness and number of tardy jobs remain polynomial solvable.
S-rough Sets and $\mathcal{F}$-knowledge hiding-discovery

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Abstract: Singular rough sets (for short S-rough sets) have three forms: one direction S-rough sets, dual of one direction S-rough sets and two direction S-rough sets. Dynamic, hereditary, mnemonic and hiding properties are the basic characteristics of S-rough sets. By employing two direction S-rough sets, the concepts of $(f,\mathcal{F})$-hiding knowledge, $\mathcal{F}$-hiding knowledge, hiding degree and hiding dependence degree are given. Then the hiding theorem and the hiding dependence theorem of hiding knowledge are proposed. Finally, an application of hiding knowledge to profit analysis of economy system is presented.

Keywords: Two direction S-rough sets, $(f,\mathcal{F})$-hiding knowledge, hiding degree, hiding dependence degree, hiding theorem, hiding dependence theorem.
The Comparison about the Clustering Analysis Based on the Fuzzy Relation

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Abstract: Fuzzy approaches are playing an important role in data mining. This paper in details analyses and compares the fuzzy clustering approaches based on the fuzzy equivalence relation, the fuzzy similarity relation, the fuzzy maximum tree and the optimized tree. According to the comparison, this paper gives a conclusion: the first three approaches referred are equal and the forth approach has the lowest degree of distortion, and finally verifies the conclusion by an instance.

Keywords: Clustering analysis; fuzzy equivalence relation; fuzzy similarity relation; maximum tree; the optimized tree.

The IDC Membership Distance between Vague Sets and Its Application

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Abstract: Based on the dynamic tendency of vague sets and the three-dimension of element membership to a vague set, a method of comparing the two vague sets by means of set pair analysis (SPA) is put forward. First, according to the positive, negative and uncertain membership of vague sets, the IDC (Identical Discrepancy Contrary) and weight IDC membership of vague set are defined; then, the IDC and weight IDC membership distance between vague sets are defined; last, the IDC membership distances between vague sets are applied to pattern recognition, which testifies the validity and simplicity of this method.

Keywords: Vague sets, IDC membership distance, Set pair analysis.
The theoretical methods of constructing fuzzy inference relations

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Abstract: In this paper a theoretical method of selecting fuzzy implication operators for the fuzzy inference sentence as “if $x$ is $A$, then $y$ is $B$” is presented. By applying representation theorems, thirty-two fuzzy implication operators are obtained. It is shown that the thirty-two fuzzy implication operators are generalizations of classical inference rule $A \rightarrow B$, $A^c \rightarrow B$, $A \rightarrow B^c$ and $A^c \rightarrow B^c$ respectively and can be divided four classes. By discussion, it is found that thirty fuzzy implication operators among 420 fuzzy implication operators presented by Li can be derived by applying representation theorems and two new fuzzy implication operators are obtained by the use of our methods.

Keywords: Fuzzy Set; Cut Set; Representation Theorem; Fuzzy Inference; Implication Operator.

Existence And Uniqueness Of Anti-Fuzzy Ideal

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Abstract: Let $S \subseteq [0, 1]$ satisfying $s = \inf S \in S$ and $C = \{I^t | t \in S\}$ be an ascending chain of ideals in commutative ring $R$. This article presented and studied the following problem:

1. Whether is there an anti-fuzzy ideal $\mu$ of $R$ such that $\mu(R) = \{\mu(x) | x \in R\} = S$ and $C_\mu = \{\mu^t | t \in \mu(R)\} = C$?

2. If the anti-fuzzy ideal satisfying (1) exists, then whether is it unique? We built theorems of existence and uniqueness of anti-fuzzy ideal.

Keywords: Anti-fuzzy ideal, order-isomorphic, cut set
Fuzzy Bayesian Discriminant on Two Non-fuzzy Groups S

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Abstract: In this paper, we discuss the discriminant approach of two non-fuzzy groups under fuzzy environment. Then, we take the normal school as a representative example.

Keywords: Discriminant, normal school, non-fuzzy group. ECM

Fuzzy Bayes Estimate of Linex Loss Function

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Abstract: This article is to discuss Bayes Estimate and Experience Bayes Estimate of the two side truncated distribution families of Linex Asymmetric Loss Function in fuzzy space, and show that the relevant estimate is acceptable.

Keywords: Linex Loss Function, Bayes Estimate, Experience Bayes Estimate, Acceptability.
Generated Fuzzy Ideals and its Lattice Structures in Semiring

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Abstract: The properties and lattice structures of generated fuzzy ideals in semiring are studied, and some perfect results are obtained.

Keywords: Generated fuzzy ideal; lattice; atoms; semiring.

Grey Assignment Problems

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Abstract: This paper introduces a new assignment problem called the Grey Assignment Problem, in which the cost of assigning every worker to every job is a grey number rather than a real number. We establish the mathematical model of the grey assignment problems and concerned theory, and also give some methods for solving the grey assignment problems.

Keywords: Assignment problem, Cost, Grey number, Mathematical model.
Lattice Minimal Automata and Lattice Reduced Automata

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Abstract: We apply lattice ordered monoids in the study of lattice finite automata, and obtain some results similar to the ones of fuzzy finite automata. In this paper, the concepts of lattice minimal automata and lattice reduced automata are put forward, and the relationship of them associated with an L-language is discussed. Moreover, the L-fuzzy equivalence relation on states is defined, and an algorithm to minimize the lattice finite automata is presented based on clustering states.

Keywords: Lattice minimal automata; Lattice reduced automata; L-regular language; L-fuzzy equivalence; Clustering
The theoretical methods of constructing fuzzy inference relations

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Abstract: In this paper, a theoretical method of selecting fuzzy implication operators for the fuzzy inference sentence as "if x is A then y is B" is presented. By applying representation theorems, thirty-two fuzzy implication operators are obtained. It is shown that the thirty-two fuzzy implication operators are generalizations of classical inference rule A → B, A′ → B, A → B′ and A′ → B′ respectively and can be divided four classes. By discussion, it is found that thirty fuzzy implication operators among 420 fuzzy implication operators presented by Li can be derived by applying representation theorems and two new fuzzy implication operators are obtained by the use of our methods.

Keywords: Fuzzy Set; Cut Set; Representation Theorem; Fuzzy Inference; Implication Operator.

The Y-compactness in L-fuzzy topological spaces

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Abstract: In this paper, we introduce the Y-compactness in L-fuzzy topological spaces. It possesses the following properties: (1) Y-compactness is hereditary for Y-closed subsets, (2) Y-compactness is preserved under Y-irresolute mapping, (3) Every set with finite support is Y-compactness. The Y-compactness is defined for arbitrary L-fuzzy subsets. It is described with α-net, α-filter, r-Y-cover form and r†-finite intersection property.

Keywords: L-fuzzy topological spaces; Y-closed set; Remote-neighborhood; Compactness; Y-compactness.
The Characteristics of Singular Rough Sets on $CS(K)$

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Abstract: The concept nodes on $CS(K)$ (Concept Lattice on formal context $K$ is marked $CS(K)$) are made equivalence class partition. The paper analyzes the characteristics of rough sets and singular rough sets on $CS(K)$ and gives their definitions and theorems, reveals their relationship. Also, Instances are presented to illustrate the characteristics of singular rough sets on $CS(K)$.

Keywords: Rough sets, singular rough sets, $CS(K)$.

Application of Fuzzy Theory to Binomial Option Pricing Model

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Abstract: This paper presents an extension of the binomial option pricing model, which has the capabilities to cope with uncertain assumptions. Such assumptions are represented and dealt with in the framework of fuzzy theory. As the stock price can not be known exactly in advance, the approach of taking stock price as fuzzy price is more realistic and be easily accepted. In this paper, we take stock price in each node as fuzzy variable instead of crisp, then build a fuzzy binomial tree model and get numerical result in one period case. The simulation for fuzzy multiperiod binomial pricing model is also provided.

Keywords: Options; Binomial option pricing; Fuzzy theory.
Weighted Semi-supervised Fuzzy Clustering

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Abstract: Semi-supervised fuzzy clustering plays an important role in discovering structure in data set with both labelled and unlabelled data. The proposed method learns the task of classification and feature selection through the generalized form of Fuzzy C-Means. Experimental results illustrate appropriate feature selection and classification accuracy with both synthetic and benchmark data sets.

Keywords: Semi-supervised clustering, feature weight.

Equivalence between Mizumoto Lattice Finite Automata

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Abstract: We use lattice-ordered monoids in the study of Mizumoto lattice finite automata. In this paper, we give the definition of its matrix presentation and establish the statewise equivalence relations of Mizumoto lattice finite automata originally. Moreover, the automata equivalence relations are obtained and two algorithms deciding the equivalence between Mizumoto lattice finite automata are constructed.

Keywords: Lattice-ordered monoid; Lattice finite automata; Equivalence.
Solving fuzzy linear systems based on the structured element method

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Abstract: According to the structured element method, this paper investigates general fuzzy linear systems of the form $Ax = y$ with $A$ matrices of crisp coefficients and $y$ fuzzy number vectors. The necessary and sufficient condition for a fuzzy solution existence is given.

Keywords: General fuzzy linear systems; fuzzy numbers; the structured element method; same formal function.

Solving general fuzzy linear systems

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Abstract: This paper investigates general fuzzy linear systems of the form $Ax = y$ and general dual fuzzy linear systems of the form $Ax + y = Bx + z$ with $A, B$ matrices of crisp coefficients and $y, z$ fuzzy number vectors. The aim of this paper is twofold. First, by the unique least Euclidean norm solution we solve the systems with no full rank matrices $A, B$. Second, We give the new necessary and sufficient conditions for a strong fuzzy solution existence. Moreover, some numerical examples are designed.

Keywords: General fuzzy linear systems; general dual fuzzy linear systems; least Euclidean norm solution; monotone function.
Power Relations and Their Properties

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Abstract: Power relation is firstly presented in this paper. Some operations of power relation are discussed, especially, weak composed operation is introduced and studied. Then, some properties of power relation itself are described, and some special power relations are defined. Afterward, upgraded and decent power relation are introduced and their properties are given.

Keywords: Relation; power relation; upgraded power relation; descent relation.

Support Vector Machines Based on Sectional Set Fuzzy K-means Clustering

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Abstract: When support vector machines (SVMs) deal with two-class classification, there are the problems of long training time and low classification accuracy which are aroused by the complexity of computation for the kernel function and the existence of noise samples. Hence, the training samples are clustered by Sectional set fuzzy k-means clustering and SVMs is trained by valid cluster centers, so that the training speed and classification accuracy are improved obviously.

Keywords: Support Vector Machines, Training Samples, Sectional Set Fuzzy K-means Clustering, Clustering Validity.
Fuzzy Neural Network Optimization by a Multi-Objective Differential Evolution Algorithm

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Abstract: Designing a set of fuzzy neural networks can be considered as solving a multi-objective optimization problem. An algorithm for solving the multi-objective optimization problem is presented based on differential evolution through the max-min distance density and a Pareto candidate solution set maintenance method. The search for the Pareto Optimal Set of fuzzy neural networks optimization problems is performed. Numerical simulations for taste identification of tea show that the algorithm is feasible and efficient.

Keywords: Differential evolution; fuzzy neural network; fuzzy rule.

Normal MP-filters of R₀-algebras

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Abstract: The aim of this paper is to introduce the notion of normal MP-filters and investigate the structure of R₀-algebras. The relations between normal MP-filters and MP-filters, and between normal MP-filters and filters are discussed. The extension property of normal MP-filters is established. The characteristic properties of normal MP-filters are obtained. Finally, normal R₀-algebras are completely characterized via the normal MP-filters.

Keywords: R₀-algebra (NM-algebra); normal R₀-algebra; normal MP-filter
Ranking Fuzzy Numbers Based on Ideal Solution

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Abstract: In this paper, we consider the factor of the decision maker's risk preference, and define the left and right deviation degree, respectively. Besides we propose the new formula of the fuzzy degree. Then we get the multi-attribute matrix of fuzzy numbers. Making use of ideal solution we rank fuzzy numbers. Some numerical examples are displayed to illustrate the validity and advantage of the proposed ranking method.

Keywords: Fuzzy number, ranking, the left and right deviation degree, fuzzy degree, ideal solution.
Adaptive Failure Detection algorithm for Grid Systems

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Abstract: Aimed at the grid system being more in failure and existing failure detection algorithms being not able to satisfy the unique requirement of grids, it was presented to a kind of adaptive failure detection algorithm in this paper. According to the characteristics of grids and the small world theory, the authors established a sort of small world based grid system model and a sort of failure detection model. By means of combining unreliable fault detection method with heartbeat strategy and grey prediction model, it was designed to dynamic heartbeat mechanism, and presented to the adaptive failure detection algorithm for grid systems further. Experimental result demonstrates that it is valid and effective in method, and it can be used for fault detection under grid environment.

Keywords: Grid; Small-world; Grey prediction; Heartbeat strategy; Fault detection.

Study on Image Segmentation Algorithm Based on Fuzzy Mathematical Morphology

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Abstract: Aimed at the noise and exiguity catchment basin of image being easy to result in over-segmentation phenomenon when adopted traditional watershed algorithm to segment the image, the paper explored a sort of new improved image segmentation algorithm based fuzzy mathematical morphology. The method firstly adopted opening-closing algorithm based fuzzy mathematical morphology to smooth the image. Then it computed gradient operators based mathematical morphology. Lastly, it segmented the gradient image based on fuzzy mathematical morphology to get the result. The simulation experiment result showed that it not only can eliminate the over-segmentation phenomenon resulted from traditional mathematical morphological segmentation algorithm and realize the goal separation from the background fully, but also can save image detail more completely when using the new image segmentation algorithm based fuzzy mathematical morphology to segment image. And it explains that the new improved algorithm has a better usability.

Keywords: Fuzzy Mathematical Morphology; Gradient Operator; Image Segmentation.

\( \rho \)-connectivity in \( L \)-fuzzy Topological Spaces

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Abstract: It is known that connectedness is one of the important notions in topology. In this paper, a new notion of connectedness is introduced in \( L \)-topological spaces, which is called \( \rho \)-connectedness. It contains some nice properties. Especially, the famous K. Fan’s Theorem holds for \( \rho \)-connectedness in \( L \)-topological spaces.

Keywords: \( L \)-topological, \( \rho \)-connectedness, \( \rho \)-separated.
Lax Invariant in Coalgebra

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Abstract: In [1], Bart Jacobs and Jasse Hughes have brought in a new kind of functor. They took the order on a functor as a new functor. Based on that, they defined and researched some new notions about bisimulation. We take this new functor into the research of invariant in coalgebra, get the definition of predicate invariant, then we define and research several new notions. In the last, we can reach some conclusion about invariant. It is worth pointing out that we find the sufficient condition to make two-way lax invariant and invariant coincide, and prove that the great lax invariant is exactly the largest fixed point of some special functor coalgebra in set category.

Keywords: Invariant, Lax predicate lifting, Lax invariant, Fixed point, Final category.

Properties of Basic Fuzzy Implication Algebra

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Abstract: Fuzzy Implication algebra is a kind of algebraic abstraction of implicative connection of logic system which values in [0,1]. In this paper, the logic properties of implication operator were given on the frame of Basic Fuzzy implication algebra. Some lattice properties of it were obtained when the basic implication algebra was regular.

Keywords: Fuzzy Logic, Fuzzy Implication Algebra, Basic Fuzzy Implication Algebra, Regularity, Lattice.
SSP-Urysohn Spaces in L-Topological Spaces

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Abstract: In this paper, we introduce the concept of SSP-Urysohn space in L-topological spaces, and establish some of its fundamental properties, where L is a fuzzy lattice.

Keywords: L-topology; remote-neighborhood; strongly semi-preclosed sets; SSP-Urysohn space.

An Improved Ant Colony Optimization Applied to Attributes Reduction

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Abstract: Attribute reduction problem (ARP) in rough set theory is an NP-hard problem, which is difficult to use fast traditional method to solve. In this paper, we discuss about the difference between the traveling salesman problems (TSP) and the ARP, and then we bring up a new state transition probability formula and a new pheromone traps increment formula of ant colony optimization. The results demonstrate that the improved ant colony optimization is better than initial ant colony optimization used in attribute reduction and more suitable for ARP.

Keywords: Ant Colony Optimization, Attribute Reduction, Rough Sets Theory.
The Direction Entropies for Intuitionistic Fuzzy Sets

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Abstract: Fuzzy positive entropy, fuzzy negative entropy and fuzzy entropy for intuitionistic fuzzy sets in [12] are studied. We discover that there is a contradiction between the definitions and the entropy theory defined by Szmidt in [8]. After that, new concepts of fuzzy positive entropy, fuzzy negative entropy and fuzzy entropy for intuitionistic fuzzy sets are proposed by Shannon function. Finally, their properties are discussed. The results show that the properties of our entropy is more weak than Szmidt, but it is useful to distinguish two different intuitionistic fuzzy sets.

Keywords: Intuitionistic fuzzy sets; Fuzzy positive entropy; Fuzzy negative entropy; Fuzzy direction entropy

Similarity Measure and Fuzzy Entropy of Fuzzy Number Intuitionistic Fuzzy Sets

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Abstract: Based on the similarity measure of trigonometric fuzzy numbers, similarity measures for measuring the degree of similarity between elements and between some fuzzy number intuitionistic fuzzy sets are defined by the one-to-one correspondence relation between the distance and similarity measure. At the same time, the fuzzy entropy for fuzzy number intuitionistic fuzzy sets is proposed. After that, their properties are discussed and an example about the application of similarity measure to pattern recognitions is given.

Keywords: Trigonometric Fuzzy Number, Fuzzy Number Intuitionistic Fuzzy Set, Similarity Measure, Fuzzy Entropy.
The Premise Reduction of SMTT Inference Algorithm

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Abstract: The comprehensive model with "weighted-objective nearness degree" is introduced in the process of multi-objective decision-making, by which a reduction problem of inference antecedents in traditional fuzzy inference method is studied. Moreover, SMTT fuzzy inference algorithm based on the comprehensive model with "weighted-objective nearness degree" is proposed. This algorithm not only shows the relative importance of every antecedent component in fuzzy inference, but also considers the influence of nearness degree between every antecedent component’s evaluation and inference objective on inference conclusions. The enactment of inference objective reflects the preference degree of decision-maker to every antecedent component’s evaluation. Therefore, it is much more fit for the demands of practical inference.

Keywords: Fuzzy Inference, SMTT Fuzzy Inference Algorithm, Weighted-objective Nearness Degree.
A characterization for intuitionistic fuzzy sets based on the assistant sets generated by s-rough sets

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Abstract: In this paper, we first give the definition of intuitionistic fuzzy sets induced by assistant set which is generated by one direction s-rough sets and two direction s-rough sets. Then, we using intuitionistic fuzzy sets to characterize the properties of assistant sets.

Keywords: Intuitionistic fuzzy set; assistant set generated by one direction s-rough sets; assistant set generated by two direction s-rough sets.

Stability of Periodic Solution to Fuzzy BAM Neural Networks with Time-varying Delays

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Abstract: In this paper, employing Lyapunov functional and elementary inequality \(2ab \leq ra^2 + \frac{1}{r}b^2\), for some sufficient conditions are derived for the existence and uniqueness of periodic solution of fuzzy bi-directional associative memory (BAM) networks with time-varying delays, we obtain some new and simple criteria to ensure global exponential stability of periodic solution. These criteria are important in the design and applications of fuzzy BAM neural networks.

Keywords: Fuzzy BAM neural networks, Periodic solution, Global exponential stability, Time-varying delays.
A portfolio selection problem with fuzzy return rate

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Abstract: The aim of this paper is to develop a portfolio selection model with fuzzy return rate. Fuzzy number is used to model the anticipative return rate of security, and an index is defined to measure the variability of the portfolio return. By taking the possibilistic mean as the portfolio return and the variability as the portfolio risk, a portfolio selection model is constructed. It is shown that there exists an optimal solution in the model, and the solution can be obtained by solving a convex quadratic programming problem.

Keywords: Portfolio selection; Convex quadratic programming; Fuzzy number.

Saddle point optimality conditions in fuzzy optimization problems

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Abstract: The fuzzy-valued Lagrangian function of constrained fuzzy programming as well as its duality are proposed via a new concept of fuzzy ordering, and the duality theorems are given. At the same time, the sufficient condition for the optimal solution of the fuzzy optimization problem is obtained by virtue of the saddle point of fuzzy-valued Lagrangian function, and the necessary condition for the optimal solution of the convex fuzzy optimization problem is also presented.

Keywords: Convex fuzzy mapping; fuzzy Lagrangian function; duality; saddle point.
Tactile Sensor Signal Processing with Artificial Neural Networks

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Abstract: Tactile sensor array is the device that provides distributive information of force at the interface between the sensory surface and the object. Together with fine-form reconstruction and primitive recognition, it has to be the main feature of an artificial tactile system. The system presented here is based on the back propagation neural network model used to tactile pattern recognition. All the tactile data acquisition and processing model using a neural network model is programmed to realize the real-time and precise recognition of a contact force position, which enables the contact position of a constant force to be determined within accuracy. Experimental results show that the high level interpretation method for this system enables automatic determination of contact position and orientations in real time.

Keywords: Tactile Sensor, Neural Networks, Back Propagation, Pattern Recognition.
Approximation of Intersection of Grade and Precision

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Abstract: Grade and precision are two important confidence levels. In this paper, the connection and combination between them are studied. The connection between graded approximations and variable precision approximations is studied, and the important formula of conversion is achieved. Approximation of intersection of grade and precision is defined based on logical "and" operation of grade and precision, and its construction is achieved, which becomes important theory base for decreasing computing complexity and computing quantity of application algorithm of graded rough sets and variable precision rough sets. Graded rough sets and variable precision rough sets are united and included by the approximation of intersection of grade and precision. The study on combination and unity of graded rough sets and variable precision rough sets in this paper, has important value on both theory development and practice application.

Keywords: Rough Sets, Graded Rough Sets, Variable Precision Rough Sets, Confidence Levels, Grade, Precision.
Research on Missile Supportability Evaluation

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Abstract: Firstly, the definition of supportability and intension were expos-nded, as well as the requirement of supportability parameters and concrete classification. Next, combined the content of missile supportability, missile supportability evaluation system was built on the foundation of many kinds of weapon supportability parameters. By AHP and grey evaluation methods, missile supportability evaluation model was built; and a concrete example was given for quantified evaluation. The result was consistent with the estimating result of experts, so verified the feasibility of the method in missile supportability evaluation.

Keywords: Missile supportability evaluation.
Crime Pattern Discovery and Fuzzy Information Analysis Based on Optimal Intuition Decision-Making

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Abstract: On purpose of improving the research in intuition learning system when the knowledge in hand is not sufficient, a learning model of fuzzy degree based on intuition index is presented. From the initial intuition decision system defined by the experience judgment, a series of learning interval-systems with various experience levels are created. Firstly, human intuitive decision making gotten by the learning approach of self-organization of intuition decision processing, and the concept mapping of selection of knowledge and experience is established by artificial intuition method based on the decision trait of human intuition. Finally, an artificial intuition method combined with self-organization method of intuition computing is proposed according to the amelioration of the fuzzy computing. Experiment proves that the Intuition Concept Space and the Intuition fuzzy mapping pattern inversion (IFMPI) approach are feasible. The IFMPI Application is currently being deployed at the Dalian Police Department (DPD) and the ICMI is undergoing further modifications. Future development efforts for intuition decision project will also be discussed.

Keyword: Intuition, experience level, intuition index, self-organization, artificial intuition, crime pattern discovery
Directed Completions and DM-completions on $\mathcal{R}$–Posets

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Abstract: As an enrichment of single order the notion of $\mathcal{R}$-posets have been introduced by Ji Wen in [8]. Let $(P, \sqsubseteq)$ be a poset and $\omega$ the natural number set whose order is denoted by $\preceq$. If $\mathcal{R} = (\sqsubseteq_n)_{n \in \omega}$ is a family of partial orders on $P$ such that (i) $\forall n, m \in \omega, m \leq n$ implies $\sqsubseteq_n \preceq \sqsubseteq_m$, and (ii) $\bigcap_{n \in \omega} \sqsubseteq_n = \sqsubseteq$, then call $(P, \sqsubseteq)$ a poset with partial order family $\mathcal{R}$ ($\mathcal{R}$-poset for short), denoted by $(P, \sqsubseteq : \mathcal{R})$. It provides possibility to interpret or measure the complex information in stepwise computing. We will write simply $P_n = (P, \sqsubseteq_n)$ and $P = (P, \sqsubseteq)$ respectively if no confusion can rise.

Let $C(P_n)$ be some completion of $P_n$. It is of interest to know the connections between $C(P_n)$ and $C(P_{n+1})$ or between $C(P_n)$ and $C(P)$. Let $\mathcal{O}(P)(\mathcal{O}(P_n))$ and $\mathcal{I}(P)(\mathcal{I}(P_n))$ denote all lower sets and all ideals of $P(P_n)$ respectively. It concludes that $\mathcal{O}(P_n) \subseteq \mathcal{O}(P_{n+1}) \subseteq \mathcal{O}(P)$ for all $n \in \omega$ which implies that $\bigcup_{n \in \omega} \mathcal{O}(P_n) \subseteq \mathcal{O}(P)$. But if we require that $\mathcal{I}(P_n) \subseteq \mathcal{I}(P_{n+1}) \subseteq \mathcal{I}(P)$ and $\sqsubseteq_n = \sqsubseteq$ for all $n \in \omega$ then $\sqsubseteq_n = \sqsubseteq$ for all $n \in \omega$. The Dedekind-MacNeille completions (DM-completion for brevity) are also investigated. It is concluded that $\sqsubseteq_n = \sqsubseteq$ for all $n \in \omega$ if $\sqsubseteq_{n+1}$ is a close subrelation of $\sqsubseteq_n$ for all $n \in \omega$. The Galois connections can be well preserved on every order in $\mathcal{R}$–poset.

It is worth pointing out that several interesting examples are indicated
Study on Remodeling of Fuzzy PID Controller Based on RBF Neural Network

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Abstract: Though fuzzy PID controller is characterized by the excellent control quality, there still exist the problems of computation complexity and poor real-time performance. To solve the problems, a known fuzzy PID controller is accurately remodeled based on the universal approximating ability of RBF NN (radial basis function neural network). With parallel computing ability, the remodeled RBF NN can simplify the computation complexity and enhance the real-time performance of fuzzy PID controller. Given the different setting signals, the control performances of fuzzy PID controller and remodeled RBF NN are compared. Results show that the control qualities of the two controllers are extremely similar. Thus, the remodeled RBF NN can replace the fuzzy PID controller to reduce the computation complexity, avoid the curse of dimensionality and improve real-time performance.

Keywords: fuzzy PID; RBF neural network; function approximation; remodeling the curse of dimensionality
Fuzzy Hyper-Topological Group

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Abstract: Based on the intuitive idea of convergent, this paper has proposed a new hyper-topological and upgraded two mathematic structure of topological group to fuzzy power set respectively. And then we proved that the multiplication operation and contradictory operation are continuous in hyper-topology after the two kinds of mathematical structure of topological group are upgraded to the new fuzzy power set. Some basic results about Fuzzy Hyper-Topological Group are obtained, and finished the unprecedented work that upgrade topological group to fuzzy power set.

Keywords: Upgrade, hyper-topology, hyper-group, hyper-topological group, Fuzzy hyper-topological group.

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Abstract: This paper analyzes a series of the construction data of Guangzhou University Town (GUT) with the third-party judging, basing on synthetic evaluating index systems of project construction of GUT. We establish the Fuzzy Hierachy Synthetic Evaluating model which takes into account the expert knowledge and policy investment, and apply this model to evaluate the construction enterprise of GUT. This model provides a system for evaluating manage standard and technology strength of construction enterprise, forecasting the result of construction and increasing the controlling capability of the GUT-commander. The present study provides not only offer a quantitative basis for the project-planning, but also give a referable scientific method for the evaluation of any large engineering project management in future.

Keywords: SESS(synthetic evaluating software system), FHSE (Fuzzy Hierachy Synthetic Evaluating) model, GUT (Guangzhou University Town), project construction.
Presentation and Relationship of the Structure of Hypergroup

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Abstract: This paper is a further study on the structure and interrelationship of hypergroups. By revealing the nature of the relationship between hypergroup and regular group, the present paper proves some theorems of the structure of hypergroup and constructs some theorems on the homomorphism and isomorphism of hypergroup as well.

Keywords: Hypergroup; structure; homomorphism; isomorphism.
Regional Economic Evaluation Method Based on Fuzzy C-Mean Clustering and Rough Set’s Property Importance Theory

—Comprehensive evaluation of county economic development level in henna

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Abstract: Applying fuzzy and rough set theory, researching into the sample’s clustering analysis and each factor’s reasonable authorization with regard to evaluation and prediction, the thesis gives fuzzy clustering based on the primitive statistics without human prior knowledge. On this basis, the thesis mines each evaluation factor weight from primitive statistics and develops new method of comprehensive evaluation. In accordance with the index system given by Henan Province Statistics Bureau in 2003 and the data in Henan Province Statistics annals in recent three years, it carries out a clustering positive analysis of county economic comprehensive development condition in Henan province in recent three years, takes a power mining from each evaluating factor and conducts a comprehensive evaluation and analysis of the county economic development level according to the calculated results.

Keywords: Fuzzy set; rough set; fuzzy c-mean clustering; weight mining; county economic development level.
The Fixed Point of Fuzzy Complex Number-Valued Mapping

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Abstract: In this paper, we introduce the concepts of fuzzy complex number, the operations of fuzzy complex number, the concepts of convergence for fuzzy complex number-valued sequence and the fuzzy complex number-valued mapping. Then the fixed point of fuzzy complex number-valued mapping is discussed, some existent theorems of this mapping are given. It will establish a foundation for researching fuzzy complex analysis.

Keywords: Fuzzy complex set, Fuzzy complex number, Fuzzy complex number-valued mapping, The fixed point of fuzzy complex number-valued mapping.

Archimedean t-norms and an open Problem

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Abstract: In this paper, we summarize some Archimedean properties and characterize some new Archimedean properties of triangular norms on \([0, 1], \leq\). An open problem on pseudo-Archimedean t-norms, recently posed by E.P. Klement [Fuzzy Sets and Systems 145 (2004) p473], is discussed.

Keywords: Archimedean t-norms; cancellation law; conditional cancellation law; continuous.
Research on Fuzzy Multiple Objective Decision Model of Evaluation of Gas Well Deliverability

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Abstract: Gas well deliverability, as a parameter of a dynamic feature, is one of the most important targets of evaluation of gas wells. According to this, we can understand the intrinsic relationship between the gas well and the whole gas pool. The development of gas pool will be more reasonable and efficient when we evaluate the classified gas wells and conduct some anticipation searches on them.

Evaluating the off take potential based on well log data is a new extension aspect of the comprehensive interpretation of well log data. We built up a membership function of gas well reservoir based on some static parameters, such as degrees of porosity, permeability, gas saturation and its effective thickness. We also built up a model evaluating gas well deliverability according to fuzzy multiple objective decision. We then classify the gas wells and judge them using Bayes decision rule. In addition, we test the model on classifying the testing gas wells and convince ourselves the method proposed here. It also supplies with a strong theoretical basis on deciding project of testing gas, implementing stimulation treatment and gas production proration.

Keywords: Oil/gas reservoir deliverability, fuzzy multiple objective decision, analytical hierarchy process, Bayes decision rule.
Iterative method for dual fuzzy linear systems

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Abstract: A simple iterative method for solving dual fuzzy linear system, \( x = Ax + u \) in which \( A \) is a real \( n \times n \) matrix, \( x \) and \( u \) are unknown and given \( n \)-dimensional fuzzy vectors, and its convergence were obtained by X. Wang et al (Iteration algorithm for solving a system of fuzzy linear equations, Fuzzy Sets and Systems, 119(2001)121-128). However, only a sufficient condition to convergence of the iteration was given. In this paper, a metric of fuzzy vectors is defined and the completeness of fuzzy vector space with this metric is argued. In the complete metric space a sufficient and efficient condition to convergence of simple iteration and error estimation for using it to get solution of the dual fuzzy linear system are obtained.

Keywords: Fuzzy numbers, Iterative method, Dual fuzzy linear system, Fuzzy vector space, Spectral radius.

Bayes Method of Multiple Fuzzy Assumptive Test of Unilateral Truncation Distribution Model under Linex Loss

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Abstract: Fuzzy assumptive test is a very important condition of dealing with fuzzy concept in statistical decision-making. For multiple fuzzy assumptive test of unilateral truncation distribution dimension parameter, this article studies the bayes method under linex loss function in the condition of destiny cut trail.

Keywords: Fuzzy assumption, bayes test, truncation distribution, linex loss function.
A multi-criteria decision making method on intuitionistic fuzzy sets

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Abstract: This paper discusses a multi-criteria decision making model on intuitionistic fuzzy sets. Based on the similarity measure between intuitionistic fuzzy sets, a novel method is shown for a multi-criteria decision making model, the starting point of the proposed method is a geometrical interpretation of intuitionistic fuzzy set. An alternative is mapped to an intuitionistic fuzzy value by using the degree of the similarity, and then a score function is used to measure the degree of suitability that an alternative satisfies the decision maker’s requirement. Examples are given to show the proposed method’s effectiveness.

Keywords: Intuitionistic fuzzy set; Intuitionistic fuzzy value; Similarity measure; Ideal point.

Series of Hybrid Variables

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Abstract: The concept of series of hybrid variables is introduced. Based on the convergence of hybrid sequences, some concepts of convergence of series are presented and their some relations are studied. Furthermore, equivalence between convergence almost surely and convergence in chance is obtained for series of globally weak independent hybrid variables.

Keywords: Hybrid variables, series, convergence, weak independence.
T-Fuzzy Subgroups with Thresholds

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Abstract: This paper mainly studies the T-fuzzy subgroups with thresholds. Product concepts of fuzzy sets are generalized to \( t \)-norm and properties of T-fuzzy subgroups with thresholds are discussed.

Keywords: Fuzzy Subgroups, T-Fuzzy Subgroups, Products of fuzzy Sets, T-fuzzy subgroup with thresholds.

\((\bot, T)\)-Generalized Fuzzy Rough Sets based on Fuzzy Composition Operations

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Abstract: This paper mainly studies the fuzzy composition expressions of the \( \bot \)-lower and \( T \)-upper approximations and the approximation characteristics of generalized rough sets based on fuzzy composition operations.

Keywords: Fuzzy rough set, Fuzzy composition operation, \((\bot, T)\)-generalized fuzzy rough set.
An New Initialization Method for Fuzzy c-Means Algorithm Based on Density

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Abstract: In this paper an initialization method for fuzzy c-means (FCM) algorithm is proposed in order to solve the two problems of clustering performance affected by initial cluster centers and lower computation speed for FCM. Grid and density are needed to determine the number of clusters and the initial cluster centers automatically. Experiment shows that this method can improve clustering result and shorten clustering time validly.

Keywords: Fuzzy c-means algorithm, Initial cluster center, Grid, Density.

On Coordination of Supply Chain Based on Information Asymmetry of Effort Level and Fuzzy Market Environment

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Abstract: The agent’s private information contributes greatly to the principal's decision in the supply chain coordination. Therefore, it is the important issue for the principal to design an effective incentive mechanism in order to get the true information from the agent. Assuming that the demand is dependent upon the agent’s effort level and the fuzzy market condition, this paper researches and analyses the principle-agent problem under fuzzy information asymmetry condition using the theory of principal-agent and incentive mechanism.

Keywords: Principal-agent theory, incentive mechanism, fuzzy information asymmetry, market demand, triangular fuzzy number, lot-sizing order.
An Efficient Algorithm for Pawlak Reduction Based on Simplified Discernibility Matrix

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Abstract: Since the definition of attribute reduction based on classic discernibility matrix is different from the definition of attribute reduction based on positive region, simplified discernibility matrix and the corresponding definition of attribute reduction are proposed. At the same time, it is proved that the proposed definition of attribute reduction is identical to the definition of attribution reduction based on positive region. For computing simplified discernibility matrix, IND(C) should usually be calculated at first, so a new algorithm for computing IND(C) is designed, whose temporal complexity is cut down to $O(|C||U|)$. Furthermore, an efficient attribute reduction algorithm is proposed, whose temporal complexity and spatial complexity are cut down to max($O(|C|^2|U_\text{pos}| |U'|-O(|U||C|))$ and max($O(|C||U_\text{pos}| |U'|), O(|U|)$) respectively. At last, an example is used to illustrate the efficiency of the new algorithms.

Keywords: Rough set, discernibility matrix, simplified discernibility matrix, attribute reduction, complexity.
Singular Rough Sets Method in Attribute Generalization

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Abstract: In this paper, element equivalence class with dynamic characteristic is introduced into Z.Pawlak rough sets, and it is extended to singular rough sets, singular rough sets has dynamic characteristics. By using of singular rough sets, this paper presents a method for updating approximations of a set, such method can support incremental updating of approximations, which is essential to dealing with dynamic attribute generalization, results in this paper can be applied to rough classification efficiently from very large data bases.

Keywords: Singular rough sets, data mining, boundary, approximation, rough classification.
L-fuzzy Relative SP-compact Sets

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Abstract: The concept of relative SP-compactness is introduced in L-fuzzy topological spaces. Some characteristic theorems of relative SP-compactness are given in terms of α-net, α-filter, r-sp-cover form and $r^+$-finite intersection property. Relationship between relative SP compactness and SP-compactness is investigated. Finally, it is proved that the relative SP-compactness is preserved under SP-irresolute mapping.

Keywords: L-fuzzy topological spaces; fuzzy lattice; semi-preclosed; remote-neighborhood; relative SP-compactness.
A Hybrid Particle Swarm Optimization Algorithm for Vehicle Routing Problem with Stochastic Travel Time

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Abstract: Vehicle Routing Problem with stochastic travel time (VRPST) is of crucial importance in today’s industries, especially in logistics distribution. This paper presents a hybrid particle swarm optimization algorithm (HPSO) to solve the problem. A chance-constraint model considering capacity of vehicle is founded. The VRPST was changed into a quasi-continuous problem by designing a real number coding. Constrained terms were processed by the penalty function. Cooperating with dynamic neighborhood and the weight value of variable inertia, the proposed HPSO can find the global optimum. The results are compared with those by both standard particle swarm optimization (SPSO) and improved genetic algorithm (IGA). The illustrations indicate that HPSO can improve success rate of searching best route and is effective for VRPST.

Keywords: Particle swarm optimization; chance-constrained programming model; stochastic vehicle; neighbor operator.

PS-closedness in L-topological spaces

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Abstract: A new notion of PS-closedness is introduced in L-topological spaces, where L is a fuzzy lattice. PS-closedness is a weaker form of pre-semiopenness, and it is a stronger form of P-closedness and S*-closedness, respectively. It is a good L-extension of PS-closedness of topological spaces and preserves many good properties of closedness in topological spaces.

Keywords: Fuzzy lattice, L-topology; Pre-semiopen set, PS-closedness.
Fuzzy Complex Value Measure and Fuzzy Complex Value Measurable Function

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Abstract: Based on the conception of real fuzzy measure. Firstly, the definition of fuzzy complex measure is introduced, the properties of fuzzy complex measure is mainly discussed in details. And gain Some better results; secondly, we introduce the conception of fuzzy complex function and fuzzy complex measurable function and initially discuss the basic properties of fuzzy complex measurable function. Establish the foundation for further research in fuzzy complex integral.

Keywords: Fuzzy set; fuzzy complex measure; fuzzy complex function; fuzzy complex measurable function.

On the Study of Linear Properties for Fuzzy-number-valued Fuzzy Integrals

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Abstract: In this paper, we firstly studied the absolute values for fuzzy numbers and introduced the inequality of absolute values for fuzzy numbers in the condition of H-difference. In the end we discussed linear properties of fuzzy integrals whose coefficients are fuzzy numbers.

Keywords: Fuzzy Numbers, Fuzzy Integral, Linear Property.
The Intuitionistic Anti-fuzzy Subgroup in Group $G$

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Abstract: On the basis of the intuitionistic fuzzy sets introduced by K. Atanassov, we first give definition to intuitionistic anti-fuzzy subgroups over group $G$ and intuitionistic anti-fuzzy normal subgroups, which are different from the definitions in [1][3] and [5]. This paper proves a necessary and sufficient condition of intuitionistic anti-fuzzy subgroups and conditions of equivalence of intuitionistic anti-fuzzy normal subgroups. Some properties of theirs and quotient groups of intuitionistic anti-fuzzy normal subgroups are also discussed.

Keywords: Intuitionistic fuzzy sets; Intuitionistic anti-fuzzy subgroups; Intuitionistic anti-fuzzy normal subgroups.
Networked Monitoring System Based on Embedded Dynamic Web

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Abstract: Aimed at the puzzle of heterogeneous data integration for networked monitoring system, the paper presented a sort of solution based on embedded dynamic web. By means of the embedded Web server based on high performance CPU and the approach of Apache+HTML+PHP, The servers distributed in the industrial field of control system were interconnected through industrial Ethernet, and composed a wide area network system based on Web service. The field bus of control system was connected to Web server in the field local area to complete the integrated monitoring of field device. The realization of dynamic Web browse completed through control unit. The results of the practical test show that it is feasible and effective, high in security level, stronger in anti-jamming, better in environment adaptability, and higher in real time performance.

Keywords: Embedded system; Protocol conversion; Networked monitoring system

The Properties and Application of Target Nearness Degree

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Abstract: In this paper, we point out the insufficiency of balance degree which presented in [6], And introduce the definition of target nearness degree. Some properties of target nearness degree is investigated, and its application in realistic life is presented through a practical example.

Keywords: variable weight; target nearness degree; departure degree; weight nearness synthesis.
Application of artificial neural networks to classify water quality of the Yellow River

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Abstract:

Within the period from 2003 to 2005 (high water, normal water and low water) 63 samples are collected and the measurement of 10 chemical variables of the Yellow River of Gansu period, are carried out. These variables are dissolved oxygen (DO), chemical oxygen demand (COD), non-ion ammonia (NH₃), volatilization Hydroxybenzene (OH), cyanide (CN), As, Hg, Cr⁶⁺, Pb, and Cd. For handling the results of all measurements different chemoinformatics methods are employed: (i) The basic statistical methods that uniform design is employed to determinate the data set according to the water quality standard, (ii) MLP neural network (BP) and Probabilistic neural networks (PNN) are used to classify the water quality of different sampling site and different sampling time. The correlation between the water quality classes and chemical measurements is sought. The model between the water quality classes and chemical measurements is built, and these models could quickly, completely and accurately classify the water quality of the Yellow River.

Keywords:

water quality, classification, ANN, PNN, MLP, The Yellow River
Convex interval and fuzzy (valued) functions with functionals

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Abstract: The writer in this paper, on the foundation of interval and fuzzy (value) function, interval and fuzzy (value) functional variation, puts forward a concept on convex interval and convex fuzzy (value) function with functional, gives the definition of a convex function and convex functional about an interval, a common function at fuzzy points, a fuzzy-valued function at common points and a fuzzy-valued function at fuzzy points, and judges their convexity condition. This lays a foundation on the application of fuzzy optimal theories and fuzzy variation methods at physical and approximate calculation.

Keywords: Convex interval function with functional; Convex Fuzzy (valued) function with functional; Fuzzy point; Fuzzy optimization.

ωδ-Convergence Theory in $L_ω$-Spaces

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Abstract: In this paper, the $ωδ$-convergence theory of nets and ideals in $L_ω$-spaces is established. By means of the $ωδ$-convergence theory, some important characterizations with respective to the $ωδ$-closed sets and $(ω_1, ω_2)$-$δ$-continuous mappings are obtained. Moreover, the mutual relationships between $ωδ$-convergence of molecular nets and $ωδ$-convergence of ideals are given.

Keywords: Fuzzy lattice; $L_ω$-space; Molecular net; Ideal; Fuzzy mapping; $ωδ$-convergence.