

MATHEMATICAL AND COMPUTER MODELLING**Geological Spatial Database And Visualization Modelling Methods For Mining Groundwater**

Wang Wensheng, Zhang Feng, Xue Huifeng, Zhang Yongheng

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It is one of the research hotspot and difficult of the mining groundwater three-dimensional information and visualization for hydroinformatics, to solve the problem of groundwater hydrology geological spatial database and visualization of 3D geological modelling, proposed a three-dimensional geological modelling method based on finite difference method, and the mine hydrogeological spatial database, the groundwater survey information database, 3D geological modelling based on GIS, groundwater spatial visualization of 3D data model and key algorithms are created. Simulation results show that can realize the hydrogeological space in Yulin area database and 3D visualization of geologic model and spatial hydrological data processing method provides a unified data model, the analysis of hydrological data support a large space, and lays the foundation for the dynamic control model refinement.

Keywords: three-dimensional visualization, groundwater, hydrogeological spatial database, modelling methods

Method of NC processing for the cover of auto gearbox

Zhang Chunyan, Qiao Yinhu, Sun Liang, Wang Lizhong

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In this paper, the common car gearbox cover is studied as a processing object, the reasonable technology and equipment is selected based on the figure process firstly. The standard processes and process card are developed through reasonable process, the PRO/E software is used for the processing set, solid modelling, then the processor and the machine code generating, The MATLAB Genetic Algorithm Toolbox is applied for the optimization of cutting parameters.

Keywords: CNC processing; Parameters optimization; the cover of auto gearbox; PRO/E

Robust model predictive control for descriptor systems with time-delay via dynamic output feedback

Zhang Dongwen, Zhang Wei, Zhang Chenxi

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The robust model predictive control was investigated for a class of descriptor systems with time-delay and uncertainty, and the dynamic output feedback control law was considered. The systems were transferred to the piecewise continuous descriptor systems and a piecewise constant control sequence was calculated by minimizing a quadratic optimal objective function. At each sampling period, by means of Lyapunov theory and variable transformation, the optimal problem with infinite horizon objective function was reduced to a convex optimization problem involving linear matrix inequalities. The sufficient conditions on the existence of the dynamic output feedback control were derived. Further, an iterative model predictive control algorithm was proposed for the on-line synthesis of dynamic output feedback controllers with the conditions guaranteeing that the closed-loop descriptor systems were regular, impulse-free and robust stable. Finally, a numerical example was presented to show the effectiveness of the proposed approach.

Keywords: Model Predictive Control; descriptor System; Dynamic Output Feedback; Variable Transformation; Linear Matrix Inequality

A new algorithm of SAR target recognition based on advance deep learning neural network

Xu Hui, Gu Hong

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In order to improve the accuracy of synthetic aperture radar images target recognition, we have proposed a new algorithm of SAR target recognition based on advance Deep Learning neural network. The traditional radar recognition algorithm has many disadvantages, In order to improve the accuracy of synthetic aperture radar images target recognition, the author have proposed a new algorithm of SAR target recognition based on advance Deep Learning neural network. In this paper, the author have got the feature of SAR image through the Refine Lee filter and HOG transformation firstly, and then realized the SAR object segmentation and recognition through the multi-layers RBM machine and GRNN neural network. And then realized the SAR object segmentation and recognition through the multi-layers RBM machine and GRNN neural network, and the learning rate parameter of the multilayers RBM machine is optimized through the GA algorithm. The simulation results shows that the object recognition rate of the algorithm proposed in this paper can reach 97%, which can improve the performance of the algorithm obviously.

Keywords: Lee, HOG, SAR, Deep Learning, RBM, GA

Flexible road and tyre modelling based on ADAMS

Wang Yang, Xue Xingdong, Lu Yongjie, Si Chundi

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MSC. ADAMS, a multibody dynamics software, is powerful in modelling of complex mechanical systems and realizes fine simulation on vehicle-pavement coupled system (VPCS). Existing MSC. ADAMS treats pavement as a rigid body and simplifies tyres as a group of mathematical formulas. Therefore, finite element model of tyre and road is the basis of flexible VPCS modelling. In this paper, finite element model of tyre and road was established and introduced into MSC. ADAMS through the MNF file. After the spatial position of finite element model was adjusted, a three-way force could be applied between tyre and road surface by setting their contact pattern. An elaborate VPCS model can be established by combining the universal vehicle prototype model and the established flexible road and tyre model based on MSC. ADAMS.

Keywords: Multibody Dynamics; Finite Element; Flexible Road Model; Tyre Model

Global convergence of a predictor-corrector smoothing newton method for generalized nonlinear complementarity problem

Su Ke, Lu Xiaoli

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A predictor-corrector smoothing Newton method for the generalized nonlinear complementarity problem is proposed based on a class of smoothing functions. Unlike the complementarity problem, there were more functions needed to be considered in generalized nonlinear complementarity problem (GNCP). Therefore, the first thing was to reformulate the GNCP to a system of smoothing equations. Then a predictor-corrector smoothing Newton algorithm was modified to solve the problem. Under some suitable conditions, the boundness of the iteration sequence generated by the proposed smoothing Newton method is proved. To describe the global convergent properties of the method, it shows that any accumulation point of the generated sequence is a solution of the generalized nonlinear complementarity problem.

Keywords: generalized complementarity problem, smoothing function, smoothing Newton method, global convergence

The problem of birthdays distribution by computer simulation

Li Man, Zhang ZhiGang

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Over the years, with the rapid development of computer simulation, the probability distribution of birthdays [1, 2] has been a hot topic. Based on the distinguishable ball-into-box issue, this paper started from a seemingly simple ball placing problem and extended to the question of birthday frequency distribution, i.e. people birthday in different dates probability distribution and the distribution law. In addition, also the most important, the value was obtained by Monte Carlo simulations with different frequency distribution birthday days through computer, finally achieving the theoretical value of the frequency values to estimate the probability.

Keywords: birthday problem, probability distribution, Monte Carlo simulation, Computer simulation

Frame synchronization algorithm of adaptive frame length system

Bi Mingxue

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To solve the problem of identifying the alterable length frames, a specific frame synchronization algorithm is proposed in this paper. In the novel frame synchronization algorithm, the alterable length frames are demarcated by searching and checking the Attached Synchronization Marker bit by bit based on the altered frame format. Then the relevant performance parameters are analyzed and deduced. The reference values for the rear protect time and the ahead protect time are given to ensure the probability of frame synchronization. Finally, the simulation results show that the novel frame synchronization algorithm can ensure the reliability of data transmitting and data processing for the adaptive frame length system

Keywords: adaptive frame length, frame synchronization, z transform, reliability, attached synchronization marker

The backstepping control of a class of random uncertain linear second order system with single known control direction

Ma Zhaorui, Gan Cheng, Li Na, Li Xia, Wang Ruiqi, Lei Junwei

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A kind of backstepping control method is researched for a class of random uncertain linear two order system with single known control direction. The rightness of backstepping control is proved by constructing a Lyapunov function and it is compared with PID method. Simulation result shows that the backstepping method has a strong robustness than PID control for second order system with whole random model parameters.

Keywords: Backstepping control, PID, Uncertainty, Second order system

Research on the calculation method of the penetration probability of projectile fragments based on Monte Carlo

Zhang Haining*Computer Modelling & New Technologies 2014 18(12A) 66-70*

This paper studies the simulate calculation about the coordinates of burst based on Monte Carlo method and the projectile fragments scattered point coordinate. According to scattered point coordinates in fried and the projectile fragmentation, this paper puts forward the concept of penetration coefficient; and through calculating the penetration coefficient, it comes a conclusion that the bigger the coefficient becomes, the probability of target damage is higher. It calculates the probability of a single fragment penetrating target and the overall target damage by using the calculation method of probability distribution. The dynamic simulation of debris' kinetic penetration and the simulation of the changes of energy and the damaged probability are carried out. In this way, the results of the simulation are analyzed, which verifies the correctness of the theory.

Keywords: Monte Carlo method, the kinetic energy projectile fragments, Transmission Probability, damage probability, Penetration simulation.

Artificial bee colony algorithm improved by centroid strategy

Chen Keming, Wang Chunping

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Artificial Bee Colony algorithm was the best optimal algorithm proposed by Karaboga in Karaboga, having the following advantages, such as good stability, excellent ability of solution, less control parameters, simple and easy achievable computation, etc. It also had some disadvantages, such as premature convergence in its later period, poor accuracy in its development, etc. Therefore, a new-typed centroid improvement strategy is introduced in the paper for improving the searching ability of the artificial bee colony algorithm. This research is experimented by the common six kinds of testing functions. The centroid strategy introduced in the paper can effectively enhance the searching ability of the artificial bee colony algorithm in terms of the results so that the continuous development of the algorithm in its later period cannot be prematurely converged and the majority of the testing functions can be obviously improved.

Keywords: artificial bee colony algorithm, the optimal algorithm, evolutionary computation

3D DNA self-assembly for maximum weighted independent set problem

Wang Hong, Wang Zicheng, Wang Yanfeng, Cui Guangzhao

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The problem of finding a maximum weighted independent set (MWIS) is a classical combinatorial optimization problem of graph theory, which has been proved to be NP-complete (NPC). A 2-D DNA tile self-assembly model for solving the problem has been proposed previously, but it still has many deficiencies. In this paper, we will propose a 3-D DNA tile self-assembly model based on 2-D DNA tile self-assembly model to solve the problem. This model includes two parts: the non-deterministic search system and the addition system. Firstly, we can find all the independent sets via the non-deterministic search system, and then get the total weight value of each independent set according to the addition system, and by comparison, the maximum weighted independent set will be found finally. Result shows that the operational time is linear, and the number of the tiles required in the process is constant.

Keywords: maximum weighted independent set problem, DNA computing, 3D self-assembly, DNA tile

Truncated aggregate homotopy algorithm for the least trimmed squares estimation in nonlinear regression

Xiao Yu, Yan Zhigang

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In data regression, an important role is played by the least trimmed squares (LTS) estimate, which is less sensitive to the outliers than some other estimators such as the least squares estimator. However, estimating the LTS in nonlinear regression would be unimaginable expensive. For the data set with size m and outliers $m - \tilde{m}$, it would require $C_m^{\tilde{m}}$ nonlinear least squares regressions. To solve this problem, this paper studies the LTS solution from an optimization point of view, and proposes truncated aggregate homotopy algorithm to the equivalent min-min-sum programming. Numerical tests with comparisons to some other methods show that the new method is efficient.

Keywords: truncated aggregate homotopy algorithm, least trimmed squares estimation, nonlinear regression

Real-coded genetic algorithm with oriented evolution towards promising region for parameter optimization

Chen Zhiqiang, Yun Jiang, Chen Xudong

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In this paper, a novel real-coded genetic algorithm is presented to generate offspring towards a promising polygon field with $k+1$ vertex, which represents a set of promising points in the entire population at a particular generation. A set of 19 test problems

available in the global parameter optimization literature is used to test the performance of the proposed real-coded genetic algorithms. Several performance comparisons with five significant real-coded genetic algorithms, three state-of-the-art differential evolution algorithms and three others significant evolutionary computing techniques are performed. The comparative study shows the proposed approach is statistically significantly better than or at least comparable to twelve significant evolutionary computing techniques over a test suite of 19 benchmark functions

Keywords: genetic algorithm, real-coded, oriented evolution, parameter optimization

Research for concurrent program data race checking algorithm in control system

Liang Hao, Ai Yunfeng

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The designing methods of multithreaded have already been used in control system widely. However the problems of data race, which are brought by multithreaded program, are being the difficulty in control system designing and testing currently. To this end, we optimized the thread-state analysis, designed the conservative lockset analysis. Further, We have introduced the thread-state analysis and conservative lockset analysis methods into Happens-Before relationship algorithm, designed a quick data race detecting method (DHTC) for control system multithreaded program with a certain hardware universality. The DHTC reduces the false alarm rate of Happens-Before relationship detecting methods, meanwhile improves the efficiency of dynamic checking greatly.

Keywords: concurrent program, data race, happens-before, thread state, lockset

An adaptive artificial fish swarm algorithm with elimination and clone mechanism

Zhenghua Yao, Zihui Ren

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For the problem with imprecise optimal solution and reduced convergence efficiency of basic artificial fish swarm algorithm in the late, the adaptive functions of artificial fish's view and step were used to improve fish algorithm. On this basis, with the new concept of effective artificial fish proposed, the elimination and clone mechanism was used to increase the number of effective fish to solve the problem with artificial fish individuals scattered and the algorithm convergence efficiency dropped. The experimental results showed that the elimination and clone mechanism enabled the artificial fish to aggregate to the global optimum rapidly, which improved the algorithm convergence efficiency and stability. Finally, the comparative studies were carried on simulation among the basic artificial fish swarm algorithm (BAFSA), adaptive artificial fish swarm algorithm (AAFSA), basic artificial fish swarm algorithm with elimination and clone mechanism (ECAFSFA) and the adaptive artificial fish swarm algorithm with elimination and clone mechanism (ECAAFSA). Simulation results showed that, the elimination and clone mechanism could increase the number of effective artificial fish significantly, which improved the convergence efficiency and stability of the algorithm.

Keywords: AFSA, elimination and clone mechanism, effective artificial fish, adaptive function

C 0 -topology of Hamiltonian homeomorphisms on Poisson manifold

Sun Dawei

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In this paper, we define the topology of Hamiltonian homeomorphisms on regular Poisson manifold, and prove that Hameo(M) is a topological group and it is a normal subgroup of the Poisson Homeomorphisms, and show that the Hamiltonian homeomorphisms arising from the two norms coincide on the regular Poisson manifold.

Keywords: Poisson map, Hamiltonian homeomorphisms, Hamiltonian map, Hofer norm

Constructing Theta function solutions to the MEW equation based on symbolic computation

Hongzhang Wang , Conggang Liang

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An accurate solution of the nonlinear partial differential equation has been the focus of studies for many years. This solution is helpful for understanding complex physics phenomena and dynamic processes. An auxiliary equation represented by theta functions is constructed by using the auxiliary equation method, which is applied to the modified equal width function. Double periodical wave solutions are numerically simulated using the accurate solution obtained by the symbolic computation software Mathematica. Results revealed that the auxiliary equation method is an effective and powerful mathematic tool for solving nonlinear evolution equations in mathematical physics using Mathematical.

Keywords: auxiliary equation method, MEW equation, theta function solutions

Data fitting based on improved genetic programming

Meng Pinchao, Yin Weishi , Li Yanzhong

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Traditional data fitting techniques usually require estimating basis function and they are specific for different application areas. Based on dynamic characteristics of genetic programming, a two-phase data fitting algorithm is proposed. In this algorithm, genetic programming is used to optimize model structure and Least Square method is applied to estimate parameters. Proposed algorithm is tested for different types of data fitting. Not only can this algorithm be applied in different areas, but also it is of high efficiency and accuracy.

Keywords: Genetic Programming, Least Square Method, Data Fitting.

An improved rule mining technology based on swarm intelligence computation

Zhang Zhaoyin

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The traditional artificial fish swarm algorithm is easy to converge to local optimum. An improved artificial fish swarm algorithm is proposed which modifies position update formula of fish according to acceleration. Then rule mining algorithm based on improved artificial fish swarm is proposed, which includes rule coding, rule evaluation and determination of fitness function. UCI data set is used to test the performance of proposed algorithm. The experiment results show that the proposed algorithm has higher classification accuracy than particle swarm optimization and artificial fish swarm algorithm. It also has fast convergence speed compared with traditional artificial fish swarm algorithm.

Keywords: rule mining technology, artificial fish swarm, classification accuracy

Analysis of M/M^k/1 queuing model in AVS real-time transmission system

Zhang Qian , Huang Jifeng

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With the development of the video encoding standard AVS, it becomes urgently to transport AVS video stream over IP network for IPTV. This paper utilizing RTP/RTCP protocol to design and realize a real-time video transport system based on AVS standard, The workflow of video player is modelled as $M / M^k / 1$ queuing system, using the states information feed-back from receiver buffer to adjust the sender rate and the buffer strategy. It provides important guidelines and insights on the design of streaming systems

Keywords: RTP; RTCP; Queuing Model; AVS;

Random forest algorithm in big data environment

Liu Yingchun

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Random forest method is one of the most widely applied classification algorithms at present. From the actual big data scene and requirements, the application of random forest method in the big data environment to conduct in-depth study. Due to the big data needs to process a huge number of features at the same time, and the data pattern changes constantly over time, the accuracy of a random forest algorithm without self-renewal and adaptive algorithm will gradually reduce over time. Aiming at this problem, analysis on the characteristics of random forest method, presents how to realize the self-adaptation ability with random forest method in similar situations, and verified the feasibility of the new method of using the actual data, and analysis and discussion of how to further research and improve the random forest method in big data environment.

Keywords: decision tree, random forest, big data

H[∞]control for a class of distributed parameter systems with leakage delay and Markovian jumping

Qian Xueming, Cui Baotong

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This paper is concerned with the problem of H[∞]control for a class of distributed parameter systems with delay and Markovian jumping. The jumping parameters are generated from continue-time discrete-state Markov process, nonlinearities and leakage delay appear in the system states. An H[∞] state feedback controller is designed such that the closed-loop system is asymptotically stable in the mean square for the zero disturbance input and also achieves required H[∞] performance level. By constructing Lyapunov functional and stochastic analysis, the sufficient conditions of systems is given in terms of linear matrix inequalities. And the criteria derived are dependent on both delay and diffusion operator. Finally, a numerical example is presented to demonstrate the effectiveness of the results proposed.

Keywords: H[∞] control, distributed parameter systems, time-varying delay, leakage delay, Markovian jumping

Application of hybrid ant colony algorithm in wireless sensor network coverage

Jiang Fei

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The coverage control is a fundamental problem in the study of wireless sensor network. The network is required to have a certain quality of service and optimized through some technologies or protocols so as to achieve the maximization of the coverage and provide reliable monitoring data and target tracking service. Based on detailed analysis of advantages and disadvantages of ant colony algorithm and genetic algorithm, this article makes some improvement and proposes a hybrid ant colony algorithm, and such new algorithm combines the strong adaptivity of the ant colony algorithm and the high convergence of the genetic algorithm etc. The experimental results show that the presented algorithm in this article can effectively improve the use efficiency of network nodes and prolong the network lifetime to realize the optimization goal of a network coverage control with highly effective energy.

Keywords: Hybrid Ant Colony-Genetic Algorithm, Wireless Sensor Network, Coverage

Voltage control strategy based on immune particle swarm optimization algorithm

Jiang Minghua

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As a new swarm intelligence algorithm after Ant Colony Algorithm (ACA), Immune Particle Swarm Optimization (IPSO) is currently an important branch of evolutionary algorithm. Its basic idea is influenced and inspired by research results of their modeling and simulation of behaviors of swarms of birds in earlier periods. And their model and simulation algorithm mainly took use of biologist FralkHeppner's model. Though PSO algorithm has been effectively applied in many areas, it has a short development history and problems exist in global convergence. Because IPSO Algorithm has the characteristics of loose mathematical condition, fast convergence speed and simple programming, this paper tries to minimize transformer loss using the IPSO algorithm, providing a new method to solve the automatic voltage control problem (AVC problem).

Keywords: IPSO Algorithm, Voltage Control, AVC Problem

The research of filter tracking algorithm based on novel hybrid navigation positioning system

Tian Anhon, Fu Chengbiao

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In order to overcome the deficiency of location failure caused by lack of GPS satellites in dense urban environment with skyscraper, in view of the advantages of terrestrial digital television signal. This paper proposes a novel hybrid positioning system combining GPS and DTMB, and the model of hybrid positioning system has also been presented. Under different number of particles, we simulate the tracking effect base on particle filter algorithm, theoretical analysis and simulation results show that the filtering trajectory is essentially consistent with true trajectory, good dynamic tracking effect is meet for the precision demand of urban environment, in addition, the more particle number, the better positioning accuracy, the smaller mean error and standard deviation. Thus in GPS blind areas, the fusion of multiple source signals has been utilized to ensure positioning accuracy, and the feasibility and superiority of combining GPS and DTMB has been verified in urban areas, the proposed method can be adopted as a supplement for urban environments in the case of GPS failure, which can improve the positioning performance of navigation system.

Keywords: combined positioning model, particle filter algorithm, nonlinear equation, global positioning system, digital television terrestrial multimedia broadcasting

Quantitative analysis of stadium operation management and spatial layout optimization based on computer placement algorithm

Xiang Yaguang

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Focused on the problems of the high investment and maintenance cost, slow recovery of the capital and complicated later-period management of large-scale stadiums, this paper proposes a spatial layout optimization strategy based on PSO-GSO algorithm. It extends the behavior classification model of swarm members in GSO algorithm, and adopts the random search together with the angle search of GSO and step size search of PSO algorithm, to well achieve the optimization of spatial layout of stadium. Finally, this paper makes a quantitative analysis on the influence factors of the stadium management. The simulation results show that the PSO-GSO algorithm proposed in this paper has good application in the spatial layout optimization of stadium, and the largest influence factors on the management are the facilities condition and consumption level.

Keywords: stadium management, PSO-GSO algorithm, computer placement, spatial layout optimization, influence degree analysis

Application of optimized ant colony algorithm in network routing

Zhao Bingchen, Huang Junying, Zhang Bin, Xia Shaofang

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The emergence of the ant colony algorithm has caused great attention of scholars, and been widely applied in such fields as the data mining and the integrated wiring design of the large scale integrated circuits and so on. However, as the complexity to solve

problems increases, the traditional ant colony algorithm increasingly shows its limitations of solving problems. Based on the ant colony optimization algorithm, this article puts forward the load-balancing routing based on the ant colony optimization, designs updating rules of pheromone concentration specific to the ant colony optimization algorithm, integrates the ant colony optimization and cross layer optimization methods, and designs updating models in terms of the volatilization of the pheromone concentration and different data groups.

Keywords: ant colony algorithm, load-balancing routing, updating rule

Network coverage optimization strategy of ant colony optimization algorithm

Xu Wenjie, Liu Xiyu

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As a new-type intelligent optimization algorithm, artificial ant colony algorithm has been applied widely. However, there still exist certain limits in the algorithm itself. The present thesis will make a deep analysis of the optimization principles of ant colony algorithm, figure out existing problems, systematically perceive available improvement approaches and eventually propose a modified artificial ant colony algorithm. During the experiment simulation phase, the modified artificial ant colony algorithm and genetic algorithm will be adopted to optimize the wireless sensor network coverage in an examination area. By virtue of the coverage optimization strategy of the algorithm proposed by the present research, it can be achieved to acquire satisfactory coverage optimization scheme within short periods. Besides, the algorithm proposed by the research possesses better instantaneity and can reduce the vibration of network.

Keywords: ant colony optimization algorithm, wireless sensor, network coverage optimization

Local search ability of frog leaping algorithm in fuzzy controller parameters optimization

Chen Yifei, Xu Sen

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To solve the problem of slow searching and poor searching ability in tuning PID controller parameters and optimizing fuzzy controller parameters with basic frog leaping algorithm, this paper proposes an improved shuffled frog leaping algorithm based on PID fuzzy controller parameters optimization. First by adding the self-adaptive learning factor, this new algorithm accelerates the convergence speed, expands the search area of the individuals, and maintains the diversity of population, which extends the search ability to a certain extent. And then by introducing the constriction factor and acceleration factor in the particle swarm optimization algorithm, the updating strategy is improved to speed up the search speed of the algorithm, and at the same time to ensure the convergence of the algorithm. Simulation results show that, the improved shuffled frog leaping algorithm proposed by this paper has excellent performance, and is suitable to PID fuzzy controller parameters optimization.

Keywords: PID fuzzy controller parameters optimization, improved shuffled frog leaping algorithm, self-adaptive learning factor

Precision optimization of node localization centroid algorithm for WSN

Li Wenxin

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Aiming at the problems that the traditional centroid algorithm in WSN node positioning precision is not high and the error is very large, this paper proposed a adaptive centroid algorithm based on weighted factor, first of all, determined the weighting factor according to the influence of different beacon node to the unknown node, with weights to reflect the impact of each beacon nodes for centroid position and then all the beacon nodes in the network were conducted with adaptive optimization, translated adaptive optimization of coordinate error into the distance error. The experimental simulation results showed that the proposed adaptive centroid algorithm based on weighted factor was effective in reducing the error of traditional centroid algorithm in wireless sensor network node location, the location precision was improved.

Keywords: centroiding algorithm, WSN, weighting factor, adaptive optimization, location precision optimization

A collaboration ontology modeling method for high level architecture

Zhu Jinda, Liu Libing

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HLA (High Level Architecture) is the general technical framework for distributed modeling and simulation. But the object model of HLA cannot meet the requirements of semantic data consistency. A collaboration ontology modeling method was proposed for HLA simulation. Firstly, the definition and formal description of collaborative ontology was provided, and constructing method was proposed, it mainly included two critical keys: the ontology template mapping and the conceptual matching degree calculation. Then, the corresponding tasks ontology was generated according to the specific goal of the simulation, and HLA object model was generated, the main structure of federate object model was designed. On the one hand, semantic data consistency in collaborative simulations for complex product development was enhanced and the efficiency of model development was improved. On the other hand, it improved the reusability of the simulation model. Finally, a case was provided to demonstrate the effectiveness and feasibility of the way.

Keywords: high level architecture, collaborative simulation, ontology, complex product, federate object model

DPQR: an improved parallel DBSCAN algorithm based on data partition and QR*-tree

Xu Hongbo, Yao Nianmin, Han Qilong, Pan Haiwei

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As a typical clustering algorithm based on the density, DBSCAN shows good performance in spatial data clustering. When clustering large-scale database, DBSCAN requires the overhead of memory and I/O. With the development of high-performance computers and the appearance of cluster computers in particular, this gives us a way to solve the defects of DBSCAN. The paper presents an improved parallel DBSCAN algorithm DPQR based on data partition and QR*-tree. According to the distribution of data on one or more dimensions, the entire data space is divided into a number of local regions. Each local region is transmitted to a processing unit. The processing unit calculates local k-dist graph for local region to get the local value Eps, and builds QR*-tree. DPQR executes the partial clustering on QR*-tree. Finally, the clustering results are merged in accordance with the merging rules. Experimental results show that DPQR is better than DBSCAN.

Keywords: large-scale database, clustering, data partition, DBSCAN, parallel computing

Extraction model of forest features based on mutation and bidirectional particle swarm optimization

Li Yan, Wang Lihai, Xing Yanqiu

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Although the existing forest feature extraction and classification model has a certain effect, but it still exists problems such as accuracy is not high, speed is slowly and so on. According to this problem, this paper proposed an extraction model of forest features based on mutation and bidirectional particle swarm optimization. First, we use mutation operators of genetic algorithm and the Sigmoid function of neural network to make a dynamic adjustment, in order to avoid the particles into a precocious state. Then according to this paper the original algorithm of the initial population is improved on the basis of the use of the two-way optimization strategy, and put forward the speed optimization strategy to help it get a local optimal solution timely when it appeared premature phenomenon and use the optimization strategy of particle effect to enhance the convergence accuracy. Finally the gauss perturbation theory is introduced to improve the convergence of the algorithm when the original algorithm falls into local optimum with optimize learning strategy to make it jump out. Through the simulation experiments, it shows that the proposed forest feature extraction model based on the variation feature subset and two-way optimized particle swarm algorithm with higher precision, better convergence performance.

Keywords: forest feature extraction, improved particle swarm algorithm, feature subset dynamically adjust, two-way optimization strategy

A cloud task scheduling algorithm based on QK-mean clustering

Zhao Guozhu, Ma Liang, Zhao Ruibin

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When classifying resources in cloud computing environment using the idea of clustering, the information entropy of resources' attribute can reflect the degree of significance in clustering process. Using information entropy, a task scheduling algorithm based on QK-mean clustering is proposed. We calculate the degree of significance of cloud resources' attributes, then apply K-mean clustering algorithm to classify the cloud resources according to the degree of significance of attributes, and we create Resources K-tree to store the process and result of the clustering. In this way, we transform the task scheduling process into the process of searching a suitable leaf node in Resources K-tree. The experimental results show that the QK-mean scheduling algorithm can effectively improve the efficiency of cloud task scheduling.

Keywords: task scheduling, information entropy, K-mean, cloud computing

Existence and multiplicity of the solutions for singular fourthorder boundary value problem

Liu Chenchen, Ya Gao

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In this paper, we research the existence and multiplicity of the solution for singular fourth-order boundary value problem: $x^{(4)} = f(t, x(t)), 0 < t < 1$, with the boundary conditions $x(0) = x(1) = x''(0) = x''(1) = 0$. In this singular boundary value, the function has no monotonicity. By using the method of topological degree, we establish solution existence theorem of singular boundary value problem.

Keywords: functional differential equation, singular, positive solutions, fourth-order singular boundary value problem

Explicit formulas for the fourth power mean of certain two-term exponential sums

Ai Xiaochuan, Chen Jianhua, Chen Hua, Zhang Silan

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The aim of this paper is to obtain the explicit equations for the fourth power mean of generalized Kloosterman sums. Moreover,

this paper also acquires the computational formulas for the fourth power mean of two-term exponential sums. This improves Calderon and Xu's results.

Keywords: two-term exponential sums, Kloosterman sums, Dirichlet character, fourth power mean, gauss sum

Nonlinear Kalman filter phase unwrapping algorithm based on the terrain

Yan Man, Hu Defa

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Phase unwrapping is one of the key steps in InSAR data processing. In condition of steep terrain, excessive stripes reduce the conventional phase unwrapping algorithms' implement, resulting in error propagation of unwrapping phase. Therefore, this paper presented a nonlinear Kalman filter phase unwrapping algorithm based on terrain. This algorithm uses local fringe frequency estimation as input control variable. Chirp-Z transform is added into Fourier transform in local frequency estimation, and this improves the unwrapping result accuracy. Results obtained with simulated and real data validate effectiveness of proposed method through analyzing and comparing with Kalman filter method, nonlinear Kalman filter method and quality map guiding method.

Keywords: InSAR, nonlinear Kalman filter, phase unwrapping, Chirp-Z transform, terrain

Multibit-flipping decoding algorithm for low-density parity-check codes

Peng Yingying, Ren Xuegang, Hu Defa

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Aiming at the Low-Density Parity-Check Codes, a reliability-based multibit-flipping decoding algorithm is proposed in the paper. The multibit-flipping criterion is based on the reliable bit position and the threshold in the flipping-decision (number of flipping bits) can be dynamically adjusted during the decoding process. The proposed algorithm is on the basis of the belief propagation decoding algorithm, and then can be derived from its theory. Compared with the traditional weighted bit-flipping decoder and the multi-bit flipping decoder, the proposed decoder can provide a faster converges faster convergent rate and better performances. Simulation results demonstrate that the proposed algorithm achieves a better balance between performance and complexity

Keywords: LDPC codes, multibit-flipping algorithm, belief propagation algorithm

A coherence-checking algorithm for ontology integration

Liu Kun, Yu Xiaogao, Pan Weifeng

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Ontology integration can be used to solve heterogeneity of different information. Different to the usual global interpretation, distributed interpretation based on DDL is taken to interpret its semantics. As a result, traditional coherence checking algorithm is not suitable any more. In this paper, we propose an algorithm to measure coherence of ontology integration under distributed interpretation. In our proposal, ontology integration is taken as global ontology and local ontologies connected by ontology mapping. Consistency and coherence are viewed as different things. Then a two-phrases checking algorithm is designed to test coherence of ontology integration. Some experiments are made to test its feasibility. We compare checking results with other algorithms, especially with that under global interpretation. Our algorithm can improve efficiency to some degree, but it is subjected to mapping relations which are found by mapping tools.

Keywords: ontology integration, ontology mapping, ontology coherence

A fault detection model for microgrid detection based on Bayesian network and association rule mining

Zhu Wenhao, Guo Qiyi

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In view of the problem that current fault detection methods exist large error in microgrid detection, this paper presents a model based on Bayesian network and association rule mining. It firstly adopts Hash technology to optimize Apriori algorithm and remove the undesired candidate item set, conducts data mining of original data set, introduces Bayesian network for sample training to reduce detection error, and finally obtains microgrid detection result. Simulation results show that the proposed fault detection model based on Bayesian network and association rule mining is efficient in microgrid fault detection with detection error far less than that of traditional algorithm.

Keywords: microgrid fault detection, association rules mining, frequent item set optimization, bayesian network, error optimization

An AM-MCMC cleaning algorithm for multi-reader RFID redundant data

Lu Yinju, Shan Guoquan

Computer Modelling & New Technologies 2014 18(12A) 260-269

The inherent characteristics of RFID device and the environmental noise cause the uncertainty of RFID raw data and, in the RFID event detection, decrease accuracy of the query results. In this paper, the recognition model of RFID reader is defined and, by using the maximum entropy method, 3-state recognition model in this recognition model has been proved to have the optimal performance. Using Bayesian principle, the posterior probability distribution of parameters to be estimated can be got from the condition likelihood observed and prior distribution of unknown parameters. Based on adaptive sampler, a Markov Chain Monte Carlo (MCMC) simulation is proposed to do data cleaning on the redundant data from RFID multi-reader. The simulation test results, carried on a large number of simulation data, verify the accuracy and efficiency of the proposed data cleaning algorithm.

Keywords: RFID, data redundancy, data cleaning, Bayesian principle, Markov chain Monte Carlo (MCMC)

Sufficiency of the solution for multi-objective semi-infinite programming with $K - (F_b, \rho) -$ convexity

Yang Hong

Computer Modelling & New Technologies 2014 18(12A) 270-274

In this paper, some nonsmooth generalized convex functions called uniform $K - (F_b, \rho) -$ convex function, uniform $K - (F_b, \rho) -$ pseudoconvex function, uniform $K - (F_b, \rho) -$ quasiconvex function are defined using $K -$ directional derivative and $K -$ subdifferential. Nonsmooth multi-objective semi-infinite programming involving these generalized convex functions is researched, some sufficient optimality conditions are obtained.

Keywords: nonsmooth, multi-objective semi-infinite programming, sufficient optimality conditions, uniform $K - (F_b, \rho) -$ convex function

Dynamic model checking for concurrent programs in control system

Liang Hao, Ai Yunfeng, Shen Huairong, Zhao Yongchao

Computer Modelling & New Technologies 2014 18(12A) 275-281

In recent years, the complexity of programs in control systems continues to increase with the growing of automation. Concurrent programming methods have been widely used in designing. However, it is a lack of effective concurrent error checking tool for control system programs. Therefore we proposed a statefull DPOR method with sleep set, and designed a dynamic checking tool for control systems Multithread programs, in which we expand Labelled Transition Systems to record the priority of interrupt and the enabled flag as a system model. We gave formal description for deadlock, data race and atomicity violation three concurrency errors. Finally we realize the testing tool which can detect multi-threaded and multi-interrupt concurrent errors in the control system. The result of Experiment shows that our method has higher efficiency and accuracy.

Keywords: concurrent program, multithread, multiple interrupts, concurrency errors

Semantic integrity and K-anonymity

Huang Liming, Song Jinling, Gao Yan, Cai Qianying

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The dataset in database have certain semantic commonly, and the semantic need to be satisfied with the form of some constrains, such as functional dependencies (FDs) and multivalued dependencies (MVDs). Nevertheless, the k-anonymity model may be destroyed the semantic integrity in the process of k-anonymization because of the incontinent generalizations. So, in this paper we address the issue of how to preserve the semantic integrity of dataset in the k-anonymization process. We define a new data dependency named k-multiset dependency (K-MSD), which can ensure a dataset satisfies k-anonymity constraint. In addition, we propose K-MSD algorithm to realize k-anonymization through constructing K-MSD between attributes, and propose K-MSD-AG algorithm to preserves FDs or MVDs as while as constructing K-MSD.

Keywords: k-anonymization, k-multiset dependency, FDs, MVDs

A modeling approach for a class of static nonlinear systems

Xu Xiaoping, Wang Feng, Dai Fang

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As the first step of any system analysis, modeling is an important task in scientific studies field. The mathematical modeling has a long research history. However, nonlinear system modeling has still not been well solved. System identification is the theory and methods of establishing mathematical models of systems. In this paper, by using a hybrid technique, a novel identification method for a wide class of static nonlinear system with unknown structure is proposed. The basic idea is as follows. Firstly, the proposed method employs a system model composed with classical models so as to transform the system structure identification problem into a combinatorial optimization problem. Then, the bacterial foraging optimization algorithm is adopted to synchronously implement the identification on the system's structure and parameters. Finally, compared with the existing method in simulation experiments, some examples are given to illustrate the validity of the proposed method.

Keywords: nonlinear system, modeling, identification, classical model, optimization algorithm

The application of MuPAD in the plotting of analytic geometry

Wu Nada*Computer Modelling & New Technologies 2014 18(12A) 295-300*

MuPAD is a toolbox in the well-known software MATLAB. The paper mainly talks about how to use MuPAD to plot all kinds of Graphics in Analytic Geometry, including cylinders, cones, surfaces of revolution and all kinds of surfaces and curves with equations.

Keywords: analytic geometry, mupad, surface, space curve, command

A new bivariate control chart for monitoring the mean vector and covariance matrix simultaneously

Zhao Yongman, Mei Weijiang

computer modelling & new technologies 2014 18(12A) 301-307

A new bivariate single control chart is proposed to simultaneously monitor the process mean vector and the process covariance matrix. This chart, called CSDW chart, is based on the cumulative sum of the diagonal elements of Wishart distributed matrix. Through our average run length (ARL) comparison, the results of the simulation show that the new chart outperforms the joint T-square and $|S|$ charts, the Max-MEWMA chart, and the VMAX. Examples are also given to illustrate the new chart procedure

Keywords: control chart, the joint T-square and $|S|$ charts, Max-MEWMA, VMAX, average run length

Pre-obfuscation model based on COIL intermediate language

Yang Yubo, Huang Wei, Fan Wenqin, Hu Zhengming

Computer Modelling & New Technologies 2014 18(12A) 308-315

Code obfuscation techniques changes and complicates the logic and structure within the program on the basis of assuring the procedures being implemented correctly, which needs to transform the original program to an intermediate form which can be analyzed. Most of the pre-obfuscation models at present are lack of unified and formalized intermediate language, and the results of the pre-processing cannot accurately extract the information needed in obfuscation. A pre-obfuscation model COTOOL which is based on COIL is put forward in this paper to accurately locate the distribution and weight of the obfuscation node in the program taking advantage of the pre-processing algorithm of COIL intermediate language. The experimental data shows that this model improves the obfuscation efficiency and effectiveness greatly.

Keywords: Pre-obfuscation model, intermediate language, CTL instruction, instruction weight

Localization algorithm of preferred beacon nodes based on ZigBee network

Ni Ying

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A new localization algorithm was proposed to enhance positional accuracy of ZigBee from improving distribution of beacon nodes. In this algorithm, beacon nodes were distributed as regular hexagon, with preferred appropriate beacon nodes in location calculation. RSSI was adopted as the distance reference. Moreover, Multimetering Averaging Method was used to reduce the impact of Gauss noise on RSSI.

Keywords: ZigBee Network; cellular network; RSSI; Gauss noise

On the theoretical properties of bipartition dissimilarity measure

Li Shuguang, Chen Shuying, Cui Mengtian

Computer Modelling & New Technologies 2014 18(12A) 322-327

Bipartition dissimilarity is a new measure introduced by Alix Boc et al. They proposed an algorithm for inferring horizontal gene transfer events which can rely on different optimization criteria. Simulation results suggested that the strategy based on bipartition dissimilarity provided better results than those based on other three existing tree comparison indices. However, no theoretical analysis on it has been conducted since then in the literature. The present paper reports some useful new results for this measure. The theoretical properties studied include minimum positive value, neighborhood, and local modifications.

Keywords: Tree comparison, Bipartition dissimilarity, Minimum positive value, Neighborhood, Local modifications

A note on generalized stationary iterative method for solving saddle point problems

Zhang Li-Tao, Meng Hui-Li

Computer Modelling & New Technologies 2014 18(12A) 328-332

Recently, Miao and Wang [Journal of Applied Mathematics and Computing, 35(2011):459-468] studied the convergence of the generalized stationary iterative (GSI) method for solving the saddle point problems. In this paper, based on Miao and Wang's convergence theorem, we perfect it and give new convergence conditions. Moreover, by using relaxation technique, we present an improved generalized stationary iterative (IGSI) method for solving the saddlepoint problems and analyze the convergence of the corresponding method.

Keywords: Saddle point problem, Generalized stationary iterative method, Convergence. MSC: 65F10; 65F15; 65F50

Comparisons of numerical experiments about GRNMM methods

Cheng Shaohua, Zhang Litao

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Based on the global relaxed non-stationary multisplitting multi-parameter (GRNMM) methods, we give comparisons of numerical experiments about GRNMM methods and show the efficiency of GRNMM methods associated with TOR multisplitting for solving a large sparse linear system whose coefficient matrix is an H-matrix.

Keywords: Relaxed non-stationary multisplitting multi-parameter method; Parallel multisplitting; Global relaxed method; H-matrix

Consistency analysis of Clough-Tocher macro-elements

Yu Wenbo

Computer Modelling & New Technologies 2014 18(12A) 338-343

In this paper, we are concerned with Clough-Tocher macro-elements of any smoothness in any dimension. An n dimensional CloughTocher complex is a split of an n simplex by connecting its centroid with its vertices. By using the Bernstein-Bézier representation of polynomials, we first make a unified analysis of the data compatibility in bivariate macro-element and a rule is given in a general case that the underlying macro-triangle can be wildly subdivided. Then Clough-Tocher macro-elements are setup in a recursive way that the n dimensional case can be obtained based on the $n - 1$ dimensional case with $n \geq 3$.

Keywords: Bernstein-Bezier form, interpolation, multivariate spines, macro-elements

An empirical analysis on the trade structure and trade competitiveness of Chinese creative industry: 1996-2010

Zou Deling, Cong Haibin

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With the extensive adjustment of world industrial structure & range, the trend transforming from the capital concentrated industry to the knowledge & technology intensive industry is more and more obvious. The creative capital with the core of knowledge creativity has become the key power for the core competitiveness and economic development of a country. The paper analyzes the industrial structure of Chinese creative industry by reviewing and researching related materials about Chinese creative industry trade, and studies Chinese creative industry's trade competitiveness using the trade competitiveness index and the Michaely competitive advantage index by collecting the trade data of Chinese creative products in 1996~2010 and creative service royalty & license fee in 1997~2010. Results show that China can be called a "creative nation", but its road to be a "creative power" is still long. On the one hand, the creative product shows strong competitiveness, but the advantages concentrate in labor intensive products and the competitiveness is still far from the creative powers for the creative products with strong original creativity and high technical input. On the other hand, for the division of creative product, sectors of handicraft, design and visual arts have relatively strong competitiveness, and printing sector shows a significant enhancing trend in international competitiveness according to the analysis on related indexes although its international competitiveness is not high and competitive advantage is not clear at present

Keywords: Creative Cultural Products, Technology Content, Trade Structure

An improved viscous fluid elastic registration algorithm of medical images based on parallel computation

Wang Yangping, Wang Bing, Du Xiaogang

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Image elastic registration based on the viscous fluid model is time-consuming to solve partial differential equation (PDE) to obtain the velocity and displacement field of the floating image. The method is also sensitive to the gray-scale transformation, with a moving force generated by the gray difference between the two pre-registered images. This paper proposes an improved algorithm which employs the mutual information as a particle moving force, thereby moving the floating image space to obtain the reference image. Conjugate gradient iteration, which is suitable for parallel computing is used to solve the PDE. The proposed registration processing is designed to perform on compute unified device architecture (CUDA) which coordinates CPU and GPU to accomplish concurrent computation. The solution of the PDE is effectively performed on multi-GPU. Experimental results show that the presented method improves the robustness and efficiency of the registration based on the viscous fluid model.

Keywords: Elastic Registration, Viscous Fluid, Mutual Information, Conjugate Gradient Iteration; CUDA

Application of ActionScript3 language algorithm in animation image design

Yu Han

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Animation became increasingly popular with the rapid development of creative culture in recent years, thereby earning increased attention and emphasis in the process. Images enter people's consciousness because of new technologies and different situations. Scholars have studied its application in animation image-making and design with ActionScript3 language algorithm routine theory under Flash. Relevant mathematical calculations are used for language code design. The function of ActionScript3 language is interpreted from five perspectives, namely, graph and image, text field, grain effect, transition effect, and 3D effect of animation film and television. Feasible language algorithms are designed to achieve vividness, exaggeration, and art. Research lays the foundation for further studies on ActionScript3 language algorithm and is beneficial for the development of image animation industry.

Keywords: ActionScript3 language algorithm; animation image; special effect design

Application of cloud model theory to construct an evaluation model for network courses on College English

Guilan Jiao

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The cloud model is a model that mutually transforms the qualitative concept described in linguistic terms and the uncertainty in its representations using numerical values. Cloud model theory integrates the fuzziness and randomness of evaluation subjects and adopts an improved backward cloud algorithm to convert a qualitative concept into a quantitative value of an evaluation index such that the practical situations of each evaluation index can be described. Unlike traditional algorithms, this method does not use single numerical values alone for expression only but can also reflect the practical development trends of each index comprehensively and ideally. Thus, the theoretical model is of practical significance in evaluating the degree of satisfaction with network courses.

Keywords: Cloud model, evaluation of degree of satisfaction, College English, network courses, backward cloud generator

Construction and application of a Web text-oriented integrated sentiment feature library mined by a big corpus

Liu Meijuan ,Yang Shicai

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This paper describes the implementation of a system containing a web text-oriented integrated sentiment feature library (hereinafter referred to as WTISFL) and its application in sentiment analysis. Sentiment library plays an important part in sentiment analysis. A quicker and more complete method of constructing new sentiment library is presented in the paper. Firstly, the structure of WTISFL which sentiment analysis needed is proposed. Besides, WTISFL is mined from the big corpus database. Moreover, our sentiment word set is extended on the basis of existing sentiment resources, semantic similarity calculation of HowNet and computation of Chinese Synonym Thesaurus. Finally, the WTISFL is checked manually. Based on the above WTISFL, Web texts are studied from the perspective of sentiment analysis with the method of maximum entropy classifier. The experiment shows that WTISFL in this paper is extremely effective in sentiment analysis, which can evidently improve the performance of web texts sentiment classification.

Keywords: Integrated Sentiment Feature Library; Sentiment Classification; Maximum Entropy; Web Texts

Design on role-based multi-area access control method in electric power unified application platform system

Zhou Cheng, Shi Jian

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With the further promotion of smart grid and the concentration of business systems, the State Grid Corporation put forward higher information security protection requirements. This paper proposes a Role-based Multi-area Access Control Method (RMACM), which provides a generalized and effective mechanism of security management in Electric Power Unified Application Platform System. RMACM provides a set of items constraint specifications. These constraint specifications are organized to form a construction, and an enact process is proposed to make it scalable and flexible to meet the need of diversified service application systems. Concerned on the problem that the standard role-based access control mechanism does not consider the implementation in multi-area secure, RMACM erases the downward information flow by extended rules of read and write and some authorization constraints while still keeping the expressive power and flexibility of standard RBAC, which makes up the limitations when applying standard RBAC on multi-area systems.

Keywords: Permission Management; Electric Power Unified Application Platform System; Role based Access Control

Ecological quality assessment of urban green spaces based on landscape metrics: A case of Nanjing, China

Xu Hao

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China's ongoing urbanization is having a profound effect on the environment, and Nanjing, as one of the most important

metropolitan areas of the city cluster in China's Yangtze River Delta, is not immune to this development; as such, it is greatly affecting the scale and structure of its urban green spaces. An ecological quality assessment of Nanjing's green spaces is fundamentally significant to appropriate spatial planning and the implementation of sustainable development ideas. This study uses ALOS (Advanced Land Observing Satellite) remote-sensing image data to map the distribution of urban green spaces in Nanjing, and employs various landscape metrics to analyze and evaluate the city's spatial layout and ecological quality. Results of the study reveal that the distribution of urban green spaces in Nanjing is highly uneven, with most located in suburban areas and few within the city's core. Green space within the urban area is highly centralized around the Zijin Mountain woodlands, while green space in the suburbs is highly dispersed and fragmented. A large proportion of Nanjing's green space comprises farmlands, primarily distributed on the outskirts of the city and in the suburbs. The amount of farmland, however, is continuously decreasing, as the land is being used in the ongoing urban development. This is expected to rapidly lower the ecological quality of the region's green spaces. In order to improve the ecological quality here, both recreational and ecologic functions of green space should be considered during the phases of spatial planning. It also is suggested that more core green spaces be built, such as ecological country parks, to increase the ratio of woodlands, enhance the management of ecological spaces in suburban areas, establish ecologic greenways, and strengthen the connectivity of green spaces.

Keywords: Urban green space; Ecological quality; Landscape ecology; Landscape metrics; Remote sensing images; GIS; Nanjing; China

Choice of Emergency Logistics Center Location based on Particle Swarm Optimization

Zhang Yuan-Yuan

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A programming model applied to location selection for an emergency logistics distribution center is established on the basis of shortest time. Then, particle swarm optimization (PSO) is introduced to solve the model. The selection of a distribution center is solved using the discrete PSO algorithm, and the distribution of goods is solved using the traditional PSO algorithm. A C++ program was written to solve the problem and enhance the efficiency and accuracy of the solution for the location selection problem. Experimental results show that the method is feasible and efficient..

Keywords: PSO, emergency logistics, logistics center, location

Energy management system (EMS) based on WebGIS

Zhang Guohai, Zhang Mingxin

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The study on the energy management system (EMS) is not perfect at present research, the energy database, knowledge database; model database has detailed design in this paper. This system (EMS) has several functions include energy consumption analysis, alerts, reports and recommendations. EMS will compatible with existing devices and systems in order to make the system more convenience. The program modules and parameter tables were selected to store energy prediction model, this EMS system can predict the desert evolution through energy early warning system. The results show that, the simulation of the energy distribution can reached 90%. At the same time "Auto Set Energy instrument - Monitoring Platform" can conducted energy data and make an analysis at anytime. In addition, the WEBGIS platform can provides necessary decision support for the local government

Keywords: Energy management system (EMS), Model library, Knowledge base

Farmland scale develop benefit evaluation in ecologically vulnerable areas-taking Songyuan land consolidation project as example

Nie Ying, Li Ke, Wang Yun Xia

Computer Modelling & New Technologies 2014 18(12A) 402-411

It is the most important issue in smoothly carrying out of agricultural land development project that the ecologically vulnerable areas can withstand the environmental impact brought by large-scale development or not . By using the Songyuan City, Jilin Province which is an agricultural land consolidation project area as a typical study area, using analytic hierarchy process to build a hierarchy and index system of agricultural land development and consolidation benefit evaluation, using the multi-level fuzzy comprehensive evaluation model to calculate the overall efficiency of agricultural land consolidation, it is concluded that the agricultural land development and consolidation in the ecologically vulnerable area can get good benefits, but needs to pay attention to the environment maintenance. Therefore, the benefit evaluation index setting should also highlight the ecological benefits and it needs to protect arable land, increase arable land vegetation, and the land use structure optimization. It is the first time to set an index system for an agricultural land development and consolidation project in western Jilin, and to discuss the feasibility of the benefit evaluation by using the multi-level comprehensive fuzzy evaluation model on the ecologically vulnerable area of agricultural land consolidation project, then in the expect of giving references to the land consolidation work in similar area and the relevant theoretical studies.

Keywords: ecologically vulnerable areas; agricultural development; reserved resources; fuzzy comprehensive evaluation; west

Jilin

K-nearest Neighbor Skyline Queries in Mobile Environment

Nie Jing, Weng Wei, Sun Linan

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With the popularity of portable mobile Internet device, the applications based on query are increasingly enriched. This kind of skyline query problems is not only related about the positions, but also the constantly moving queries. Range-base queries are widely used to solve the problem in recent algorithm, but focusing more on computing all skyline points. However, users are interested in nearby skyline points in mobile environments. Two different algorithms are proposed and the characteristics and applied range are analyzed in the paper to solve the problem, after researching relevant properties based on the basic concept of the skyline query.

Keywords: skyline queries; k-nearest neighbor; query optimization

Numerical Simulation on Gas Drainage of Boreholes in Coal Seam Based on Gas-Solid Coupling Model

Li Bo, Wei Jianping, Li Peng

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Gas pre-drainage of boreholes in coal seam is considered to be the main effective measure for preventing coal and gas outbursts. In order to research the stress changes in surrounding coal mass of drainage boreholes and the distribution of pore pressure, as well as the evolution of permeability, the methane in surrounding coal mass of boreholes was classified into two different parts, namely free gas and adsorbed gas, which were based on the law of mass conservation. Then the gas migration model of coal mass around boreholes was proposed considering the Klinkenberg effect. The deformation field equation and gas seepage equation of coal seam were deduced, and the evolution models of permeability and porosity were derived under the combined contribution of the adsorption swelling and pore-fracture compression. Afterwards, the fluid-solid coupling model was imported on the basis of the basic theory of porous media fluid-solid coupling, and the two-dimensional geometric model was implemented into the multi-physical coupling simulation software. The conclusions were obtained as follows: (1) The initial stress state was disturbed due to the presence of drainage boreholes, and the concentrated stress in the coal mass around boreholes was gradually transferred into the deep zone, which was consistent with the evolution of permeability; (2) As time goes by, the gas drainage radius gradually increased, however the growth rate reduced by degrees.

Keywords: Coupling model; Drainage borehole; Numerical simulation; Permeability, Gas pressure

Research on emergency facilities location problem and its greedy dropping heuristic algorithm response to public health emergency

Hu Jiaxiang, Li Jian

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When a public health emergency, such as an anthrax attack, happens in many areas, it is vital to deploy the medical supplies to the affected people quickly. In this condition, emergency facilities, which provide medical supplies, play an important role in rescue management. The decision of where to locate the emergency facilities becomes very critical, as it determines the efficiency and effectiveness of the emergency management. In this paper, a multi-objective programming model that balances the total cost of emergency facilities and effect of rescue is proposed, and the effect of rescue is measured by the ratio of the arrival quantity of the rescue material to the demand. And then the model is solved by the Greedy Dropping heuristic after the multi-objective function is transformed into a single-objective. Finally, a practical example is given to illustrate the application of the model.

Keywords: Emergency facilities location problem, Public health emergency, Greedy Dropping Heuristic Algorithm, Rescue effect.

Research on liquefaction process of FLNG unit with propane precooling device and double nitrogen expander

Chen Xingyi, Yuan Zhongming, Xie Ying, Wang Shuhua

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Along with the further development of global natural gas exploration and development, more and more deepwater gas fields, marginal gas fields and associated gas fields have been found. As a new development technology of offshore deepwater gas fields, a floating LNG unit which integrates production, storage and offloading into one (FLNG), with its advantages of lower investment, shorter construction period and reusability, is warmly welcomed today. By investigating the latest liquefaction technology of natural gas both at home and abroad, and combining with the FLNG production project under construction, the study reported in this paper concluded that the nitrogen expansion liquefaction technology with precooling device is the first choice for liquefaction technology of natural gas for FLNG equipment. And based on that, this paper conducted optimized analysis of the FLNG equipment liquefaction process, and established a HYSYS simulation. The result indicated that three-stage propane refrigeration technology adopted in the precooling period is able to reduce the temperature to 273.16 K, 258.16 K and 238.16K respectively, and thus the compression power during the precooling period is reduced, while the precooling effect of

natural gas is improved. In addition, double nitrogen expansion refrigeration technology is employed during the super-cooling period, the division temperature of two-stage refrigeration is chosen to be 178.16 K, the total compression function drops to the lowest value, the refrigeration effect is improved and the liquefaction ratio during the whole process reaches 95%. Therefore, the three-stage liquefaction technology with propane precooling device and double nitrogen expander is better adapted to offshore gas fields, and is suitable for FLNG equipment.

Keywords: FLNG, Propane precooling, Nitrogen Expansion and Liquefaction, Technological Process, HYSYS Simulation

Research on rejuvenation analytical models for a virtualized system with live VM migration

Zhong Yi, Xu Jian, Zhong Jing, Liu Fengyu

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With the widespread use of virtualization technology, availability of Virtual Machines (VMs) in server virtualized systems became an important issue. In aspect of availability of virtualized systems, software rejuvenation is a favourable technology, which can postpone or prevent failures caused by software aging in VMs and underlying Virtual Machine Monitor (VMM). During the rejuvenation of the VMM, live VM migration can further improve availability of virtualized systems. In this paper, we will analysis rejuvenation process of virtualized system with live VM migration, propose a time and load based rejuvenation analytical model in Stochastic Reward Net (SRN) to describe state change during system rejuvenation, find the optimum combinations of rejuvenation trigger intervals that maximize the availability of VM, and do a experience to analyze and compare the model in this paper and the time based model. The experience result shows the time and load based rejuvenation analytical model is better than the time based model in respect of system availability and throughput rate, and is more stable in face of the dynamic change of system load.

Keywords: Virtual Machine (VM); Virtual Machine Monitor (VMM); Software Aging; Software Rejuvenation; VM Migration; Stochastic Reward Net (SRN)

Research on the characteristics of overlying strata movement in downward and upward mining longwall panel in steeply inclined seam by similar physical simulation

Cheng Jingyi, Zhang Yidong, Zhang Peng

Computer Modelling & New Technologies 2014 18(12A) 446-452

To study the failure and collapse rule of overlying strata movement in the downward and upward mining longwall panel in a steeply inclined seam, panel B in mine A was used as the engineering background. Experimental methods for similar physical simulations were applied to study the overlying strata movement in different mining stages. Experimental results showed that during the upward and downward mining stages, the main breaking span for the crack development rule inside the overlying rock was significantly different. During the downward mining stage, the internal vertical fissures tended to close, whereas crack development of the vertical fissures was exacerbated in the upward mining stage. In addition, the main breakage span in the upward mining stage was obviously less than that in the downward mining stage. Field measurement results validated the experimental results, which were significant to the retreating panel under similar conditions.

Keywords: Downward and Upward Mining; Steeply Inclined Coal Seam; Overlying Strata; Similar Physical Simulation

Research on training mode of information security application-oriented personnel on the basis of engineering practice in China

Zhou Yuping, Huang Rufeng, Yu Dongmei

Computer Modelling & New Technologies 2014 18(12A) 453-461

Information security is now a key component to maintain national security, social security and economic security, and the training of high quality information security personnel is urgently needed. This paper would start from analyzing purposes and current situations of information security personnel training in China, and then discuss about training mode of China information security personnel from aspects of optimizing curriculum system, cultivating outstanding teachers, constructing engineering practice system, and regulating personnel training evaluation system.

Keywords: CDIO, Information Security, Engineering Practice, Curriculum Optimization

Risk forewarning mechanism of ship investment: model and numerical analysis

Zhu Yuhua, Chen Yujuan

Computer Modelling & New Technologies 2014 18(12A) 462-465

The ship investment is a capital intensive and high risk industry with a huge amount of investment and long payback period of investment. Therefore, ship owners, shipyards and banks are very concerned about ship prices fluctuation. This paper takes the containership new building prices as an example. The paper analyzes the causes of the containership new building prices fluctuation risk, and analyzes the trend of the containership new building prices by applying the ARIMA model, a classical time series analysis model. Then it establishes the containership new building prices forewarning mechanism model for ship owners, shipyards or banks to control price risk and improve management level.

Keywords: ship investment, containership new building prices, ARIMA model, forewarning mechanism

Search results optimization approach based on semantics

Li Li, Yao Qiang

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Search results optimization technology studies how to process and optimize the original search results so as to improve the user experience. This paper proposed a search results optimization approach based on semantics. This approach represented user query as its semantic structure expression, and represented each original result page as a word list. A correlation calculation model was constructed by combining WordNet, large-scale corpus and users' evaluation data, based on which the correlation between each result page and user query was calculated. When calculating correlation, different module was adopted according to the type of user query. This approach forms a new results list at last. The experiment showed this method can improve retrieval results to some extent.

Keywords: search results optimization, information retrieval, semantic analysis

Study of the influencing factors of compressive characteristics for the foundation layer of undersea immersed tube tunnels

Wei Gang, Xing Jian-jian, Qiu Hui-jie, Yang Ze-fei, Wang Dong-di

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Shenjiamen undersea immersed tube tunnel in Zhoushan, Zhejiang was taken as prototype to establish a 1:10 scale model with 30m in vertical length. The formation process of sand grouted foundation layer in seawater environment was simulated in the experiment considering the interaction of gravels during the formation of foundation layer. Different construction factors were examined by incorporating different design boundary condition, back-silting condition and sand grout density. Results showed that in the boundary condition of one end fixed and the other free, the settlement at the free end of the tube increased significantly (approx. 3 times) and the timeframe for settlement to stable increased; back-silting increased the overall condensability of the foundation layer and led to non-uniform compression; the reduction of sand-water ratio of the grout reduce the compressive modulus of the foundation layer. Further settlement occurred when the load exceeded the limit which is detrimental towards the global stability of the foundation layer. Comparing the effects on the settlement of foundation layer or compressive modulus, the factor of one end fixed and one end free was most significant, followed by back-silting and reduced sand-water ratio.

Keywords: immersed tunnel; base layer; model test; compression feature; influencing factor

Study on identification of structural damage to wind turbine blade based on modified fruit fly optimization algorithm

Gu Guimei, Wang Zheng

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A damage diagnosis method was proposed based on modified fruit fly optimization algorithm for the identification of structural damage to wind turbine blade. By transforming the identification of structural damage into constrained optimization, this method identified the structural damage to wind turbine blade by fruit fly optimization with minimum inherent frequency and oscillation mode error as target function of constrained optimization. Given that the basic fruit fly optimization (FOA) has problems of partial optimization and low optimization accuracy, so chaos optimization algorithm was used to modify FOA. The numerical simulation of single- and multi-damage to wind turbine blade and various experiments of damage to small-scale wind turbine blade showed that modified fruit fly optimization (MFOA) can not only accurately identify the damage position, but also effectively identify the damage degree in detection of structural damage to wind turbine blade. Therefore, the identification accuracy of MFOA was obviously better than that of basic FOA and genetic algorithm (GA).

Keywords: Wind turbine blade; structural damage; fruit fly algorithm; constrained optimization

Study on the financing mode selection of overseas investment for coal mining projects

Fang Li, Cong Jin

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Outward foreign investment of coal mining project needs a large amount of money and has the characteristics of high returns and risks. The transnational financing is more difficult to manage and make decisions, under the complicated financial and legal environment. From the perspective of project sponsors, the selection of the financing model not only affects the project ownership, the cost of capital, risk sharing, etc., but also is the basis of development work of follow-up. This paper found out the influence factors of financing model selection through the ISM method, and calculated the index weight through the ANP model with unknown expert weight, based on the analysing of the existing financing modes and their respective characteristics. Then the grey target decision model was established for financing mode selection, with index weight got by the previous step.

Keywords: Overseas investment ; Coal mining ; Financing mode ; Unknown experts' weights ; ANP ; Grey target decision

model

Super-sampling method during decoding for fractal image compression

He Jie, Guo Hui

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A super-sampling algorithm is presented to avoid the need for recoding when magnifying a reconstructed image after fractal image compression, thus making the fractal image compression method more practical. The sizes of and coordinates of range blocks and domain blocks in the decoder are adjusted according to the proportional relationship between the decoded initial image and the encoded image; then, the bilinear interpolation method is applied to complete the re-sampling process; and then, iterations are conducted. Thus, image magnification is directly completed in the decoding process. Image magnification with this algorithm does not lead to change in image texture or loss of image quality, and also image quality through super-sampling mainly depends on the size of sub-blocks during coding, according to experimental results. The method put forward in this paper can broaden the application scope of fractal image compression by effectively avoiding the excess time consumption resulting from re-decoding.

Keywords: Fractal Image Compression, Image Magnification, Super-sampling, Re-sampling, Bilinear Interpolation

Technological structure determination of Chinese creative cultural product export

Cong Haibin, Zou Deling

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This paper adopts Technology Content Index and Relative Technological level Index to determine export structure of Chinese creative cultural products in the past decade. The results show that creative cultural products exported from China are mainly of middle or low technology content; the overall technological level of export structure of creative cultural products is lower than the world level, which has not been improved for a long period of time. Therefore, China should strengthen originality and technological innovation, bring cultural resources into full play, and further optimize industrial and export structure of creative cultural industries.

Keywords: Creative Cultural Products, Technology Content, Trade Structure

The correlation analysis between exercise dependence and exercise motivation

Li Menglong, Nie Jingsong, Ren Yujia

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Purpose: Study the correlation between exercise motivation and exercise dependence behaviour for female university students' involvement with extracurricular physical exercise. Method: Refers to domestic and overseas relevant literatures, employ the exercise dependence scale and exercise motivation scale, conduct a survey among 617 exerciseloving female university students. The result shows: positive correlation of exercise intensity and exercise dependence; the 2 dimensions appearance motivation and ability motivation included in the exercise motivation appeared to be correlative to exercise dependence, while other motivations appear to be uncorrelated to exercise dependence. Conclusion: the main reasons of female university students' dependence on exercise are appearance motivation and ability motivation and other motivations are not the cause of their dependence, should start with the 2 motivations to prevent female university students from their dependence on exercise.

Keywords: Multivariate Regression Analysis; Exercise Dependence; Exercise Motivation; Correlation; Female University Students

The coupling mechanism between key resources acquisition capabilities and technologies innovation capabilities under open innovation pattern

Du Junshu, Guo Yi

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This research investigates the mechanism of coupling relationship between enterprise key resources acquisition capabilities (KRACs) and technological innovation capabilities (TICs) in open innovation pattern. An evaluation model of coupling relations is set up by means of synergistic theory, which including efficiency function, coupling degree function, coupling degree index system, as well as coupling coordination function. Then, by taking SY corporation as a case, the study employs the evaluation model to evaluate the coupling degree of KRACs and TICs. The results show that the two factors of SY company both are in the state of middle coupling degree and coordination degree. The paper, on the one hand, fills the gap about the theory research between business KRACs and TICs in open innovation. On the other hand, this present provides a theoretical basis and practical guidance for enterprises to evaluate properly and monitor the coupling coordinated development between KRACs and TICs

Keywords: Open Innovation; Coupling; Key Resources Acquisition Capabilities; Technological Innovation Capabilities

The empirical research of the relationship between knowledge integration and service capability in service outsourcing

Liu Wenhua, Ren Licheng, Jiang Tiangang

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A relationship model among knowledge integration influence factors, knowledge integration and enterprise service was built in this paper based on the fundamental theories of organizational learning, knowledge management, learning organization, intellectual capital and ability. Corresponding hypothesis has been put forward on account of this model to do the empirical test using survey data from questionnaires and site interviews, the assumptions of which in the model have been all passed the inspection further proved that knowledge integration factors have important effects on enterprise knowledge integration capability, and simultaneously the ability and degree of knowledge integration have important influence on enterprise service ability.

Keywords: Knowledge Integration; Service Outsourcing; Service Capability.

The subjective evaluation on sound quality for interior noise based on customer satisfaction

Xing Peng, Hua Lin, Deng Song, Du Songze

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Customer satisfaction is proposed to evaluate a product quality whether good or not in the development of market with customer-oriented. In this paper, the importance of the customer requirement is introduced in sound quality evaluation. During the subjective evaluation procedure, the roughness coefficient and average roughness interval are applied to calculate the basic importance of customer requirement. Subsequently, the amending factor set is conducted to correct the basic importance of customer requirement based on the Kano model. As a result, the final importance of customer requirement is obtained, which can transform the customers' subjective requirements to engineering improvement targets. Moreover, the test on noise working condition is carried out. The results indicate effectiveness of the proposed method.

Keywords: Customer Satisfaction; Roughness Coefficient; Average Roughness Interval; Kano Model

A method for probabilistic decision making with distance measures under 2-tuple linguistic environment

Gu Fengjuan, Zeng Shouzhen

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In this paper we develop a new approach for 2-tuple linguistic multiple attribute decision making with probabilistic information, named the probabilistic 2-tuple linguistic ordered weighted averaging distance (P2LOWAD) operator. The main advantage of this operator is that it uses the probabilistic information in a unified framework between 2-tuple linguistic distance measures and the OWA operator that considers the degree of importance of each concept in the aggregation. Some of its main properties and different families are also studied. Moreover, a practical method based on the P2LOWAD operator for multi-criteria decision making with 2-tuple linguistic information is presented. Finally, an illustrative example demonstrates the practicality and effectiveness of the proposed method.

Keywords: 2-tuple linguistic variables; Distance measure; OWA operator; Probabilistic information; Multi-criteria decision making

Effect of coal price on the economy in China

Si Zhaoxia, Chen Xiangjun

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Coal is the main economic resource in China. To study the effect of coal price on the economy, a vector auto regression model was established through a co-integration test based on the coal price and economic variables. An empirical analysis of the relationship between coal price fluctuation and economic variables was conducted by using an impulse response function and variance decomposition method. Results demonstrate that a co-integration relationship exists between the coal price and economic variables. Coal price fluctuation has a short-term and long-term positive effect on CPI, a short-term negative effect and long-term positive effect on PPI, a short-term positive effect and long-term unobvious impact on GDP. From the impulse response analysis, within the forecast period, coal price fluctuation has an obvious positive effect on CPI in long time and PPI unobvious positive effect on GDP at beginning, its positive effect on GDP enhances as the forecast period increases. The analysis of the contribution shows that coal price fluctuation influences economic variables to different extents. A coal price management mechanism should be established and perfected to reduce the impact of coal price fluctuation on the economy. Furthermore, the energy consumption structure should be improved.

Keywords: Coal price fluctuation, Co-integration test, VAR model, Impulse response, Variance decomposition.

Multivariable panel data cluster analysis and its application

Zheng Bingyun, Li Sui

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Although the research on statistical analysis is very mature, the study on cluster analysis of multivariable panel data is little in China. This paper firstly analyses the numeric characteristic of multivariable panel data, and reconstructs a new distance function of multivariable panel data and the function of sum of squares. On the base of clustering analysis basic thought, the paper explains the arithmetic and process of cluster analysis. At last, an experimental analysis is done on productive efficiency of

the industrial enterprises in China, this example results shows good applicability.

Keywords: Multivariable; Panel data, Cluster analysis; Productive efficiency

On echo signal of complex cloud background based on narrow pulse laser detector

Li Jing, Li Mengyao, Li Wentan

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In consideration of the poor ability of anti-interference to cloud of the present laser detector, the characteristics of laser back scattering is studied according to the extinction coefficient of cloud, so as to build a signal-to-noise ratio model under the backgrounds of uniform and non-uniform cloud. In addition, under the condition of certain laser energy, the simulation and experimental analysis on the echo signal of laser detection with different pulse width of 100 ns, 10 ns and 1 ns are conducted. The analysis shows that the result of the experiment and calculation are perfectly in accordance with each other, and the narrower the pulse width of lasing is, the higher the signal-to-noise ratio of the system is, that is, the higher the ability of anti-interference to cloud of the laser detection system is. Undoubtedly, this is of great significance in the improvement on the ability of anti-interference to cloud, the enlargement of the distance and the enhancement of the accuracy of the laser detector.

Keywords: Narrow Pulse Laser; Cloud Background; Characteristics of Back Scattering; Signal-to-noise Ratio

Laser cladding technology in the repair of shearer picks

Che Lei, Sun Wenlei, Huang Yong, Chao Yongsheng

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Xinjiang is rich in coal mineral resources, and the consumption of machineries in mines wear is quite great. In order to improve the wear of mining shearer picks, laser cladding technology have been used in the repair of worn shearer in this paper, and the result is very satisfactory. The conclusion provides some reference and guidance for similar problems of repair, and its application prospects are extensive.

Keywords: shearer picks, wear, laser cladding, repair

A hybrid method for intuitionistic linguistic decision making with distance measure and aggregation operator

Mu Zhimin, Zhang Linyun, Zeng Shouzhen

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In this paper we propose a hybrid method for intuitionistic linguistic decision making and introduce the intuitionistic linguistic hybrid weighted distance (ILHWD) operator. It is a new aggregation that uses a unified model between distance measures and hybrid aggregation operator considering the importance degrees of both the individual distances and the attitudinal character of the decision maker. We study different families of the ILHWD operator. Finally, based on the presented operator, we develop a decision making approach and illustrate it with a numerical example under intuitionistic linguistic environment.

Keywords: Distance measures; hybrid weighted distance operator; intuitionistic linguistic set; decision making

A kernel vector quantization codebook designing for image compression based on simulated annealing into genetic algorithm

Zhao Mengling, Liu Hongwei

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To solve premature phenomenon and falling into local optimum of genetic algorithm, the simulated annealing algorithm is introduced to the genetic algorithm and a simulated annealing is presented based on genetic clustering algorithm, a new effective SA, crossover operator and mutation operator proposed for fitting the partition-based chromosome coding. In addition, the Euclidean distance is replaced by the kernel function distance to improve the performance of the proposed algorithm further. We also applied the proposed algorithm to image compression. Experimental results indicate its superiority in terms of peak signal to noise ratio (PSNR).

Keywords: Mercer Kernel; crossover operator; mutation operator; Vector Quantization

Non-Darcy properties of gas flow in different metamorphic grade coals

Yuan Junwei, Yue Gaowei

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Under different confining pressure, gas seepage tests are carried out in different metamorphic grade coals, which tests is used to discuss gas penetration mechanism in coal. The tested and theoretical results show that under different confining pressure, gas seepage laws are consistent in different metamorphic grade coals, but under the same confining pressure and the same gas pressure at the entrance, the metamorphism grade of coal is higher, the gas seepage flow is bigger. In the higher gas pressure section, the percolation curve of Q and $\Delta 2p/L$ meets the linear relationship, but the gas pressure is lower, the percolation curve

of Q and $\Delta 2p/L$ deviates linear relationship of Darcy's law. The critical point lies from nonlinear to linear segment of gas flow in coal, and it is a gradual process from Non-Darcy flow to Darcy flow. At high Reynolds number, gas percolation obeys Darcy's law, but at low Reynolds number, the gas seepage in different metamorphic grade coals is non-Darcy flow. The collision of gas molecules and coal wall is the physical mechanism of gas non-Darcy flow phenomenon, which is determined by the mean free path of gas molecules and pore structure of coal, and the theoretical calculation well reveals the mechanism of gas non-Darcy seepage in coal.

Keywords: gas, coal, non-Darcy seepage, metamorphic grade

Table tennis video data mining based on performance optimization of artificial fish swarm algorithm

Hai Wang, Wenbo Qu, Qunli Shen

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In view of the traditional AFSA still has problems such as the low optimal performance and poor efficiency in data mining for table tennis video, a video data mining model for table tennis match is proposed based on improved AFSA. First, the traverse range of chaotic motion enlarges to the value range of AFSA optimization variables by leading in chaotic Logistic mapping. And then it increases the optimal artificial fish state information on the basis of original artificial fish behaviour, so guides the artificial fish to quickly close to the global optimal, improves the speed of the algorithm. Finally, adaptive optimize the search strategy of traditional AFSA, and apply the improved algorithm to the video data mining for table tennis match. The simulation experiments show that the video data mining model for table tennis match based on improved AFSA has better ability of optimization, and can dig out more attributes and types in the table tennis game video.

Keywords: Improved AFSA, Table Tennis Match, Data Mining, Chaotic Logistic mapping, Behavioral Optimization, Adaptive Strategy

Instantaneous overload optimization of scheduling algorithm for real-time systems of Linux operating system

Ding Fuhuai, Chang Jinyi

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Aiming at the real-time scheduling algorithm in practical application of Linux operating system and some problems such as instantaneous overload, this article proposed a based on local pheromone updating path optimization ant colony algorithm optimization and excitement factor of Linux operating system real-time scheduling model, first of all we use local pheromone update strategy, we introduce the ant- cycle model, and improve the convergence performance of standard ant colony algorithm, then we use the concept of excitement in artificial fish algorithm, the standard ant colony algorithm optimization process is divided into two stages of optimization, in order to improve the searching capability of the ant colony algorithm, finally improve the algorithm of pheromone persistence parameters, in order to improve the original routing capabilities of the algorithm. The simulation experiments show that the ant colony algorithm proposed in this article which is based on local pheromone updating optimization and excitement factor in comparison with the standard ant colony algorithm, has better convergence performance and convergence speed, and can better solve the Linux operating system real-time scheduling of instantaneous overload problem.

Keywords: Linux operating system, real-time scheduling, improved ant colony algorithm, local pheromone updating, excitement factor

Performance optimization of wavelength conversion ADMH algorithm in WDM optical network

Feng Wei, Ma Yurong, Zhu Bojiang

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Aimed at the poor application performance issues of adaptive dynamic minimum hop routing algorithm (ADMH) in the wavelength conversion of WDM optical network, in this paper we present an improved ADMG algorithm based on ant colony algorithm. By using ant colony algorithm, we optimize the update rules of local and global link of ADMH algorithm when selecting route and obtain the global optimal value. Then, we set priority for links with different number of optical fibers. According to different number of available wavelengths, we calculate different selection probability and optimize the priority of wavelengths. Simulation results show that the performance of improved ADMH algorithm proposed in this paper based on ant colony algorithm is better than ADMG algorithm when the network traffic load is large.

Keywords: Improved ADMH algorithm, ant colony algorithm, rule optimization, wavelength priority optimization, WDM optical network