Cumulative Index

Mathematical and Computer Modelling

Xiang Zhang, Huaixiang Zhang, Yifan Wu A SoPC design of a real-time high-definition stereo matching algorithm based on SAD
Computer Modelling & New Technologies 2014 ***18****(4) 7-14*

The System-on-Programmable-Chip (SoPC) architecture to implement a stereo matching algorithm based on the sum of absolute differences (SAD) in a FPGA chip is proposed. The hardware implementation involves a 32-bit Nios II microprocessor, memory interfaces and stereo matching algorithm circuit module. The Nios II microprocessor is a configurable soft IP core in charge of managing the buffer of the stereo images and users' configuration data. The system can process any different sizes of stereo pair images through a configuration interface. The maximum horizon resolution of stereo images is 2048. When the algorithm core works under 60MHz, the 1396×1110 disparity map can be achieved at 30 fps speed.

Keywords: Stereo matching, System-on-programmable-chip, FPGA, Disparity map, SAD

Song Fei, Cui Zhe Study on improved LLE algorithm based on a sample set of well-distributed and weights matrix
Computer Modelling & New Technologies 2014 ***18****(4) 15-18*

There are large amounts of data has accumulated along with technology of computer, information and network developed. How can we using these data and mining out the valuable information are hot topics in information processing field. There are some distress and difficulties caused by the high-dimensional data on data modelling and data analysis. In this paper, a local linear embedding algorithm based on the improved uniform sample set and the weight value matrix is proposed. The test shows that the improved dimensionality reduction algorithm accuracy is significantly higher than the original LLE algorithm.

Keywords: LLE, Well-distributed, Weights Matrix

Gongfa Li, Jia Liu, Guozhang Jiang, Jianyi Kong, Liangxi Xie, Wentao Xiao, Yikun Zhang, Fuwei Cheng The nonlinear vibration analysis of the fluid conveying pipe based on finite element method
Computer Modelling & New Technologies 2014 ***18****(4) 19-24*

A Coupling between the fluid and the structure existed almost in all industrial areas the vibration of fluid solid coupling for fluid conveying pipe was called the "dynamics of typical"[1], Because of the physical model and mathematical description for the fluid conveying pipe was simple, especially it was easy to design and manufacturing, according to the characteristics of fluid conveying pipe, transformed the transverse vibration of the fluid conveying pipe to the beam element model of two nodes. Using Lagrangian interpolation function, the first order Hermite interpolation function and the Ritz method to obtain the element standard equation, and then integrated a global matrix equation. Used the mode decomposition method, obtained the vibration modal of the fluid conveying pipe with Matlab programming. The vibration modal of the fluid conveying pipe in four kinds of boundary conditions was analysed. The characteristics of pipes conveying fluid was obtained which the pipeline system parameters under different boundary constraints. To provide the theoretical support for the research of vibration attenuation of fluid conveying pipes.

Keywords: Fluid solid coupling, Nonlinear vibration, Modal analysis, Interpolation, The finite element algorithm

Jianhua Zhang Dynamic coupling analysis of rocket propelled sled using multibody-finite element method
Computer Modelling & New Technologies 2014 ***18****(4) 25-30*

Rocket propelled sled is a most important testing tool in aerospace and aviation industries flying along the rails on the ground. It is very difficult to simulate the operating conditions in the computer using numerical analysis method. In consideration of this fact, the dynamics analysis and simulation of the rocket propelled sled were done based on

Multibody System Dynamics and Finite Element Analysis theory in this paper. The most difficult work during the analysis was establishing the boundary conditions of the rocket propelled sled. This paper made this kind of attempt. Then the relevant post processing figures and data were obtained, thereby providing the designer and manufacturer with detailed and reliable data. The conclusion is the combination of finite element analysis and multisystem theory is more effective than those before and the boundary conditions are correct and acceptable. The results of it can be important references of structure designers.

Keywords: Rocket propelled sled, Finite Element Analysis, Multibody Dynamic Analysis (MDA), Multibody-Finite-Element Method, Rail Irregularity

Gaochao Xu, Yunmeng Dong, Xiaodong Fu, Yan Ding, Peng Liu, Jia Zhao A heuristic task deployment approach for load balancing

Computer Modelling & New Technologies 2014 ***18****(4) 31-36*

The load balancing strategy, which is based on the mission deployment, has become a hot topic of green cloud data centre. For the question that currently the overloaded physical hosts in the cloud data centre causes the load imbalance of the whole cloud data centre, the proposed makes an intensive study which is about the select location question of the deployment tasks on the physical host and then this proposed a new heuristic method which is called LBC. Its main idea consists of two parts: First, based on the function, which denotes the performance fitness of physical hosts, it conducts a constraint limit to all physical hosts in cloud data centre. So a task deployment strategy with global search capability is achieved. Secondly, using clustering methods can further optimize and improve the final clustering results. Thus, the whole way achieves the long-term load balancing of the cloud data centre. The results show that compared with the conventional approach, LBC significantly reduces the number of failure of the deployment tasks, improves the throughput rate of the cloud data centre, optimizes the performance of external services of the data centre, and performs well in terms of load balancing. Besides, it makes the operation of cloud data centres be more green and efficient.

Keywords: load balancing strategy, cloud data centre, task deployment, LBC, clustering

Gongfa Li, Wentao Xiao, Guozhang Jiang, Jia Liu Finite element analysis of fluid conveying pipeline of nonlinear vibration response

Computer Modelling & New Technologies 2014 ***18****(4) 37-41*

Fluid filled pipe system was widely used in the city water supply and drainage, water power, chemical machinery, aerospace, marine engineering and the nuclear industry and other fields, it was play an important role for improving the living standards of the nation and the national economic strength. Pipe conveying fluid was easy to design and manufacture, according to the characteristics of fluid conveying pipe, transformed the axial vibration mathematical model of the fluid conveying pipe, which considerate the fluid solid coupling to the beam element model for two nodes. Using Lagrangian interpolation function, the first order Hermit interpolation function and the Ritz method to obtain the element standard equation, and then integrated a global matrix equation, obtained the response of conveying fluid pipe with the Newmark method and Matlab. With the Matlab to simulate the axial motion equation of the conveying fluid pipe, study the response of the system in two aspect of fluid pressure disturbance and the fluid velocity disturbance, and the simulation results are analysed, which provides theoretical support for the work of fluid conveying pipes.

Keywords: response, MATLAB, Numerical simulation, nonlinear vibration

Yi Wang Birkhoff normal forms for the wave equations with nonlinear terms depending on the time and space variables

*Computer Modelling & New Technologies 2014 **18**(4) 42-49*

The one-dimensional (1D) quasi-periodically forced nonlinear wave equation with periodic boundary conditions is considered. It is proved that there is a real analytic and symplectic change of coordinates, which can transform the Hamiltonian to the Birkhoff normal form.

Keywords: Infinite dimensional Hamiltonian system, quasi-periodically forced nonlinear wave equation, quasi-periodic solution, periodic boundary condition, Birkhoff normal form

Sun Zeyu, Yang Tao, Shu Yunxing Wireless sensor networks optimization covering algorithms based on genetic algorithms

*Computer Modelling & New Technologies 2014 **18**(4) 50-56*

This paper starts with two methods applied widely of computational intelligence; Evolutionary computing and swarm intelligence. It makes the Genetic Algorithms (GA) that is classic in evolutionary computing and genetic algorithm that is representative in swarm intelligence as its study foundation. It presents theory and characteristic of the two methods to seek the application of intelligent optimization in engineering practice. In application, in view of the feature that wireless sensor network (WSN) must possess auto-organization, auto-adaptation and robustness, especially, energy of WSN is very limited, this paper fully utilizes the advantages of computational intelligence, marries together both the research focuses. It proposes some methods and ideas for applying computational intelligence to solve optimization problems of WSN. This paper depicts coverage problem of WSN, for the feature that this problem is the problem of multi objective optimization, under the topology control of GA, it applies GA based on sorting to solve the problem, then improves this algorithm to maintain population diversity and obtain high-quality, well distributed solutions. The algorithm it proposes realizes the aim that using the least number of sensor nodes to achieve the best coverage, which is able to save energy of the network, decrease the interference between signals and prolong the network life-time.

Keywords: Wireless Sensor Network (WSN), Coverage rate, Sensor node, Genetic Algorithms

Na Wang, Yanxia Pang An improved light-weight trust model in WSN

*Computer Modelling & New Technologies 2014 **18**(4) 57-61*

WSN is often deployed in unattended or even hostile environments. Therefore, providing security in WSN is a major requirement for acceptance and deployment of WSN. Furthermore, establishing trust in a clustered environment can provide numerous advantages. We proposed a light-weight trust model which considers data aggregation and communication failure due to wireless channels. It computes retransmission rate to get success, failed and uncertain value, and details the data in parameters to depend against attacks. With comparing our model with LDTS and Model using Trust Matrix, we conclude that our model has implemented a trade-off between detection rate and communication consumption.

Keywords: direct trust, light-weight, trust matrix, retransmission rate, indirect trust

Information and Computer Technologies

Gaochao Xu, Yushuang Dong, Bingyi Sun, Xiaodong Fu, Jia Zhao An approach of VM image customized through Linux from scratch on cloud platform

*Computer Modelling New Technologies 2014 **18**(4) 62-67*

The cloud platform provides abundant resources and services for users. More and more mobile users began to use the cloud services. They have higher real-time demands on service. The size of traditional virtual machine (VM) operating system is basically large. It will take many resources in deployment and communication process, and always affect the real-time performance of system. To reduce communication overhead and improve deployment speed of VMs, this paper proposes an approach of customized VM image with LFS. LFS can reduce the size of VM image efficiently and

enable flexible customization of the VM image by incremental customization. The experimental results show us that the size of VM image generated by the proposed method is smaller than the one generated by kernel tailoring technology in system overhead. Meanwhile it is also faster in running speed.

Keywords: Cloud computing, Linux from scratch, Customized virtual machine

Fengqing Qin Blind multi-image super resolution reconstruction with Gaussian blur and Gaussian noise
Computer Modelling & New Technologies 2014 ***18****(4) 68-99*

A framework of blind multi-image super resolution reconstruction method is proposed to improve the resolution of low resolution images with Gaussian blur and noise. In the low resolution imaging model, the shift motion, Gaussian blur, down-sampling, as well as Gaussian noise are all considered. Firstly, the Gaussian noise in the low resolution image is reduced through Wiener filtering method. Secondly, the Gaussian blur of the de-noised image is estimated through error-parameter analysis method. Thirdly, the motion parameters are estimated. Finally, super resolution reconstruction is performed through iterative back projection algorithm. Experimental results show that the Gaussian blur and motion parameters are estimated with high precision, and that the Gaussian noise is restrained effectively. The visual effect and peak signal to noise ratio (PSNR) of the super resolution reconstructed image are enhanced. The importance of Gaussian blur estimation and effect of Gaussian de-noising in multi-image super resolution reconstruction are tested in an experimental way.

Keywords: blind, multi-image super resolution, Gaussian blur, Gaussian noise, iterative back projection

Xu Gaochao, Ding Yan, Ou Shumao, Hu Liang, Zhao Jia A 'Follow-Me' computing scheme based on virtual machine movement for QoS improvement in mobile cloud computing environments
Computer Modelling & New Technologies 2014 ***18****(4) 74-81*

Mobile cloud computing utilizes virtualized cloud computing technologies in the mobile Internet. To improve Quality of Service (QoS) and execution efficiency of mobile cloud applications, we propose a novel computing scheme called "Follow-Me" (FM), which is based on live wide-area virtual machine (VM) migration. In a virtualized mobile cloud environment based on the VMs of cloud side and mobile devices of user side, the purpose of the proposed FM scheme is to migrate the corresponding VM in real-time when a mobile device moves from one service area to another. FM obtains the current positions of mobile devices, estimates the next servicing areas, and finally migrates the VMs along with the mobile users' movement. The proposed FM scheme has been tested in an experimental environment by using the CloudSim platform. The experimental results demonstrate that FM evidently improves the QoS of mobile cloud computing compared with the existing approaches. FM achieves a better average service response time, a clearly smaller error rate and consumes less energy.

Keywords: Mobile Cloud Computing, Mobile Device, Virtual Machine, Area Localization, Live Wide-Area Migration

Xiao Xiaohong, Wu Yonggang A cloud-removal method based on image fusion using local indexes
Computer Modelling & New Technologies 2014 ***18****(4) 82-88*

For optical images, cloud and cloud shadow is always a problem during image processing and interpretation. Landsat ETM+ images, as a kind of optical images, are affected by cloud too. On the other hand, microwave images such as ALOS PALSAR images, which depend on microwave, is not affected by cloud, thus they are cloud-free. The aim of this study is to develop a semi-automatic method for removing cloud and cloud shadow in Landsat ETM+ images based on fusion of Landsat ETM+ image and ALOS PALSAR image. The key point of this method is to develop a cloud and cloud shadow mask based on which Landsat ETM+ and ALOS PALSAR images can be fused. To accurately define cloud and cloud shadow area, we first approximately draw the area of interest containing cloud and cloud shadow manually, and the resulted AOI image greatly reduce the number of ground objects and the confusion between objects as well. By analysing the spectral and the grey value of the AOI image, we then define LCI (local cloud index), LSI (local shadow index), and LGI (local ground index) to accurately identify cloud and cloud shadow area in Landsat ETM+ images. Finally, a combination mask of cloud and cloud shadow is developed. Based on this mask, Landsat ETM+ image and ALOS PALSAR image are merged. The fused image is cloud free, at the same time;

it keeps the spectral feature and the integrity of Landsat ETM+ image.

Keywords: Cloud-removal, AOI, Landsat ETM+, ALOS PALSAR, LCI, LSI, LGI

Song Xiaoxia An efficient method for acquiring and processing signals based on compressed sensing
Computer Modelling & New Technologies 2014 ***18****(4) 89-94*

Compressed sensing (CS) theory provides a novel sensing/sampling and processing paradigm that breaks through the limitation of Nyquist rate to some applications. However, it is usually happened to the instability and redundancy of the acquired CS measurements. In view of this, we propose an efficient method to achieve adaptive minimal measurements with fewer measurements and good reconstruction performance by adding the pre-processing block into CS data acquiring and processing paradigm. In the proposed method, we firstly obtain the measurements to perfectly reconstruct the signal, and then design the optimization method to obtain adaptive minimal measurements by eliminating the redundant measurements. Experimental results show that the proposed method can obtain fewer measurements to perfectly reconstruct the signal than that of classical CS and sequential compressed sensing frameworks.

Keywords: compressed sensing, sequential compressed sensing, signal reconstruction, homotopy method

Xiaoping Wang, Jin Yao, Wangang Wang Detection of WCDMA uplink signal with combination between sliding match and power spectrum
Computer Modelling & New Technologies 2014 ***18****(4) 95-101*

Aiming at problem of WCDMA uplink signal being difficult to be detected under low SNR, this paper proposes a type of algorithm in which sliding match combines with power spectrum to detect WCDMA signal. Firstly, this algorithm estimates desynchronizing point of signal using Frobenius norm. According to desynchronizing point, a whole cycle of information sequence is intercepted. Correlation of OVSF code sequence is utilized in which residual carrier or DC component of signal would come into being while the received OVSF code sequence completely matches with local OVSF code sequence. Then its power spectrum is calculated and sharp spectral peak would appear in the frequency position of power spectrum. Through detecting amplitude and position of spectral peak, frequencies of OVSF code sequence and residual carrier utilized in WCDMA signal could be accurately estimated. Simulation results show that this algorithm rapidly realizes the estimation on OVSF code sequence and desynchronizing point keeps good detection effect and may effectively overcome the influences of residual frequency offset on it.

Keywords: WCDMA signal, OVSF code sequence, Frobenius norm, sliding match, power spectrum

Operation research and decision making

Lei Li, Jianrun Zhang Multidisciplinary design optimization of complex products based on data fusion and agent model
Computer Modelling & New Technologies 2014 ***18****(4) 102-107*

Multidisciplinary design optimization (MDO) of complex products is discussed in this article. For the characteristics of higher order, high-dimensional, multi-input and multi-output in design of complex products, application of MDO in design and optimization of complex products is difficult. An effective MDO framework combined with the method of data fusion and agent model is proposed. Firstly, date fusion is applied to deal with the process with a large number of incomplete, vague and uncertain in complex product's evaluation and optimization; secondly, agent model is used to reduce the complexity of the MDO model; and finally, MDO is applied to complex products design and optimization according to the collaborative design and optimization method. In order to identify the feasibility of this method, the design of diesel engine motion mechanism is discussed and shown a good result. The current study provides a powerful tool for complex products designing and optimization and owns great theory and practical values.

Keywords: Complex Products, MDO, Date Fusion, Agent model

Si Chen, Gan Mi, Dingqi Shuai Research on the influence of the different logistics demand structures of the city in regional logistics planning
Computer Modelling & New Technologies 2014 ***18****(4) 108-112*

This research analysis the different parts of regional logistics demand at first. There are three parts of the logistics demand considered in this paper; they are logistics demand in the city, logistics demand between cities and the logistics demand from or outside the area. The relationships have been studied by the Grey Theory, and a numerical example has been made to show the way how to analysis the logistics demand structure in the regional logistics planning. In the regional logistics, planning the difference of logistics demand structures of the cities should be fully considered. Then the logistics planning with different regional logistics planning purposes have been programmed. Based on the numerical example, different plans and different influence scopes have been got at last.

Keywords: Logistics Demand, Grey Theory, Logistics planning, Demand Structure

Yongqin Jin, Dongsheng Liu Integrating TTF and TAM perspectives to explain mobile knowledge work adoption

Computer Modelling & New Technologies 2014 ***18(****4) 113-120*

It is an advanced research subject to information technology as well as a great influence to the development of mobile work that how mobile work service is adopted and how it provides effectiveness. This article refers to 1) Analyse principles of TAM & TTF models, clarify the precondition and strength & weakness of the model, and propose a new mobile work service model combined with TAM & TTF; 2) Practical study to the new model. The conclusion for this model is as follow: a) two basic characteristics of mobile work and support from up-level managers in a firm are the preconditions whether service will be adopted. b) task-technology matching is the significant factor on service acceptation. c) It could improve employees' efficiency within the practical use of task-technology matching mobile work service.

Keywords: mobile work, TTF, TAM, Embedded model

Jie Liu, Qiusi Dai, Huifeng Yan Application of magnified BP algorithm in forecasting the physical changes of ancient wooden buildings

Computer Modelling & New Technologies 2014 ***18****(4) 121-125*

CA using neural network model of ancient buildings to predict changes in the physical properties of Applied X-ray detector collection of ancient buildings grey wood elements, so that the ancient wooden building components of each pixel grayscale and Neural Network CA model correspond to each cell, using the CA model "grey" concept learning through the improved BP Algorithm to calculate the grey value of each cell changes, so as to arrive ancient architectural wood elements over time the case of damage by example through the projections obtained wood over time damage to the picture.

Keywords: ancient building, BP neural network, cellular Automata (CA)

Cunjie Guo, Wei Liang, Laibin Zhang The Semi-quantitative evaluation method and application of the risks of geological disaster of the Shaan–Jing pipeline

Computer Modelling & New Technologies 2014 ***18****(4) 126-130*

Based on the index scoring method, the semi-quantitative method for assessment of pipeline geological disaster risks calculates the relative risk of a disaster by investing and assessing the objective existence state of index in accordance with pre-determined scores and weights, and meets the requirements of risk prioritizing and ranking at the geological disaster investigation stage so as to guide the development of risk control planning. A geological disaster risk semi-quantitative assessment system and risk grading standards both of which are applicable to oil and gas pipelines have been established. What has been developed also includes the pipeline geological disaster risk management system software, which integrates the risk semi-quantitative assessment technique based on the index-scoring-method, and other techniques such as information management and risk management, and thus provides a platform of information, technology and management for the management of pipeline geological disaster risks. This method has been used for a unified risk assessment of more than 3300 disaster points along the oil and gas pipeline, and satisfactory evaluation results are obtained, thus providing an important basis for the development of planning of pipeline geological disaster risk remediation.

Keywords: oil and gas pipeline, geological disasters, index scoring method, semi-quantitative assessment, risk grading

Dasheng Wu Estimation of forest volume based on LM-BP neural network model
*Computer Modelling & New Technologies 2014 **18**(4) 131-137*

Since cost factors are of primary importance, continuously searching for more efficient and reliable estimation models that could integrate or, in some cases, substitute the traditional and expensive measuring techniques for forest investigation is necessary. The evaluation indexes set, which included 10 factors: elevation, slope, aspect, surface curvature, solar radiation index, topographic humidity index, tree ages, the depth of soil layer, the depth of soil A layer, and coarseness, was established. Then, using the integration data of the administrative map, Digital Elevation Model (DEM), and forest resource planning investigation data of the key forestry city of Longquan, Zhejiang Province, PRC, the membership of each factor was empirically fitted by polynomials, and the forest volume was estimated via an improved back propagation (BP) neural network(NN) model with Levenberg-Marquardt(LM) optimization algorithm(LM-BP). The results show that the individual average relative errors (IARE) were from 23.29% to 47.87% with an average value of 33.06%; The groups relative errors (GRE) were from 0.38% to 9.31% with an average value of 3.65%, this meant that groups estimation precision was more than 90% which is the highest standard of overall sampling accuracy about volume of forest resource inventory in china.

Keywords: LM-BP; Forest Volume; Estimation

Kun Zhang, Yanxi Chen, Minfei Qiang Required screw length measurement in distal tibia based on three-dimensional simulated screw insertion
*Computer Modelling & New Technologies 2014 **18(**4) 138-144*

The objective of the study was to provide morphological data of the distal tibia to offer guidance on the required screw length. Computed tomography scans of the ankle in 225 patients were reviewed. Then parameters in the three-dimensional reconstruction images were measured by three independent, qualified observers on 2 separate occasions. The anteroposterior length increases from medial to lateral margin at the level of the base of the tibiofibular syndesmosis. On both proximal and distal planes of tibiofibular syndesmosis, the medial-lateral width increases from posterior to anterior margin. Significant differences were observed in all parameters between male and female and in the minimum width at the level of the roof of the syndesmosis between left and right limbs (P<0.05). All of the parameters exhibited moderate to excellent intra-class correlation coefficient. The anteroposterior screws would probably penetrate the far cortex and injure the structures surrounding the distal tibia if longer than 35.35 mm and 32.53 mm in male and female. The screws should not longer than the maximum diagonals which are 51.29 mm and 46.58 mm on distal plane and 43.64 mm and 38.24 mm on proximal plane in male and female respectively, or inadvertent distal tibiofibular syndesmosis penetration may occur.

Keywords: Tibia, Tibiofibular syndesmosis, Tomography, X-ray computed, Imaging, three-dimensional

Weiming Chen, Xiaoyang Ni, Hailin Guo Disruption management for resource-constrained project scheduling based on differential evolution algorithm
*Computer Modelling & New Technologies 2014 **18**(4) 145-153*

In this paper, we study the problem of how to react when an ongoing project is disrupted. The focus is on the resource-constrained project scheduling problem with finish–start precedence constraints and the recovery strategies based on disruption management for the different types of disruptions are proposed. The goal is to get back on track as soon as possible at minimum cost, where cost is now a function of the deviation from the original schedule. The problem is solved with a differential evolution (DE) algorithm that can be solved more perfectly on the objective function. The new model is significantly different from the original one due to the fact that a different set of feasibility conditions and performance requirements must be considered during the recovery process. Project scheduling problem library (PSPLIB) has been taken into account so as to test the effect of novel hybrid method. Simulation results and comparisons determine the effects of different factors related to the recovery process and show that the differential evolution algorithm is competitive and stable in performance.

Keywords: disruption management, scheduling, resource-constrained, differential evolution

Xing Yu The optimal dynamic robust portfolio model
*Computer Modelling & New Technologies 2014 **18**(4) 154-157*

This paper is concerned with the optimal dynamic multi-stage portfolio of mean- dynamic var based on high frequency exchange data with the constraint of transaction costs transaction volume. The proposed solution approach is based on robust optimization, which allows us to obtain a worst best but exact and explicit problem formulation in terms of a convex quadratic program. In contrast to the mainstream stochastic programming approach to multi-period optimization, which has the drawback of being computationally intractable, the proposed setup leads to optimization problems that can be solved efficiently.

Keywords: dynamic portfolio, mean-var, robust, high frequency exchange

Baohui Jin Travel route choice model based on regret theory
*Computer Modelling & New Technologies 2014 **18**(4) 158-163*

Travel route choice behaviour research is a hot issue in the field of urban traffic planning, and it mainly researches the traveller's route choice decisions under uncertainty conditions, which theory includes such as expected utility theory, prospect theory, and regret theory. Based on the analysis of expected utility theory and prospect theory's applicable condition and the insufficiency, this paper establishes a travel route choice model according to regret theory. Study shows that people always try to avoid occur that other options is better than that selected option, and the properties of selected option cannot be replaced each other, which fits regret minimization of regret theory. The travel route choice model based on regret theory is simpler than others, and it is suitable for describing traveller's route choice behaviour under uncertainty conditions.

Keywords: urban traffic, travel route choice, regret theory, Bayesian updating

Heping Zhong Optimal contracts of production personnel's innovation based on slack resources
*Computer Modelling & New Technologies 2014 **18**(4) 164-171*

Based on the analysis frames of the multi-task principal-agent model, this paper establishes a principal-agent model of production personnel's innovation based on slack resources and obtains the optimal incentive contracts for production personnel while they are engaged in "production task" and "slack innovation" through the analysis of the model. In order to improve the performance of production personnel's "slack innovation", on one hand, the firm can reward their "slack innovation" according to the optimal incentive contracts; on the other hand, the firm can optimize the incentive contracts for their "production task" according to the interdependence of the cost functions of "production task" and "slack innovation" to promote indirectly the performance of "slack innovation". The originality of this paper is not only examining the multi-task problems of the compensation incentives for production personnel's "slack innovation" but also considering the impacts of the firm's active actions to support the production personnel's "slack innovation" on incentive contracts.

Keywords: contract, incentive, optimization, multi-task agent model, innovation, slack resources, production personnel

Zhou Huijuan, Zhao Huan, Liu Baoxun, Fan Qinglan A facilities state-based evaluation method on level of service in subway station
*Computer Modelling & New Technologies 2014 **18**(4) 172-177*

Subway station is the key node in the urban rail transit system. Its level of service affects directly the subway's operation efficiency and traveller's choice of track traffic way to travel. Considering the facility characteristics in subway station and pedestrians perspective, on the basis of a large number of survey data, this paper identifies the facilities which impact the level of service in subway station mainly, takes safety, comfort and smoothness as evaluation index, and evaluates respectively from the entrance, channel and platform area. The judgment matrix of facilities condition influence in each region on pedestrians is constructed and the evaluation model of level of service in subway station has been built based on the facility state. Finally taking PingGuoYuan subway station as instance for analysis, the result verifies that the evaluation method is effective.

Keywords: urban transportation, facilities state, level of service, judgment matrix, pedestrian experience

Hailing Li, Kejian Liu Resource management modelling and simulating of construction project based on Petri net

*Computer Modelling & New Technologies 2014 **18**(4) 178-183*

This paper establishes a model to exactly express the resource configuration, task duration and information transmission during the project execution phase. Based on the resources' properties in the projection execution phase and the hierarchical timed coloured Petri net (HTCPN), this hierarchical model exactly express the information required for project resource management, such as the task dependencies, resource demands and the task durations by defining a non-empty colour set as coloured tokens to represent the classes and combinations of the resources. This model is then simulated and analysed on the model structure, resource conflicts and run time using CPN Tools to verify the correctness and effectiveness of the HTCPN modelling of the project resources in the project execution phase.

Keywords: Construction Project, Petri Net, Resource, Modelling, Simulation

Lifei Yao, Ruimin Ma, Maozhu Jin, Peiyu Ren Study on distribution centre's location selection of internal supply chain for large group manufacturing companies

*Computer Modelling & New Technologies 2014 **18**(4) 184-190*

The purpose of this paper is to study what distribution centre's location selection can bring to the internal supply main management for large group manufacturing companies. This paper chooses the analytic hierarchy process to select an optional location for internal distribution centre', and evaluate it through the simulation method. Internal distribution centre construction can effectively shorten the delivery time, reduce the logistics intensity, and improve utilization rate of transport equipment. Therefore, the distribution centre's location selection is necessary and reasonable. This paper simplified some information when running the simulation and it is not all the same as the actual situation. This paper provides a good internal supply main management method for large group manufacturing companies. This paper put forward the importance of internal supply chain for a large group manufacturing company and studied the internal distribution centre's location selection.

Keywords: manufacturing, internal supply chain, distribution centre, simulation

Ouyang Fang, Chih-hung Hsu Exploring Dynamic Performance improvement in Service SCM: the Lean Six Sigma's perspective

*Computer Modelling & New Technologies 2014 **18**(4) 191-196*

This paper defines the performance evaluation system of Service SCM. As service is intangible and heterogeneous, the paper is to develop a model that illustrates under which conditions Lean Six Sigma is deemed most appropriate according to the type of service delivered. It investigate Lean Six Sigma practice in service supply chain and show how the Lean Six Sigma improve the performance of Service SCM from the statistics perspective. Furthermore, it stresses the CTQ (critical to quality) to the customer and clarifying their demands in terms of value-added requirements.

Keywords: Service Supply Chain Management, Intangible, Lean Six Sigma

Shimei Wu, Yulong Pei, Guozhu Cheng The study of urban traffic modal splitting method based on MD model under the low-carbon mode

*Computer Modelling & New Technologies 2014 **18**(4) 197-202*

Aimed at the problem of overly-simplify in the factors of travel cost in the traffic modal splitting method, built an Urban Traffic Modal Splitting Method Based on MD Model Under the Low-carbon Mode, to predict transportation share rate; Put forward four considerations such as the travel time, cost, safety and low carbon to describe the travel cost on the basis of the application of MD model; Gave the forecasting process of the prediction model and key variables algorithm, applied the model by the examples of DONGGUAN city. The results show that the urban structure of the transportation changed in DONGGUAN with rapid construction, development in traffic and implementation of transport policy, on the one hand, the travel occupies proportion of public transport (including

conventional bus and rail transit) will increase significantly in the future, expected to reach more than 25% by 2020; on the other hand, motorcycle travel will gradually fade away.

Keywords: Transportation Planning, Low-carbon Transportation, MD model, traffic modal split

Guangbin Wang, Honglei Liu, Lei Zhang Research on dynamic evolution of innovative virtual prototyping technology diffusion based on cellular automata

Computer Modelling & New Technologies 2014 ***18****(4) 203-209*

The construction industry plays a very important role in the national economy; it is widely criticized because of its slow technical progress and long-term inefficiency all over the world. Building information modelling (BIM) is a transformative virtual prototyping technology for construction industry. VP (Virtual Prototyping Technology) based on BIM as the core technology has been widely regarded as a tool to solve this problem, but was questioned by both academia and industry due to its delayed diffusion. To solve this problem, this paper is based on the characteristics and the evolution rules of cellular automata, built on the CA model of the BIM proliferation process in construction projects, simulating this process, then analysing the impact of important factors such as diffusion willing, decision-making preferences, national and industry support and other factors to the BIM technology diffusion, studying the changes in the proportion of BIM recipients and the importance of the distribution position of the initial to the BIM proliferation process. Finally, it analyses the randomness of BIM technology diffusion.

Keywords: Building Information Model Diffusion, CA Evolution Model, Diffusion Willingness, Decision-Making Preferences, National and Industry Support

Chen Kai, Xie Yi Research on well-formed business process modelling mechanism

Computer Modelling & New Technologies 2014 ***18****(4) 210-214*

It is very important to ensure that the logic structure of business process model is correct before the model is implemented. Because traditional graphical process modelling methods lack efficiency mechanisms or rules to ensure correctness of the logical structure during business process modelling, they need additional methods to verify its correctness of the logic structure after the business process model is established. Therefore, the well-formed business process modelling mechanism is researched. The business process logic structure model is built firstly. Then the semantic and syntactic rules are presents for the correctness of business process logic structure model, and the algorithm is proposed to detect whether the model meets the rules. The modelling mechanism has been applied in our business process scheduling optimization system with integration of modelling and simulation, which shows its feasibility and effectiveness.

Keywords: business process modelling, modelling mechanism, well-formed model, model verification

Luya Wang, Liang Xiao Research on wisdom urban public security management system integrated into the situation of urban safety

Computer Modelling & New Technologies 2014 ***18****(4) 215-221*

With the expanding of the sizes of the cities, the urban population and property space distribution becomes more concentrated, urban public safety incidents into the increasingly frequent stage. How to intelligent and efficient manage the urban public safety is imminently. On the basis of defining the urban security situation management model systematic, this article will establish the urban safety stratified hierarchical data acquisition of internet of things which is based on urban monomer-group region, study the tracking-summarized-warning-optimization handling mechanism which support the city security complex event, construct the wisdom urban public security management system which is integrated into urban security situation and provide an effective means to realize the wisdom management of the city public security.

Keywords: public security, safety situation, wisdom city, internet of things

NATURE PHENOMENA AND INNOVATIVE TECHNOLOGIES

Wenxia Qiu, Huixi Xu, Zhengwei He Study on the difference of urban heat island defined by brightness temperature and land surface temperature retrieved by RS technology
Computer Modelling & New Technologies 2014 ***18****(4) 222-225*

At present, the Remote Sensing is the most advantage method of studying on the Urban Heat Island (UHI) from the space. In general, the method uses remote sensing images to inverse the brightness temperature or land surface temperature to define the UHI. But have any differences of UHI defined by the two kinds of temperature? And what are the differences? This problem is rarely being studied now. Based on this, the brightness temperature (BT) and the land surface temperature (LST) of the Chengdu City were retrieved using Landsat ETM+ image obtained on July 30, 2006. And then, the differences of UHI defined by the BT and the LST were studied from three aspects, which were temperature value, temperature classification and heat island intensity respectively. Research result are the following: (1) There were some differences between BT and LST, and the variation level of LST was higher than BT. (2)There was a slight difference only on the area covered by the low temperature and the secondary low temperature, and the area covered by the others was equal. Therefore, there was no difference on the area of UHI defined by BT and LST. (3) The UHI intensity defined by LST was slightly higher than that was defined by BT, and the intensity value was determined by the method used.

Keywords: Urban Heat Island (UHI), Brightness Temperature (BT), Land Surface Temperature (LST), Remote Sensing Technology (RS)

Xuechao Liao, Zhenxing Liu Multi-level dosing and preact self-adaption correcting automatic batch control model
Computer Modelling & New Technologies 2014 ***18****(4) 226-231*

The process flow and system structure of automatic batch weighing system are presented. In order to increase production speed and dosing accuracy, the multi-level dosing control model (high/low speed dosing + inching dosing) is designed. Besides, the inching dosing mode is adopted to accurately compensate the weight deviation. In order to solve the problem that the fall of materials in-air cannot be easily controlled and out of tolerance. The multi-level dosing control model and preact will correct after each dosing dynamically with iteration method, moreover, the target value is predicted with second-order estimator, so as to increase the dosing speed with high weighing accuracy. The successful application proves that the control model can realize the rapid and accurate control of batch weighing process and has quite favourable control and reliability.

Keywords: Automatic batch, Multi-levels dosing, Fall of dosing, Self-adaption correcting, preact

Wu Zhang, Wei Guo, Chuanwei Zhang, Yizhi Yang, Yu Zhang Experimental research on transmission efficiency of metal belt continuously variable transmission
Computer Modelling & New Technologies 2014 ***18****(4) 232-237*

Transmission efficiency is one of the main limiting factors on metal belt CVT large-scale assembly car. Metal belt CVT transmission efficiency has been invested in this paper, and, test-bed has been established by L13A3 engine, MB-CVT, brake, input sensor, output sensor, coupling and half shaft. Efficiency test results show that, with the decrease of transmission ratio, CVT efficiency first increases and then decreases. The range of efficiency is nearly 45%-89% in increases part (i>1), the range of efficiency is nearly 85%-89% in decrease part (i<1), the efficiency reaches the highest when transmission ratio is 1. The conclusions are in consistent with others conclusion, whereby demonstrating that the established transmission efficiency test-bed is rational and that the experiment results are reliable.

Keywords: metal belt, CVT, pulley, strain

Zhang Feng, Xue-Hui Feng A method of reliability modelling based on characteristic model for performance digital mock-up of hypersonic vehicle
Computer Modelling & New Technologies 2014 ***18****(4) 238-242*

In order to grasp the complexity of the hypersonic vehicle dynamic characteristics, create its reliability control model, for the mathematical model of hypersonic vehicles is highly nonlinear and strong coupling, introduced the object-oriented modelling method, design a neural network, Petri control algorithm based on characteristics model, the mathematical model of the nonlinear is transformed into the equivalent linear model with control design requirements. And through the appropriate transform, design of the hypersonic vehicle dynamic inversion control system, building performance prototype reliability model based on Petri net, can stabilize the system, get decoupled affect purposes. Simulation results show that the performance digital mock-up reliability model is high accuracy, robustness, anti-jamming capability, has a good dynamic and steady-state performance.

Keywords: hypersonic vehicle, performance digital mock-up, characteristic model, reliability, flight control

Jiangtao Liu, Jinggang Yi Research of key technology on self-propelled farmland levelling machine and hydraulic servo system simulation
Computer Modelling & New Technologies 2014 ***18****(4) 243-248*

According to the present situation of the farmland levelling, the equipment cost is high, maintenance is complex and its cost is high. The paper carries a research on the key technology of self-propelled farmland levelling machine. The key technology includes the levelling knife, the levelling part, the sundry separating device and the measurement and control system of the laser and inclination sensor. At the same time, the paper establishes the hydraulic servo system mathematical modal and utilizes MATLAB to analyse, revise and simulate for the system mathematical modal.

Keywords: farmland levelling machine, levelling knife, levelling part, inclination sensor, simulation

Manli Dou, Chun Shi, Gang Wu, Xiaoguang Liu Comfort and energy-saving control of electric vehicle based on nonlinear model predictive algorithm
Computer Modelling & New Technologies 2014 ***18****(4) 249-254*

This paper develops a control-oriented drivability model for an electric vehicle and a nonlinear model predictive optimization algorithm for an electric vehicle. A cost function is developed that considers the tracking error of setting value and the variation of control volume. Longitudinal ride comfort and energy-saving is also considered. Simulations show that the developed control system provides significant benefits in terms of fuel economy, vehicle safety and tracking capability while at the same time also satisfying driver desired car following characteristics.

Keywords: Nonlinear Model Predictive, Comfort, Energy-saving, Electric Vehicle

Ying Zhang, Zhaohui Yuan Force-fight problem in control of aileron's plane
Computer Modelling & New Technologies 2014 ***18****(4) 255-261*

In order to reduce or eliminate the force-fight phenomenon of single feedback loop of redundant-channels, modelling the whole control system on the basis of analysing the structure of aileron, the correctness of the model is verified by experiments. Simulation results show that set the dead band of the valve which control the feedback loop smaller is conducive to the decrease of system's fighting-force; for every reduce in the difference of the two valves' overlap of 0.01mm, the fighting-force decreases one time; when the driving speed is more than 50mm/s, system abstains smaller fighting-force. Therefore, the optimization of structure parameters can reduce fighting-force effectively. When the parameters of valves and driving speed is restricted, another method of using a bypass orifice to connect the two cavities of the cylinder is proposed to solve the problem, simulation results shows that fighting-force reduce 2000N for every increase in the orifice's diameter of 0.1mm when using the fixed orifice, and using the variable orifice can abstain a small fighting-force and meanwhile reduce the wastage of hydraulic oil.

Keywords: single feedback loop, force-fight phenomenon, difference of the two valves' overlap, driving speed of motor, bypass orifice

Xiaobo Li Gene selection for cancer classification using the combination of SVM-RFE and GA
Computer Modelling & New Technologies 2014 ***18****(4) 262-267*

Gene selection is a key research issue in molecular cancer classification and identification of cancer biomarkers using

microarray data. Support vector machine recursive feature elimination (SVM-RFE) is a well known algorithm for this purpose. In this study, a novel gene selection algorithm is proposed to enhance the SVM-RFE method. The proposed approach is designed to use the combination of SVM-RFE and genetic algorithm (GA). The performance of the proposed model is validated on a binary and a multi-category microarray gene expression datasets. The results show that the proposed gene selection method is able to elevate the performance of SVM-RFE, which extracts much less number of informative genes and achieves highest classification accuracy.

Keywords: cancer classification, gene selection, support vector machine recursive feature elimination (SVM-RFE), genetic algorithm (GA), microarray data

Shigang Mu Dynamic analysis of ball-screw with rotating nut driven
Computer Modelling & New Technologies 2014 ***18****(4) 268-272*

There is a certain degree difference between the static and operation condition for the high-speed Ball-screw with Rotating Nut. Therefore, this paper establishes a dynamic model of a preload-adjustable ball-screw with rotating nut by means of lumped-parameter and analyses the effects of changeable table position and work piece mass on the first three axial modes of the free vibration. A high-speed feeding system is modelled and its nature characteristics when the feeding system is in static, low and high rotate state. The results show that, at low speed state, the dynamics of the feeding system is the same as stationary state, and in high-speed conditions, the dynamics is quite different with the static state. The natural frequencies are notably changed with the position change of the table movement. The research lays an important theoretical foundation for developing this novel feed drive system.

Keywords: Ball screw, Dynamic analysis, Modal analysis, Frequency response

Ming Lv, Haiqiang Liu Thermodynamic analysis of hydrogen production via zinc hydrolysis process
Computer Modelling & New Technologies 2014 ***18****(4) 273-277*

The thermodynamic studies were carried out for the hydrogen production via zinc hydrolysis. It is shows that it is reasonable to keep the temperature of zinc hydrolysis under 900 ^{o}C. The system pressure has no notable thermodynamic influences on the hydrolysis reaction. The initial H_2O/Zn molar ratio should be controlled in a reasonable range. The concentration of steam in carrying gas in experiments should better be kept above 50%.

Keywords: hydrogen, hydrolysis, thermodynamics, zinc

Qiang Song, Ai-min Wang Study on prediction of sintering drum strength under small sample lacking information
Computer Modelling & New Technologies 2014 ***18****(4) 278-283*

The paper provides a grey model and support vector machine algorithm and method for prediction of sinter drum strength based on the characteristics of large time delay, strong coupling, nonlinear, sintering process, put forward a kind of Combination forecasting model of drum strength based on grey model and support vector machine, the drum strength of sinter ore Laboratory values as output variables, the variables associated with the drum strength of sinter as input variables, using support vector machine powerful machine learning method and strong nonlinear fitting ability, so as to establish a stable, high precision of drum strength, the drum strength stronger generalization ability of the forecasting model, the method of the method has the high prediction accuracy, fast and convenient, and has great popularization and application value, and lay a good foundation for the green sintering technology of sintering.

Keywords: GM(1,1), LS-SVM, drum strength, Prediction

Jinglong Li, Bin Sui Discussion on determination method of characteristic stress of Jinping marble under confining pressure condition
Computer Modelling & New Technologies 2014 ***18****(4) 284-288*

The characteristic stress is coincident well with the internal crack propagation in brittle rock. The characteristic stress are separately called closure stress, cracking stress, damaging stress and peak stress according to the internal crack state in loading. The propagation and damage extent in brittle rock can be reflected. Limited by loading testing

equipment, the characteristic stress in confining pressure condition cannot be determined in China. In order to confirm the stress, the strain curves under different confining pressure condition are used to analysis the problem. The results show that the closure stress, cracking stress and damaging stress can be accurately confirmed by this method. The characteristic stress relates to the confining pressure, and the relationship is approximately linear.

Keywords: brittle rock, characteristic stress, marble, confining pressure

Jianning Han, Tingdun Wen, Peng Yang, Lu Zhang High resolution photoacoustic system based on acoustic lens and photoacoustic sensors array

Computer Modelling & New Technologies 2014 ***18****(4) 289-295*

Photoacoustic tomography is a nondestructive bio-photonic imaging method based on the differences of optical absorption within biological organization. An approach using the lens with negative refractive index and photoacoustic sensors array to make the evanescent wave involved in the imaging process was presented in this paper. A set of comparative experiments was demonstrated on the imaging effect between the ordinary lens and the lens designed in this work. The experiment showed that the imaging effect of photoacoustic tomography by the designed lens had greatly outperformed the ordinary lens. In order to illustrate the good results, according to the characteristics of ultrasonic waves produced in photoacoustic effect, the propagation properties of the acoustic waves in lens with different refractive index was discussed. On the basis of analysing evanescent decay of ordinary acoustic lens which results in the loss of high-frequency information with image details in current photo-acoustic tomography system, the diffraction limit of was broken through and the image resolution was greatly improved by the lens with negative refractive index in theory.

Keywords: Photoacoustic Tomography, Acoustic Lens, Negative Refraction, Image Resolution

Yunshan Sun, Liyi Zhang, Haiyan Zhang Frequency domain minimum error probability medical CT image blind equalization algorithm

Computer Modelling & New Technologies 2014 ***18****(4) 296-299*

A frequency domain minimum error probability medical CT image blind equalization algorithm was proposed. Blind image equalization is implemented by minimizing a cost function consisting of estimated image and blur. The steepest descent method was adopted to solve the proposed cost function. Computer simulation experiments show that the new algorithm reduces mean square error and improves restoration effect, peak signal to noise ratio and improving signal to noise ratio.

Keywords: Blind equalization algorithm, minimum error probability, medical CT image