Information and Computer Technologies

A new surface recovery method based on hybrid reflectance model

Li Yanfeng, Ma Jiquan

Computer Modelling & New Technologies 2014 18(12B) 9-13

Generally, the surface shape of a object can be recovered from a single image, that is called shape-from-shading (SFS), which relies on the assumption of Lambertian, although the specular reflectance component often exists in the original image. In order to improve the quality of the surface reconstruction in SFS, hybrid reflectance model is introduced firstly and is applied on SFS method. Firstly, the reflectance component is estimated using simulated annealing based on the distribution of the surface's normal. Secondly, a new surface recovery algorithm is designed under a hybrid reflectance model, which is a linear model composed with Lambertian and specular reflectance. Finally, Experiments are performed on synthetic and real images.

Keywords: *Shape-from-shading; Hybrid Reflectance Model; Simulated Annealing*

Application of cluster mining and the apriori algorithm in the management of library books

Ming Li

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Data mining technology has strong data processing ability. A library is a data resource center in which numerous, potentially correlated data are located. Thus, library management is greatly challenged in terms of determining the internal value of this information and using it effectively. Data mining technology is used for clustering and association rule analyses on library management systems, locating popular books and categories in numerous book resources, and determining the correlations among books. Moreover, the mined data are applied in library management systems to provide new books and recommendation services to readers and to introduce opinions on other analytical methods, thereby enhancing the theoretical research basis for data mining.

Keywords: *Data mining technology, clustering mining; association rule mining, library management*

Attribute-based encryption with hidden threshold access structure

Zeng Fugeng, Xu Chunxiang

Computer Modelling & New Technologies 2014 18(12B) 19-22

This paper proposes attribute-based encryption schemes in which threshold access structures are hidden. With these schemes, an encryptor can encrypt data with hidden attributes. After receiving the ciphertext from the encryptor, a decryptor first tests which block of ciphertext is associated with which attribute. Decryption will be successful if the attributes associated with the secret key of the decryptor satisfy the access structure associated with the encrypted data. The security of the proposed construction is proved in the selective model based on the decisional bilinear Diffie-Hellman assumption. The proposed scheme shows greater flexibility than other hidden access control encryption schemes.

Keywords: *attribute-based encryption; hidden access structure; threshold*

Design of intelligent bus control terminal based on ARM9

Zhang Haixia, Liu Suyi, Cui Yin

Computer Modelling & New Technologies 2014 18(12B) 23-27

With regard to urban increasing traffic congestion problems, an intelligent bus control terminal, which based on embedded system is studied and designed in this paper. It adopts AT91sam 9260 produced by ATMEL company as the processor, realizes positioning information access and completes network data transmission with peripheral GPS and GPRS module. Linux is selected as the operating system, and many advanced technologies such as the linux interrupt handling and multithreading are used in software design process, which bring about high efficiency, less resource consumption, stability and reliability. At the same time, sites and the communication network configuration information are processed by configuration files treatment, convenience for system maintenance in case of modification of later stage circuit, giving full play to the characteristics of embedded system. Compared with similar products, this terminal has advantages with compact structure and low cost. This study provides reference value for the similar product development from software angle, and has great significance.

Keywords: Intelligent bus; Positioning Information; Network; Embedded system

Real-time physically cloth simulation with CUDA

Li Huaming, Kang Baosheng

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With the development of the simulation technique, deformable cloth simulation has become highly desired. It can be widely used in many fields such as game, animation, virtual surgery, etc. Real-time algorithm is the most urgent bottleneck problem that needs to be solved. This paper introduces a solution to implement deformable simulation of cloth in real time, accomplished through using a meshless simulation technique, which is known as position-based dynamics, implemented using

CUDA parallel framework. The simulation results are directly sent to vertex buffer object for rendering to avoid the costly communication between CPU and GPU. The experimental results show significate improvements on performance in comparison to CPU algorithm.

Keywords: *Position-based Dynamics, Cloth Simulation, CUDA, Parallel Algorithm, Uniform Grid*

Study on next generation of in-vehicle network protocol for passenger vehicles based on CAN FD

Cai Qijin, Xu Yong

Computer Modelling & New Technologies 2014 18(12B) 33-38

Aiming at the next generation of in-vehicle network protocol system for conventional passenger vehicles and new energy passenger vehicles, an in-vehicle network protocol named as IOCAN is proposed using information-oriented idea based on CAN FD. By using longer ID field of extended frame and concepts of PDU, PGN, SPN in SAE J1939 protocols, the information management-oriented protocol frame are designed. With variable and higher bit rate of CAN FD and its maximum 64 bytes of data field, a data segment transmission strategy is put forward. Then the practicality of the system is demonstrated with the analysis of the application. Finally described is the framework of the in-vehicle network protocol of passenger vehicles with universal, normative and greater information capacity.

Keywords: *CAN FD, passenger vehicles, network protocol, SAE J1939*

A novel image segmentation algorithm based on multi-motive reinforcement learning and OTSU

Sun Qiao, Chen Feixiang, Han Hui , Xu Fu, Shi Yanan

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Image segmentation is one of the key technologies of computer vision. Among the image segmentation algorithms, the thresholdbased approach is a simple and effective one. OTSU algorithm is considered to be one of the best approaches for threshold selection, but its drawbacks are the high time complexity and poor real time capabilities. In order to solve this issue, an efficient image segmentation algorithm based on multi-motive reinforcement learning is proposed in this paper, in the framework of OTSU, multimotive reinforcement learning algorithm is adopted to get the optimal threshold for image segmentation. The learning motivation and action for threshold learning are defined in this article, and the original State-Action dual-layer structure is extended to State-MotiveAction triple-layer structure. Compared to traditional approach, the proposed approach has more flexibility, and is easier to integrate priori knowledge. The experimental result validated the effectiveness of the proposed approach.

Keywords: *Image segmentation, Machine Learning, Computer Vision*

Data clustering based on particle swarm optimization with Lévy mechanism

Liu Xiaoyong

Computer Modelling & New Technologies 2014 18(12B) 45-49

Clustering analysis is a popular approach in data mining field. It is often used to automatically find classes or groups for unlabeled datasets. This paper looks into the use of Particle Swarm Optimization (PSO) for cluster analysis. In standard PSO, the nonoscillatory route can quickly cause a particle to stagnate and also it may prematurely converge on suboptimal solutions that are not even guaranteed to local optimal solution. In this paper, Lévy Mechanism is proposed for the particle swarm optimization (PSO) algorithm and applied in the data sets. Results show that the new PSO model, named LPSO, provides enhanced performance for clustering data.

Keywords: *Particle Swarm Optimization, Data clustering, Lévy Mechanism*

Research on WEB user behavior mining of personalized recommendation

Li Xufang

Computer Modelling & New Technologies 2014 18(12B) 50-53

Personalized recommendation directly decides the result set pushed to users and affects the quality of personalized information service. And analysis of user behavior is the key to realize personalized recommendation. The paper studies the user behavior mining based on content and VecPat-tree. When mining based on content, compound word judgment is joined in segmentation process, and the concept of keyword position factor is added to keyword weight calculation. When mining based on VecPat-tree, the paper proposed the algorithm based on VecPat-tree to process user behavior mining. The algorithm based on VecPat-tree uses the strategy of binary tree growth to avoid unnecessary projected database and effectively distinguish distribution and partial support. The paper simulated 193000 browse records of users in the experimental database to compare PrefixSpan algorithm and the algorithm based on VecPat-tree in many aspects, such as running time. And the experimental results show that the algorithm based on VecPat-tree can be more effective than PrefixSpan algorithm in achieving personalized recommendation to improve the quality of personalized information service.

Keywords: *User Behavior; Data Mining; Sequence Pattern; Personalized Recommendation*

An error recovery transmission mechanism for mobile multimedia

Chen Min, Li Ang

Computer Modelling & New Technologies 2014 18(12B) 54-59

This paper presents a channel coding transmission mechanism in wireless and mobile networks by using the cross-packet transmission method of the sub-block structure to solve the problem of the poor quality of the network mobile multimedia. The present channel coding technology has the protective effect aiming to the data transmission in the mobile network. However, the present channel coding technology faces many kinds of network transmission phenomenon under the limited bandwidth constraint, including those comprehensive problems caused by the network congestion and the signal error. The poor efficiency of the data recovery and the bandwidth utilization is still one of the channel coding's main defects. Compared with the present technologies, the experimental results demonstrate that the proposed method can achieve better bandwidth utilization by means of using sub-block coding structure to combat with small amount of transmission errors. Furthermore, the data recovery performance can be improved based on the two following facts about the cross -packet transmission: 1) the channel coding capacity is beyond a single packet and 2) both packet loss and signal error can be recovered simultaneously.

Keywords: *cross-packet, channel coding, forward error correction, FEC, error recovery, mobile multimedia*

Research on the cloud platform resource management technology for surveillance video analysis

Zhuang Yonglong, Weng Xiaolan, Wei Xianghe

Computer Modelling & New Technologies 2014 18(12B) 60-65

As the cloud computing provides the characteristics of the computing resources which can be randomly used or rented, it has become a topic issue to develop a method for dynamically adjusting the computing resources in terms of the service. The paper introduces a method for dynamically adjusting the computing resources on the basis of the surveillance video analysis result. The contents of the surveillance video in the method are cut into many segments, distributed into many computing nodes and to be analyzed. In the meantime, the estimated method for the workload can be sensed through the introduced contents and the system workload can be predicted. The numbers of the computing nodes can be dynamically adjusted without affecting the quality of the service, and the utilized computing resources can be reduced to the minimum as soon as possible. The experimental result shows that the method introduced by the paper can effectively predict the system workload, and can show its advantages in the computing cost and work completion under the situation of not affecting the service quality.

Keywords: *cloud computing, video processing, resource management*

A continuous integration environment building based on the research of C#.NET

Zhu Jintan, Liu Xiangfeng, Wei Wei, Shen Peiyi

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In the software development process of the past, integration is a very painful thing, usually a long time to do integration, as a result, it can cause many problems. Continuous integration, which is the core of the agile development practice, was integrated in one day more than ten times or even dozens of times, so often integration can minimize conflict. Due to the frequent integration, there are few changes to be made each time, even under integration failure conditions; it is easy to locate errors.

Keywords: *continuous integration; positioning*

Face recognition based on the invariant single training sample

Yang Zhaonan, Zhang Shu

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Despite the constantly change of human face pose, illumination, expression, and occultation, one major problem of the face recognition technique arises from the difficulties of gaining training samples. When everyone just can gain an image for face recognition, the training samples are so insufficient that the extracted feature vectors can not support the whole face sample subspace and the performance drop is expected. This problem is called the face recognition with the single training sample and has received significant attention during the past years. Researchers have proposed image-strengthen method, sample-expansion method, and generic learning framework, etc, which mostly aim to expand the number of the training samples by using computer techniques to create several combining virtual images based on the original one. Therefore, the problem simply becomes a general face recognition problem. However, these methods result in enlarging the calculation volume and requiring bigger storage space. It also needs to be retrained once a new person is put into system. These problems make it extremely difficult to popularize these methods. In this paper, we try to exclude training and to extract features directly from the hybrid Taylor-ATMT, which has constructed a set of invariants. The recognition errors caused by the change of human face expression, illumination and partial occultation could be reduced after projecting it to wavelet space to lower the dimension, and then classify categories with the use of Bayesian Decision Theory, which results in a better effect. Experiments are implemented on YALE and ORL face databases to demonstrate the efficiency of the proposed approach. The experimental results show that the average recognition accuracy rates of our proposed method which are higher than those of previous methods.

Keywords: *face recognition, single training sample per person, analytical Fourier-Mellin transform (AFMT), Taylor transform,*

wavelet transform

Fast depth coding techniques using early termination scheme

Wang Fengsui, Wang Guanling

Computer Modelling & New Technologies 2014 18(12B) 79-84

Depth video coding is a new technique that permits lower storage and transmission bandwidth compared with multi-view video coding (MVC). Therefore, fast depth video coding is necessary to reduce the computation complexity of the encoder for realizing the practical use. This paper proposed a fast encoding algorithm for depth video coding based on early termination scheme using texture and depth video correlation. Based on the observation that the Direct mode and Inter16×16 mode were highly possible to be the optimal mode, the proposed algorithm first computed the rate distortion cost of the Direct mode and compared with an adaptive threshold. If this rate distortion cost was smaller than the adaptive threshold, Direct mode was selected as the optimal mode. Otherwise, our approach proceeded with the early termination scheme and further checked whether the current microblock belonged to the low motion region using motion complexity for excluding impossible modes. Experimental results have shown that our proposed algorithm can significantly reduce encoding time with a negligible loss of coding efficiency of depth video, compared with the original joint multiview video coding encoder.

Keywords: *depth video coding, mode decision, texture-depth correlation, early termination*

Dynamic optical transfer function: a function to characterize random motion degraded image

Zhao Yanqiao, Tan Jiubin, Liu Jian

Computer Modelling & New Technologies 2014 18(12B) 85-90

Previous DOTF model is only for static, uniform motion and high speed harmonic vibration. In order to characterize random motionblurred image, an arbitrary motion DOTF model was built, and it is a function of displacement s(t) of the motion image. The displacement function is no limits to any motion type, and we rigorous derived previously known DOTF expressions for static, uniform motion and high speed harmonic vibration, it is therefore concluded that our DOTF model can be developed for random motion. At last, an experiment was developed to verify our DOTF model.

Keywords: *motion-blurred image, DOTF, random motion*

CityGML-based 3D GIS visualization in the cloud environment

Huang Fenghua

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CityGML provides an effective approach to the sharing and inoperability of 3D GIS spatial data. However, due to the large amount of data, CityGML's resolving, transferring, and rendering processes during visualization are inefficient in a standalone system, causing considerable delays in viewing the information of large 3D maps for users. The cloud computing technique is introduced to address these problems in this paper. The Hadoop Distributed File System (HDFS) is employed to store the huge amount of CityGML data. A MapReduce-based parallel CityGML data visualization scheme is proposed. A Hadoop-based public cloud for a 3D city information service is constructed in the cloud, allowing cloud users to interact with the cloud via the service interface and obtain the desired highquality 3D city scenarios. The visualization effectiveness and interoperability efficiency of the large-scale CityGML 3D virtual city data are improved.

Keywords: *cloud computing, virtual city model, CityGML, hadoop open-source platform*

Domain unlimited false data filtering schemein wireless sensor networks

Zhao Jinguo, Luo Qingyun, Li Xin, Liang Junbin

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The false data filtering scheme of WSN has no way to detect the false data injected from the non-forwarding area of the compromised nodes. For this, two schemes are proposed in the article. The first one is that false data are filtered by combining the information of the forwarding path with threshold method. Each forwarding sensor not only checks the correctness of the MAC carried in the report, but also validates two security threshold parameters. The second one does not utilize the information of transmission path, but filter false data in the course of transmission, based on the distribution of secret keys in the whole key pool. Theoretical analysis and simulation experiment show that both the two schemes can detect the false data injected from any area on the network, with low energy consumption and high security.

Keywords: *wireless sensor network, false data filtering,MAC, key pool, threshold method*

Multi-hop routing design based on the asymmetric wireless sensor networks

Chen Min, Li Ang

Computer Modelling & New Technologies 2014 18(12B) 106-110

In multi-hop wireless sensor networks, the information collected by the sensors requires to be transferred by the sensors. As each sensor has different positions, each sensor can withstand different pressure so that the network bottleneck is caused. In

order to achieve the purpose of the load balance, all pressures in each layer sensor should be analyzed and the transmission distance should be adjusted according to the characteristics of the multi-hop wireless sensor networks in the past references. The sensor in each layer allows the data to be transferred to the next one or the next two layers so that the needed hops transferring the data can be reduced and the load can be loaded. The transmission distance rate in each layer just forms the Fibonacci sequence. The simulation results show that the proposed transmission distance adjustment strategy can indeed improve the whole network efficiency and the data delivery rate.

Keywords: *multi-hop wireless sensor networks, gradient protocol, Fibonacci sequence, data delivery rate*

The improvement of a variational level set formulation for image segmentation

Jiang Minghua, Luo Xiaosuo

Computer Modelling & New Technologies 2014 18(12B) 111-115

This paper shows a new improvement variational formulation for geometric active contours that make sure the level set function to be close to a signal distance function. The variational formulation consists of an internal energy term that penalizes the deviation of the level set function from a signal distance function. An external energy term that drives the motion of the zero level set toward the object boundaries. Therefore eliminates the need of the costly re-initialization procedure. Upon simulation experiments present that the method is fast and applicable way for application in image segmentation. This method not only simplifies the calculation, but also the iteration can be set longer than the traditional method in time-step so that the evolution of the curve faster. Its flexibility in initializing level set function makes the selection of initial contour has more freedom, and calculations are a lot simpler.

Keywords: *active contours, level set, image segmentation*

Detecting trap region with assortativity measurement in temporal networks

Zheng Yi, Liu Fang

Computer Modelling & New Technologies 2014 18(12B) 116-121

Based on the threshold model of Watts, the effect on cascade dynamics induced by temporal shuffling according to assortative structure was investigated in this paper. Two assortative rewiring schemes were introduced and explored, by considering the topological parameter of nodal degree and the average degree of nodal neighbors. Temporal behaviors are generated by edge breaking and rewiring, according to the assortativity coefficient of links. Analysis shows that the trap region on cascade dynamics identified by edge assortativity based on degree of the neighbors is better than the nodal degree-based one. The correctness of the analysis is validated with simulations on scale-free module networks.

Keywords: *cascade threshold model, trap region, module network, assortative links*

Interaction between propagation and consensus on module networks

Liu Fang, Zheng Yi

Computer Modelling & New Technologies 2014 18(12B) 122-126

The effect on spreading dynamics induced by collective consensus is investigated in this paper, on the basis of epidemic model for spreading dynamics and phase synchronization model for collective consensus. The interaction between propagation and collective synchronization is explored by theoretical analysis and numerical simulation. We found that the spreading dynamics and synchronizations are highly affected with the increasing of coupling strength on sparse links between communities. With the level of collective consensus about awareness increasing, both oscillation amplitude and mean prevalence are suppressed, and the intercommunity coupling strength have great effect on time spent on reaching consensus.

Keywords: *phase synchronization, module network, information spreading, collective behaviour*

Robust hand gesture detection by fusion of depth and colour information using kinect

Yang Shuai, Premaratne Prashan, Vial Peter, Alshebani Qasim

Computer Modelling&New Technologies 2014 18(12B) 127-132

Microsoft Kinect camera has drastically changed the world of human computer interaction based computer vision, due to its low cost and high quality of depth information for visual images. This has made the depth data to become common place at a very low cost allowing myriad of computer vision related application including hand gesture recognition. Hand gesture recognition research suffered severely from the clutter and skin tone regions in any background. With the availability of depth information, background clutter and skin toneregions which are not part of the hand gesture can be removed improving the performance of any classification strategy. This article discusses a novel hand detection strategy based on Kinect camera by combining depth and colour image information. In the detection procedure, the Kalman filter is applied to the study to achieve a good detection result. The experiment results show this detection method is reliable and stable in the clutter background, and works well in various light conditions.

Keywords:*Kinect, human computer interaction, depth information, Kalman filter, fusion*

Research of QoS routing protocol for underwater wireless sensor network

Liu Bin, Han Jianghong

Computer Modelling & New Technologies 2014 18(12B) 133-140

With the constant strengthen of detecting activity underwater in recent years, the research of underwater wireless sensor has been gradually paid more attention to. This paper mainly introduces the basic concept, main advantages and network structure of underwater wireless sensor network and stress on analyzing the relative characteristics of the QoS routing protocol of current underwater wireless sensor network under the application background of large scale of hydrometry monitoring. Besides, it also elaborates network topology architecture and data forwarding mechanism of the QoS protocol and attempts to put forward the improved QoS protocol on the base of colony. And this QoS (Quality of Service) routing protocol selects the routing mechanism of a route or a dynamic routing protocol covering all kinds of QoS parameters according to the available network resources and business flow requirements of QoS with a extremely essential realistic research significance.

Keywords: *underwater wireless sensor networks, hydrometry monitoring, network topology architecture, data forwarding, routing protocol*

Research of concurrency control protocol based on the main memory database

Zhang Yonghua

Computer Modelling & New Technologies 2014 18(12B) 141-145

The concurrent access of data can cause the inconsistency. How to control it efficiently is one of the question of the first importance in the database application system. In this paper a management mechanism called dynamic multi-grain lock and a related concurrency control protocol were given.

Keywords: *concurrency access, management mechanism, dynamic multi-grain lock, protocol*

A face recognition method of integrated technology

Ning Ma, Wang Zhiyan

Computer Modelling & New Technologies 2014 18(12B) 146-150

In this paper, based on the study of the Two-Dimensional Principal Component Analysis (2DPCA), Two-Dimensional Principal Component Analysis (2DPCA) and fuzzy set theory, we propose a new face recognition algorithm integrating 2DDCT, 2DPCA and fuzzy 2DLDA. This method can make good use of the advantages of each single method, and also can make up for the defect of each other. The comparison of the results of the different methods identification effect on the ORL, YALE and FERET face database show, the integrated method proposed in this paper improves the recognition rate, and it also reduces the training and classification time as well.

Keywords: *face recognition, 2DDCT, Two-Dimensional Principal Component Analysis (2DPCA), Two-Dimensional Linear Discriminant Analysis (2DLDA), fuzzy set theory*

Intrusion intention recognition and response based on weighed plan knowledge graph

Cai Zengyu, Zhang Qikun, Zhang Ran, Gan Yong

Computer Modelling & New Technologies 2014 18(12B) 151-157

With the development of the network, security has become the focus problem of network. To be effective, current intrusion prevention systems must incorporate artificial intelligence methods, such as plan recognition and adversarial plan. Plan recognition is critical for predicting the future actions of attackers and the adversarial plan is critical for planning appropriate responses to attacks. In this paper, an attack intention and plan recognition method based on weighted planning knowledge graph is presented to predict the anomaly intentions of potential intruders to a computer system according to the observation data. And the adversarial planning method based on HTN planning to response the future actions of attackers is also presented. The experimental results show that the plan recognition method based on weighed planning knowledge graph has a good accuracy in predicting the intrusion intentions. The experimental results also show that the adversarial planning method can prevent computer system correctly and effectively.

Keywords: *adversarial plan, plan recognition, plan knowledge graph, intrusion*

A general method to solve problem of blind signal separation using tensor decomposition

Zhang Yan-liang, Li Geng

Computer Modelling & New Technologies 2014 18(12B) 158-162

The estimation of mixing matrix is a key step to solve the problem of blind signal separation. The existing algorithm can only estimate the matrix of well-determined, over-determined and under-determined in condition of sparse source. Scaling and permutation ambiguities lie in both factor matrix of tensor Parallel factors decomposition and mixing matrix in blind signal separation. With this property, the estimation of mixing matrix can be transformed into tensor parallel factors decomposition of observed signal's statistic. The decomposition can be realized by the method of alternating least squares. The theoretical analysis and simulations show that the method proposed in this paper is an efficient algorithm to estimate well-determined,

over-determined and under-determined mixing matrix.

Keywords: *blind signal separation (BSS), tensor, parallel factors decomposition, alternating least squares (ALS)*

Multi-view object recognition based on sparse representation

Cai Jin-jin, Liu Bo, Yao Wei

Computer Modelling & New Technologies 2014 18(12B) 163-168

In recent years, sparse representation has emerged as a powerful data representative model to draw much attention. In term of the intrinsic structured characteristic of signal itself, this model decomposes a signal as a linear combination of a few atoms from an over-completed dictionary. As it turns out, we obtain the parsimonious representation of signal with regularization by different sparsity-inducing norms. Through the adaptivity and robustness of sparse representation, it is well applied to the field of signal and image processing. In this paper, the problem of recognizing an object from its multiview images with unconstrained poses and context was considered. A novel framework called metasample-based supervised dictionary learning for multi-view object recognition exploiting the sparse property of intrinsic information was proposed. Experimental results demonstrate that the proposed algorithm exhibits better performance than the recent state-of-the-art methods.

Keywords: *multi-view object recognition, sparse representation, supervised dictionary learning algorithm*

Review on the technology of network public opinion monitoring system

He Wenyi, Bai Zhuoling, Xu Shiyuan

Computer Modelling & New Technologies 2014 18(12B) 169-173

This paper introduced the technology related to the network public opinion monitoring system. According to the work flow of public opinion monitoring system, the paper summarizes the research status from three aspects of network information collection, preprocessing and analysis.

Keywords: *public opinion monitoring, crawler, text classification*

Research on personalized information recommendation platform for CSA users

Sheng Zhao, Yipin Lu, Jing Qin

Computer Modelling & New Technologies 2014 18(12B) 174-183

This paper analyses the demand in personalized recommendation service and the characteristics of classification content for CSA users. Then it proposes a personalized information recommendation platform based on the interests of agricultural users. For the interest update in push service, we integrate mathematical modeling, three-dimensional synthetic techniques and the quantization techniques, to establish user interest model. For the distribution problem in push service of agricultural information, we propose an improved classification model based on genetic algorithm, BP neural network and multiple linear regressions. The process of feature extraction and algorithm implementation are also provided in this paper. The experiments show our recommendation algorithm based on user interest has obvious improvement in precision and recall compared to traditional algorithms. It can further excavate the users' interest to cater to the preferences and make effective and in-time information recommendation.

Keywords: *recommendation service, data miming, interest, neural network, agricultural information*

A key agreement scheme for identity authentication based on multiple security factors

Wang Ying, Peng Xinguang, Bian Jing

Computer Modelling & New Technologies 2014 18(12B) 184-192

By the study of Li-Hwang's three-factor authenticated key agreement protocol, we find there exists multiple attack in it. Therefore, this paper proposes a remote user authentication protocol based on ECC to improve the protocol. The new protocol only needs one point multiplication of elliptic curve cryptography in login and authentication protocol, so its computation efficiency is high. The protocol can resist all the attack mentioned in this paper, smart cards loss attack included. It is also suited to three-factor authentication protocol including password, mobile devices and biometrics. The comparisons with related schemes in computation price and efficiency show that though it costs a little more computation consumption than relative protocols, it has better performance in robustness.

Keywords: *authentication, attack, biometric, smart card, ECC*

Research of batik image classification based on support vector machine

Yuan Qing-Ni, Lu Jian, Huang Haisong, Pan Weiji

Computer Modelling & New Technologies 2014 18(12B) 193-196

The digital protection and development of batik is applied in the digital design of the arts and crafts by the digital image acquisition of batik to construct a graph database. Its key technology is the automatic classification of image. In this paper, we use image analysis and recognition technology to image classification recognition of five type of batik: Bronze drum lines, Butterfly lines, Bird lines, Fish lines and Flower lines etc. On the basis of the segment image of batik, we extract the shape and

texture feature by Histogram of Oriented Gradient (HOG). Then, we respectively use Support Vector Machine (SVM), Minimum Distance Method and BP Neural Network to classify test. The result shows that the classification recognition ability of SVM is better than the Minimum Distance Method and the BP Neural Network. Therefore, the classification recognition method of the Histogram of Oriented Gradient (HOG) and the Support Vector Machine (SVM) is feasible to the automatic classification of batik image.

Keywords: *batik image, automatic classification of image, histogram of oriented gradient (HOG), support vector machine (SVM)*

Development and application of lightweight cloud platform workflow system

Hou Qing, Xie Qingsheng, Li Shaobo

Computer Modelling & New Technologies 2014 18(12B) 197-201

Based on the principle of colored Petri net, this paper introduces a lightweight cloud platform workflow system, which will deliver BI services in Hadoop. The system aims to achieve the quick development and deployment of business processes via the workflow engine and to provide BI personalized application construction and service by way of rental. The paper expounds the workflow engine's creation principles, activity analysis, scheduling algorithm and specific application. Furthermore, it illustrates the BI parallel cloud platform deployment and system implementation. That platform is applied in the project management of operator construction and achieves some results.

Keywords: *workflow engine, cloud computing, business process management, (business intelligence) BI*

OPT-UFR algorithm for distributed environment

Wang Huijuan, Yuan Quanbo

Computer Modelling & New Technologies 2014 18(12B) 202-208

As a novel relevance filtering method, some experiments are done to illustrate the performance of UFR since this algorithm is proposed. However, there is no any comparison between UFR and some other relevance filtering mechanisms. This paper compares UFR with VON in scalability and efficiency. By changing the peer number and changing the AOI when setting the peer number fixed in experiments, it is proved that UFR is more efficient than VON in these two cases. Then some experiments on group based moving model prove the result more sensitive. To counter that the original "strip" algorithm to calculate the UFR border is not very efficient, we proposed OPT-UFR to reduce the useless update messages, and finally proposed a new algorithm to solve the heavy traffic problem for the joining node. Experimental results show that OPT-UFR always has better performance than both random based and group based moving models.

Keywords: *filtering method, UFR, VON, OPT-UFR*

Secure group ownership transfer protocol with independence of old owner for RFID tags

He Lei, Gan Yong, Yin Yifeng

Computer Modelling & New Technologies 2014 18(12B) 209-214

It is important to transfer the ownership of multiple tags efficiently. We proposed a secure group ownership transfer protocol with independence of old owner. It can transfer multiple tags ownership simultaneously. Moreover, the protocol runs regardless of the location of old owner. We analyzed the protocol by using GNY logic. The result indicates that the protocol provides mutual authentication, independence of old owner, forward security and backward security. It resists replay attack, man-in-the-middle attack, desynchronization attack and tracking attack. We implemented and simulated our protocol and other protocols and obtain experimental data. The performance comparison infers that our protocol is efficient and suitable for low-cost tag.

Keywords: *RFID, tag, group ownership transfer, independence of old owner, GNY logic*

Based on IPC-610H industrial control computer low voltage selfstarting control system of motor group

Zhao Hongyu, Li Yan, Xu Tao, Zhang Weichong, Zhao Yunning

Computer Modelling & New Technologies 2014 18(12B) 215-219

This paper proposed taking IPC-610H as the controlling core, a monitoring picture is established via configuration software, implemented with a remote or local monitoring and control, a low voltage self-starting system of motor group are achieved with accurate determination and rapid response.

Keywords: *flashover voltage loss, automatic starting of motor group, industrial control computer*

Evaluation of portal sites for enterprises using normal cloud model

Wang Er-nuan, Zhang Chun-yan, Chen Liang

Computer Modelling & New Technologies 2014 18(12B) 220-227

The existing schemes for evaluating the portal sites of enterprises suffer many problems. A novel evaluation scheme based on the normal cloud model is proposed, where two layers of indicators are created and their weights are specified. Cloud generators are used to enable transition of indicators between qualitative description and quantitative data. Three characteristic values of the cloud model are obtained through the use of the assigned weights. The final evaluation results are achieved using

the cloud drop distribution. The real-data experiments show that the proposed scheme is simple, efficient and practical and can act a guide.

Keywords: *cloud model, normal cloud model, cloud generator, performance evaluation*

Study on the LEACH protocol based on hierarchical cluster heads probability

Du Sanshan

Computer Modelling & New Technologies 2014 18(12B) 228-233

In this paper, we systematically analyze the clustering routing LEACH protocols, and make an in-depth study of how the protocol works. The ECHNL routing algorithm based on the probability of hierarchical cluster head is proposed and the improved algorithm simulation environment is built using NS2 platform. Then we compare the algorithm performance of ECHNL, LEACH and RPUCDH. The results show ECHNL algorithm performs well in optimizing the cluster head election, balancing energy consumption of the network nodes, and effectively enhancing network lifetime.

Keywords: *wireless sensor network, LEACH protocol, ECHNL algorithm, hierarchical cluster heads probability, energy balance*

Image collection and processing system for welding pool and proximate seam using multiple image detectors

Quan Yanming, Bi Qilin

Computer Modelling & New Technologies 2014 18(12B) 234-241

Because of the dynamic nature of welding parameters and power characteristics, the arc ignites and extinguishes too rapidly. The length and luminous intensity of the arc is unstable. This makes the imaging of the welding pool and seam problematic for selecting and fixing time of exposure for the camera. Moreover, the luminous intensity of region being welded decreases sharply along the welding seam. The seam that is not in the proximity of the welding pool is too dim for imaging by the camera, making the length of the seam imaged too short. In this study, an image-capturing system based on multiple image detectors and image fusion are used to image the welding pool and proximate seam during MAG welding process. The offset between center point of the welding pool and center line of seam and the seam width are determined by innovative measuring techniques that include collection of images of the pool and seam using multiple image detectors. The results obtained have shown that the accuracy of offset between welding pool and seam is ±0.5mm, and the accuracy of seam width is ±0.5mm. This imaging and measuring method developed in this study is promising for tracking and monitoring of high-speed welding, especially the MAG welding where interference from the arc is a problem.

Keywords: *MAG automatic welding, welding seam tracking, multiple image detectors, image fusion*

Image classification method based on improved bag-of-words mode

Li Li, Yan Zhou

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Image classification is one of the basic problems of image analysis and understanding. An improved SIFT algorithm is proposed for BoW model, which includes feature extraction and generation of visual dictionary. Caltech 256 database and Caltech 101 database are used for experiment to test the classification accuracy of proposed scheme. The experiment results show that the proposed scheme has higher classification accuracy than BoW model based on SIFT.

Keywords: *image classification, Bag-of-Words, SIFT, feature extraction.*

Design and verification of GPS IF software analogue signal simulator

Huang Feijiang, Lu Xiaochun, Li Xiaoyong, Zhang Wenxi, Liu Guangcan

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For the need of GPS intermediate-frequency (IF) analogue signal in various dynamics and disturbances, this paper has proposed a design to realize GPS IF signal simulator with software. Based on the given GPS satellite clock error and GPS signal transmission error, it analyzes their influence on signal acquisition and tracking as well as position calculation; deduces the mathematical model and analogue method of the ionospheric disturbance, the tropospheric disturbance and the multipath interference in the transmission of the navigation signal; designs the GPS IF analogue signal method based on software and chooses to use MATLAB software to realize GPS C/A Code IF signal simulator in L1 frequency. Through a software receiver which can successfully acquire and track the actual GPS signal, it verifies the correctness of the IF signal simulator; uses GPS IF signal simulator into GPS receiver development and gets arbitrary signal to noise ratio and the analogue GPS signals in various dynamics and disturbances for the developers of GPS receivers to investigate the influence of various errors on the receivers.

Keywords: *satellite navigation, GPS, signal simulator, intermediate-frequency (IF) signal*

Local-structure-based community detection in firm network

Zhang Liang, Liao Yuling, Cao Xing, Hao Guodong

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The community detection algorithm based on label propagation could discover latent community structure in a complex network by propagating the label of node between neighboring nodes. Due to the uncertainty and randomness involved in the propagation process, the output community structure is often unstable and lacks precision. The Local-Structure-Based Community detection algorithm propagates the label as an entity instead of propagates the labels of individual nodes, while defying the influence of label on the basis of the local structure in the network. Experiments shows that, applied on complex network data-bases, the algorithm can output high quality community structure, and the output was stable.

Keywords: *firm network, community detection, label propagation, local structure*

A complementary hybrid classification algorithm based on Web text

Xing Lili, Zhang Bing Lu Yuhong, Li Zhong

Computer Modelling & New Technologies 2014 18(12B) 258-263

In view of the insufficiency of existing weight computation methods and SVM algorithm, a weight computation method of variable precision rough set based on Web text and a complementary hybrid classification algorithm are proposed; In the hybrid classification algorithm, the rough set is used as a front-end processor of SVM, the traditional SVM is optimized from classification efficiency and precision through the reduction theory and weight computation method proposed in this paper. The experimental results show that the reduced and weighted data are classified using SVM, and then the performance of classification is further guaranteed.

Keywords: *SVM, rough set, reduction, weighting, web text classification*

TCP ADaLR+: Enhanced TCP Scheme for GEO Satellite Networks

Zong Liang, Du Wencai, Bai Yong

Computer Modelling & New Technologies 2014 18(12B) 264-270

TCP performance is essential for data transmissions over the satellite network. The TCP ADaLR is congestion control algorithm that the sender judgments the relevant window change and measures round-trip time to control congestion window. It can adapt to the characteristics of the satellite link and improve the performance of TCP than conventional TCP (New Reno). However, it doesn't take into account distinction of random packet loss and congestion packet loss like the TCP Veno. In this paper, we propose further enhancement scheme of TCP ADaLR, called TCP ADaLR+, which can distinguish between random packet loss and congestion loss. The improved performance of proposed TCP ADaLR+ is demonstrated by simulations. In all simulation scenarios, TCP ADaLR+ outperforms TCP ADaLR and TCP Veno in terms of satellite link throughput and FTP download response time

Keywords: *satellite networks, TCP ADaLR, random loss*

A fair scheduling for power line communication network

Fan Guangyu, Liu Wenhong, Sun Qiang

Computer Modelling & New Technologies 2014 18(12B) 271-276

Power line Communications (PLC) has gained a lot of interest for the last mile or access because the normal electric power line is utilized for transmission also communication signals. Considerable research effort has been extended on investigating the technologies. But the transmission scheduling is still a key design problem in the PLC networks. In this paper, a transmission scheduling for providing fairness (FTRS) between users is proposed. It assigns the users time slots with special reuse and makes them achieve fair transmission speed. So that the users can achieve the goal of a relative high throughput, as well as the fairness of channel share. FTRS is an appealing concept for PLC networks, since there is always a manager controlling the network, and PLC networks are often master slave structure with tree topologies. The simulation results show that the proposed protocol can achieve a trade-off between the high throughput and the fairness of channel share in PLC networks.

Keywords: *power line communication (PLC) networks, transmission scheduling, resource reuse, fairness*

Cloud resource scheduling research based on intelligent computing

Zeng Xianquan

Computer Modelling & New Technologies 2014 18(12B) 277-282

Load balancing is an important problem of cloud computing. Due to the particularity of cloud computing, it puts forward higher requirements for load balancing. Thus a kind of load balance scheduling model of cloud computing based on improved ant colony algorithm is put forward. A new pheromone update strategy is proposed for the traditional ant colony algorithm. Through the improvement strategy, load balance scheduling algorithm of cloud computing resources based on ant colony algorithm is more in line with the characteristics and requirements of cloud computing. The experiment result shows that performance of load balancing degree and time efficiency of the proposed algorithm are better than the performance of genetic algorithm and traditional ant colony algorithm

Keywords: *cloud resource scheduling, ant colony algorithm, load balancing degree time span*

A scheme for logistics tracking and monitoring based on internet of things

Dong Chong

Computer Modelling & New Technologies 2014 18(12B) 283-292

This paper proposes an IOT-based scheme to solve the problems of long transportation time, low transparency degree and high operation costs for logistics vehicle monitoring and tracking system. At the vehicle terminal we adopt integrated sensor techniques with SunSPOT platform. It integrates the information of temperature, humidity, light intensity and so on to make real-time and multidimensional control for rapid response and locating. All the collected parameters or audio-video information can be uploaded and sent to the monitoring centre via 6LoWPAN. For the controlling centre, we provide the processes of design and implementation for key modules. The scheme in this paper is proved to offer defamation and informatization for vehicle transportation, with stowage optimization of vehicles and effective monitoring control.

Keywords: *IOT and ITS theories, Sun SPOT mechanism*

Personalized requirements oriented data mining and implementation for college libraries

Zhao Xiang, Zheng Hao

Computer Modelling & New Technologies 2014 18(12B) 293-300

By the study of data mining technologies and systematic theory of personalized service, this paper introduces data mining to the college libraries to provide personalized requirements oriented service for readers. It analyses the demand for college library database at the phase of data mining, and explains the necessary for modelling in theory. Then the structure of model is designed. During data mining, we adopt ClassIndex number to establish index distribution trees. We compute the interest distance among the readers according to the depth of ClassIndex numbers of books. Inspired by Cruskal's method, we use minimum spanning tree to establish a weighted undirected liaison graph to perform clustering analysis for the readers. In the association rule mining, by the clustering of readers' borrowing information we find the results are ideal. So we can offer corresponding rules pattern to provide personalized recommendation service for readers

Keywords: personalized service, data miming, interest, clustering, apriori

Image segmentation method based on fuzzy Markov random field

Li Zhaofeng, Feng Xiaoyan, Liu Lanqi

Computer Modelling & New Technologies 2014 18(12B) 301-306

Fuzzy theory is introduced into the Markov random field model, a kind of algorithm for image segmentation based on fuzzy MRF model is put forward. Firstly the definition of membership function is given. Then fuzzy prior distribution and likelihood distribution are given. The specific steps of segmentation algorithm based on fuzzy MRF model are carried out. The simulation results show that the proposed segmentation algorithm based on the fuzzy MRF model can better deal with the problems of overlapped gray, partial volume effect, and low contrast. It also has more accurate segmentation effect.

Keywords: *image segmentation, fuzzy theory, Markov random field*

Research on the management pattern for fragmentation knowledge in organizations under the Web 2.0 environment

Huang Bingyi

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Fragmentation of knowledge in organizations has become more evident in the Web 2.0 environment. At the same time, key Web 2.0 applications such as microblogs, Really Simple Syndication feeds (RSS) and wikis provide effective technical support for management of knowledge fragmentation through efficiently helping communication and interaction between organizations' employees. Management of knowledge fragmentation in organizations in the Web 2.0 environment aims to convert fragmented knowledge into effective knowledge within the organization. This is achieved thought identification, collection, mining, extraction, dissemination and sharing knowledge, taking advantage of Web 2.0 technologies

Keywords: *Web 2.0, fragmentation knowledge, knowledge management, knowledge systematics, knowledge migration*

An improved fuzzy adaptive predictive control method for network control system

Yi Suhuan

Computer Modelling & New Technologies 2014 18(12B) 313-317

In view of the random time-varying time delay of networked control system, a kind of method using least square support vector machine to forecast the network time delay is put forward. Network time delay is modelled as a nonlinear time sequence firstly, and then the radial basis function is used as kernel function of the least square support vector machine, so that the prediction model of time delay for network control system is established. Then the estimated time delay is used as the parameters of the fuzzy adaptive predictive controller for predictive control of networked control system. Simulation result shows that fuzzy

adaptive predictive controller based on least square support vector machine time delay identification enables the system output to track the desired output very well.

Keywords: *network control system, least square support vector machine, fuzzy neural network, adaptive predictive control*

Key technology analysis of wireless sensor networks networking

Yang Zhongguo, Cai Tianfang

Computer Modelling & New Technologies 2014 18(12B) 318-322

This paper studies the networking mode of heterogeneous network in wireless sensor network and put forwards the hierarchical and distributed networking architecture suitable for large-scale heterogeneous wireless sensor networking. This structure achieves the unification of heterogeneous sensor network networking without changing the existing sensor network internal networking mode. By LBA addressing algorithm, we can convert the address-based addressing mode to content-based addressing mode by the map between label and address. The result shows that LBA is more suitable for large-scale WSN addressing requirements in hierarchical structure.

Keywords: *wireless sensor, network networking, resource addressing, network deployment*

Facial expression recognition based on ASM and Multi-Instance Boosting

Zhu Shaoping

Computer Modelling & New Technologies 2014 18(12B) 323-330

In this paper, a novel method for facial expression recognition in dynamic facial images is proposed, which includes two stages of feature extraction and facial expression recognition. Firstly, Active Shape Model (ASM) is used to extract the local texture feature, and optical flow technique is determined facial velocity information, which is used to charaterize facial expression. Then, fusing the local texture feature and facial velocity information get the hybrid characteristics. Finally, Multi-Instance Boosting model is used to recognize facial expression from video sequences. In order to be learned quickly and complete the recognition, the class label information was used for the learning of the Multi-Instance Boosting model. Experiments were performed in the JAFFE database to evaluate the proposed method. The proposed method shows substantially higher accuracy at facial expression recognition than has been previously achieved and gets a recognition accuracy of 95.3%, which validates its effectiveness and meets the requirements of stable, reliable, high precision and anti-interference ability etc.

Keywords: *Facial expression recognition; Active Shape Model; Multi-Instance boosting*

Research of distributed IDS based on mobile agent and genetic algorithm

Gao Weimin, Xiao Lizhen

Computer Modelling & New Technologies 2014 18(12B) 331-336

The special radiation and openness of the propagation channel during wireless communication will lead great threats to security of network management and communication. In recent years, there are more and more application of genetic algorithm and the mobile agent in IDS. As traditional knowledge based IDS has to build artificial rules and patternsfrom expert of field with human interventions, limitations of expert rules will be highlighted with the change of time and space, resulting in unsatisfied detection correctness and effectiveness. As a result, we need to optimize the performance of IDS. In this paper, we first introduce the mobile Internet network architecture and security problems, and put forward a general IDS model and classification, then design a intrusion detection system based on mobile Agent and genetic algorithm, with flexibility, scalability and strong adaptability and low error rate, which meets the needs of mobile IPv6 environment to use. Experimental results show that the proposed design model has advantages in the performance of the detection efficiency, which is suitable for mobile network.

Keywords: *mobile internet network, intrusion detection system, mobile agent, genetic algorithm*

An efficient image compression method based on SPIHT algorithm using run-length coding

Zhu Li

Computer Modelling & New Technologies 2014 18(12B) 337-342

EZW (Embedded Zerotree Wavelets) coding algorithm has not only high compression rate but also some new features such as progressive coding/decoding, low computational complexity, etc. Based on EZW, many improved algorithms have been developed in recent years. SPIHT (Set Partitioning in Hierarchical Trees) is an outstanding one among them. Statistical experiments show that some directional and positional dependencies still exist between significant coefficients in each subband. Based on this structural characteristic, this paper incorporated RLC(Run-length Coding) into SPIHT and proposed a new scanning scheme to cluster significant coefficients' 1-D distribution, which reduced coefficients' such structural redundancy to the largest extent. Theoretic analysis and experiments indicate: after introducing RLC into SPIHT, not only is the low computational complexity preserved, but also increases the PSNR up to 2 dB at very high compression ratios, and the average improvement is about 0.1dB at 0.3-0.7bpp for standard test images used. The visual quality of reconstructed images is also significantly improved.

Keywords: *remotely sensed image compression, wavelet transformation, zerotree, SPIHT, RLC coding*

Task scheduling in multiprocessor systems using inertial velocity differential evolution

Qiu Xiaohong, Hu Yuting, Li Bo

Computer Modelling & New Technologies 2014 18(12B) 343-349

Task scheduling in multiprocessor systems is a challenge NP-complete problem. All practical real-time scheduling algorithms in multiprocessor systems present a trade-off between their computational complexity and performance. In this paper, An improved Differential Evolution algorithm combined Particle Swarm Optimization idea is proposed to solve the Task Scheduling Problem (TSP) in multiprocessor system. The proposed algorithm called Inertial Velocity Differential Evolution (IVDE) consists of an additional inertial velocity factor based on adaptive differential evolution algorithm. IVDE optimizes task scheduling to the minimum of the overall schedule length. The simulation results show that IVDE algorithm not only reduces the computational complexity, but also is easy to get the global optimum compared with GA and Ant Colony Optimizer to solve the task scheduling problem in multiprocessor systems.

Keywords: *multiprocessor systems, task scheduling problem, differential evolution; algorithm*

Light weight one-time pad RFID bidirectional authentication protocol research

Zhang Xiaohong, Xiao Juanfeng, Dong Lifeng

Computer Modelling & New Technologies 2014 18(12B) 350-356

Today the RFID system is widely applied in the open system environment, the communication between reader and tags is easily influenced by a various kinds of interferences and attacks, so the safety performance is threatened. This paper proposes a light weight one time pad RFID security authentication protocol, associates chaotic map with hash function. In the certification process, this protocol takes a filtering operation, reduces the back-end database search calculation load, and avoids pretence, retransmission attack, tracking and so on. At the same time, takes some flag variable of the RFID system as the initial value of chaotic mapping and parameters, combines with the certification process to make the original information position scrambling, then executes XOR or encryption. Experiment simulation results show that this scheme security relies on the RFID system itself parameters and encryption process, so can solve the RFID system problem of illegal access, forge coaxing, data leakage and so on.

Keywords: *RFID, light weight, bidirectional authentication protocol, hash function, chaotic map*

Video-based face recognition using tensor and clustering

Zhao Jidong, Zhang Wanjie, Li Jingjing, Lu Ke

Computer Modelling & New Technologies 2014 18(12B) 357-362

Video-based face recognition has become one hot topic in the field of pattern recognition recently. How to fully utilize the spatial and temporal information in video to overcome the difficulties existing in the video-based face recognition, such as low resolution of face images in video, large variations of face scale, radical changes of illumination and pose as well as occasionally occlusion of different parts of faces, is the focus. In this paper, we propose a novel manifold-based face recognition algorithm using tensor and clustering(TCVLPP), which can discover more space-time semantic information hidden in video face sequence, simultaneously make the best of the intrinsic nonlinear structure information to extract discriminative manifold features. We also compare our approach with other algorithms on our own video databases. The experimental results show that TCVLPP can get a higher recognition accuracy rate for video-based face recognition.

Keywords: *video-based face, tensor, manifold learning*

Data fusion algorithm analysis and realization based on wireless sensor networks

Wang Na

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In the premise of ensuring the veracity of model prediction result as well as simplify the model and prediction algorithm, this paper introduces a wireless sensor network data fusion algorithm based on ARMA time series model. This algorithm aims at reducing the energy consumption of wireless sensor network and improving the accuracy of fusion result. It conducts reliability analysis to node collecting data and removes the abnormal data. By analyzing ARMA model, we find that the construction of prediction model and cost of predicting is related to order of the model. The experiment result shows that this algorithm can not only reduce the network energy consumption but also detect abnormal data. ARMA model that determinates by BIC&F applicability test methods can adapt the wireless sensor network well.

Keywords: *wireless sensor networks, data fusion, prediction, time series analysis*

A cost optimization model and its heuristic algorithm for a content distribution network

Guo Junfang

Computer Modelling & New Technologies 2014 18(12B) 369-374

Content Distribution Network (CDN) is an effective approach to improving the quality of Internet service. In a CDN, it is an important problem how to minimize the connection cost over all input requests. This paper firstly reviews some state-of-the-art

research works related to the classical facility location problem. Secondly, based on existing Facility Location Models, the this paper proposes a mathematical programming formulation for optimizing the connection cost in a CDN and then presents a corresponding heuristic algorithm for solving this optimization problem. Finally, the theoretical analysis demonstrates that our proposed algorithm performs better than previous algorithms in terms of effectiveness and efficiency.

Keywords: *facility location, content distribution network, approximation algorithm, modeling*

An improved handoff scheme using SIP for time-shifted service in heterogeneous network

Xiao Lin, Liang Jun

Computer Modelling & New Technologies 2014 18(12B) 375-382

Multimedia service is widely developed with the convergence of network, but it is sensitive to the data delay and packet loss introduced by mobility. The time-shifted service is a typical application in multimedia service. An improved application-layer handoff scheme using SIP is proposed in this paper to reduce the delay user experienced in time-shifted service under IMS architecture. The improved handoff scheme includes horizontal handoff and vertical handoff which supports terminal mobility and mode mobility in time-shifted service. Theoretical analysis and simulation results show the delay user experienced is greatly reduced by the improved handoff scheme which ensures the seamless experience for time-shifted service.

Keywords: *time-shifted, handoff, SIP, delay of handoff, delay user experienced*

Active defense technology and its developing trend

Zhang Qing, Liu Caixia, Lu Ganqiang

Computer Modelling & New Technologies 2014 18(12B) 383-390

Active defense technology has attracted more and more attention in the field of network security. This paper introduces the main threats of computer network and traditional network security defense technology. Aiming at the shortcoming of the traditional defense technology, the active defense technology is proposed. Finally, according to the current research hotpots, this paper presents the new direction of active defense: Moving Target Defense and Mimicry Security Defense.

Keywords: *traditional defense, active defense, honeypot technology, moving target defense, mimicry security defense*

The GPS information acquisition system based on Zigbee

Xin Zhenghua, Hu Liangyi, Chen Guolong, Song Qixiang, Li Hong

Computer Modelling & New Technologies 2014 18(12B) 391-397

This system designs the global positioning system (GPS) module in the CC2530 chip. So it is called the GPS wireless sensor node. It makes the GPS combine the Zigbee node. The Zigbee is the communicating protocol for the wireless sensors. The location information is sent from the terminal sensor through the Zigbee protocol to the coordinator wirelessly. The coordinator sends the GPS information to the PC or other terminal via the serial. At last, the personal computer can communicate the position information with other users via a wired or wireless network. If the GPS information timely can be transmitted by the Zigbee wireless network, then you can get the more accurate positioning system through the software in the upper host computer. It will be widely applied in the field of the industry and the agriculture.

Keywords: *GPS, Zigbee, CC2530*

Research on general foundation platform based on MDA

Wu Qingfeng, Wu Minwen, Dong Huailin

Computer Modelling & New Technologies 2014 18(12B) 398-403

With the rapid development of informatization in various industries, the needs of information systems for government and enterprise continues rising, and the scale and complexity of such systems is increasing as well. Therefore, lack of reusability and reliability has become one urgent issue in traditional software design. Based on the core idea of model-driven development, this paper designs a J2EE-based business platform which has three subs systems: model generation subsystem, workflow information subsystem and rolebased permissions subsystem. The implementation and practice of this platform indicates that such software development method based on platform can significantly improve the development efficiency. The basis functional modules and workflow applications can be implemented by configuring the software. Through the built-in user management, menu management, rights management and other public module, the platform can greatly improve software reusability, reducing the development effort and achieving perfect results.

Keywords: *platform, MDA, general foundation platform, information systems, J2EE*

Research on small embedding rate of universal steganalysis based on rich model

Dong Rui-hong, Shang Qi-chang, Zhang Qiu-yu

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In order to solve the problem that detection rate will be lower than normal value when the embedding rate is small, this paper proposes a small embedding rate of universal steganalysis method based on rich model. This method is that corresponding

feature set is extracted from the noise component model and texture component model. First, some features, which are extracted from wave contour analysis, neighborhood linear prediction and image de-noising analysis, are calibrated so as to reflect variation due to embedding secret information preferably. Finally, use ensemble classifier, which verifies whether the image contains hidden information, to classify. Simultaneously, this paper adds a predictive image in order to remove the characteristic of the image itself. The experimental results show that the correct detection rate exceeds eighty-four percent when the embedded quantity is higher than 1 KB and this method has higher reliability by comparing with the existing literature

Keywords: *universal steganalysis; rich model; ensemble classifier; small embedding rate*

Influence estimation method of network factors in Internetware reliability

Zhang Jing, Lei Hang

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The reliability of Internet ware system is greatly influenced by the network factors. In some classical reliability calculation methods, the component reliability, the connection reliability between components, transition probability and so on, all are set into some fixed values, without considering the network factors. the main factors of network influence for reliability estimation are analyzed and researched in Internetware system, according to these factors, the Markov characteristics of Internetware is analyzed. Using the principle of DTMC and the minimum quadratic difference, the estimation method for reliability is proposed, the new models are defined, and the algorithm for reliability estimation is designed. The experiment proves that the presented method and the designed algorithm can effectively quantitative estimation with great value in Internetware reliability analysis, also provides effective reference value.

Keywords: *Internetware, reliability, method, models, algorithm, influence, factor*

Development of smart home environment based on internet of things technologies

Shi Qiao

Computer Modelling & New Technologies 2014 18(12B) 416-421

Wireless sensor networks (WSNs) have been becoming increasingly essential in recent years because of their ability to manage realtime situational information for various novel services. Recently, the scope of WSN technologies has been expanded to places such as the home, in order to provide the residents with various intelligent services, such as home automation services or home energy management services. The ubiquitous home network has gained wide-spread attentions due to its seamless integration into everyday life. This innovative system transparently unifies various home appliances, smart sensors/actuators and wireless communication technologies. The ubiquitous home network gradually forms a complex system to process various tasks. The proposed intelligent home control system divides and assigns various home network tasks to appropriate components. It can integrate diversified physical sensing information and control various consumer home devices, with the support of active sensor networks having both sensor and actuator components. We develop a new routing protocol to improve the performance of our active sensor networks. This paper introduces the proposed home control system's design that provides intelligent services for users. We demonstrate its implementation using a real test.

Keywords: *home networks, intelligent home control systems, active sensor networks*

The study on workflow retrieval using knowledge flow mechanism

Han Ke, Song Liangong

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A workflow can usually be described using formal or informal flow diagramming techniques, showing directed flows between processing steps. Workflow often have to meet different users' requirements that have imposed diverse constraints on data oriented workflows such as cost and speed, etc. Data oriented workflows are often designed based on open, distributed and heterogeneous environments, and have been widely applied in many fields such as ecology, utility computing services, earth science, and so on. In the situation, it becomes a challenging problem for reusing workflows to retrieve such constrained data oriented workflows. However, there is no clear solution for retrieving constrained data oriented workflows. In this paper, we propose an approach for retrieving constrained data oriented workflows, which seamlessly combines semantic and structural information of workflows by computing the similarities between constrained data oriented workflows. First, a graph based representation is proposed for modelling constrained data oriented workflows. Second, the semantic and structural similarities for data oriented workflows are respectively discussed. Third, a distance measure based on matrix is adopted to seamlessly combine semantic and structural similarities for retrieving constrained data oriented workflows by similarity comparison. Finally, we make some related experiments to show the effectiveness and efficiency of our approach.

Keywords: *workflow, workflow semantics, workflow structure, constrained workflow*

Research and design of multi-robot wireless control system based on ZigBee

Zhao Dan, Tao Shao

Computer Modelling & New Technologies 2014 18(12B) 428-431

Combining wireless communication technology and the multi-robot technology, this paper designed a multi-robot wireless

control system based on wireless sensing ZigBee network technology. ZigBee node is introduced in the hardware system of the robots, multiple robots depend on ZigBee to form a star network, each robot can keep communication with each other through the center node, so as to achieve simple wiring, the collaborative communication between the multi-robots, and improve the work efficiency of the robots.

Keywords: *wireless communication technology, ZigBee technology, multi-robot*

The differentiation strategy for proprietary software firms when Open Source software appears

Xing Mingqing

Computer Modelling & New Technologies 2014 18(12B) 432-437

By extending the Hotelling model, this paper studies the software location and differentiation strategy for proprietary software firm when open source software emerges. It assumes that proprietary software firm pursues profit maximization and open source software can be freely available and mainly finds that: (i) Higher (resp. lower) the learning (maintenance or development) costs of open source software, smaller (resp. greeter) the software differentiation. (ii) the compatibility degree between open source and proprietary software affects the software differentiation strategy for proprietary software firm. (iii) the impact of network externalities or user's software development skills on proprietary software firm's software location and differentiation strategy may depend on the compatibility degree between open source and proprietary software.

Keywords: *software differentiation, proprietary software, Open Source software, compatibility, network externality, hotelling model*

A defeasible policy based access control approach for semantic web services composition

Hu Luokai, Liang Chao, Lu Ying, Zeng Yan

Computer Modelling & New Technologies 2014 18(12B) 438-444

Semantic Web services have brought great convenience to service-oriented software development. However, during the semantic Web service composition because the component Web services and licensing issues often require repeated dynamic binding, which greatly affect the efficiency of the service execution. To address this problem, we propose a defeasible policy based a ccess control approach for semantic Web service composition. Firstly, before the semantic service is bound to a component of Web services, static analysis can avoid unnecessary service binding in the semantic Web service composition and execution time. Then we give the access control enforcement process in composition and execution time. Finally, the feasibility of this method has been verified through experiments. Our approach can increase the efficiency and successful rate of semantic Web service composition.

Keywords: *defeasible logic, access control, semantic web services composition*

Study on Fidelity evaluation method of visualization simulation

You Yanjun

Computer Modelling & New Technologies 2014 18(12B) 445-450

With rapid development of visual simulation in the various fields, simulation fidelity evaluation ought to extend indicator in order to adapt different simulation evaluation. But now, most of visual system evaluations are based on subjective feeling of experts with indicators ignored. Fuzzy AHP method was presented in order to decrease the influence of field specialist's opinion. First, the characteristic of visualization simulation system is proposed. Second, fidelity evaluation method of simulation system is given, and a set of evaluation indicators were presented. And then, the value of evaluation result was given, and shows that the evaluation method of visual simulation system has better practicability and prospect in project.

Keywords: *fidelity, simulation, visualization, fuzzy AHP, evaluation of credibility*

Computer vision in the exploitation of vehicle contour dimension automatic measurement system of technology and its application

Li Xingliang

Computer Modelling & New Technologies 2014 18(12B) 451-453

This paper researched and realized a measuring system of the vehicle gabarite based on the computer vision, in order to meet the requirements of vehicle management department to measure the vehicle gabarite automatically. The accurate measurement of the vehicle gabarite with non-contact and speediness was realized.

Keywords: *computer vision, vehicle gabarite, measuring system*

Implementation of neotype simple Bayesian algorithm by mapreduce and the application of discreteness and continuity in data mining

Yan Xiliang

Computer Modelling & New Technologies 2014 18(12B) 454-459

MapReduce is a programming model that can run in a heterogeneous environment. Its programming is simple and used for the parallel arithmetic of large-scale data sets. We do not need worry about the underlying implementation details. MapReduce is applied into the three arithmetic of data mining: simple Bayesian algorithm, K-modes clustering algorithm and ECLAT frequent item set mining algorithm. This paper put forward an improved simple Bayesian algorithm which was implemented by MapReduce based on MapReduce programming model and the existing research. It could deal with the application of data mining which both with the nature of discreteness and continuity. At the same time, combined with the ideas of each algorithm and the running mechanism of MapReduce, this paper put forward K-modes clustering algorithm and ECLAT frequent item set mining algorithm which was implemented by MapReduce. These implementations expanded the application range of the two algorithms from stand-alone to cloud computing platform. When facing huge amounts of data, it can effectively improve the work efficiency of the algorithm.

Keywords: *MapReduce, simple Bayesian algorithm, data mining, cloud computing, work efficiency*

Study and implementation of algorithm for pencil drawing automatic generation based on computer

Liu Lixia

Computer Modelling & New Technologies 2014 18(12B) 460-464

Non-photorealistic rendering (NPR) as the iconology branch corresponding to photorealistic aims to generate artistic effect using computer. At present, NPR technology can successfully simulate oil painting, watercolor, cartoon, pencil drawing, etc. and has been widely applied in many fields. Pencil drawing is the monochrome that uses lines to present light and shade of objective image, and its rendering mainly includes detection and rendering of contour line and rendering of textures. This paper first introduced the research status of pencil drawing, then analyzed operator and improved algorithm based on effect implementation, used algorithm to rendering the input image into pencil drawing, and finally made the rendering effect closer to the practical drawing style of artists.

Keywords: *non-photorealistic rendering, stylized silhouette, contour line, pencil drawing*

Analysis of selecting the optimal threshold in image segmentation based on the evolution of feature field

Liu Shuqin, Peng Jinye

Computer Modelling & New Technologies 2014 18(12B) 465-468

In order to select the optimal threshold in image segmentation, this paper raised an image segmentation method based on the data field evolution mechanism. Integrating the local gray feature with the metric texture, it enabled to extract sufficient image information. Imaging that every pixel with multi-features was a particle with physical meaning, it built a feature field in the space of image feature. Under the supposition that the optimal threshold was the potential direction of evolution, particles would self-adapt to attract or repel each other because of the interaction in the dynamic data field among particles. In this way, the co-evolution was achieved and we further got the segmentation result. The experiment result shows that this method acquires quite good segmentation performance and is quite practical, without significantly increasing the time complexity

Keywords: *image segmentation, feature field, the optimal threshold, evolution algorithm*

The research of rural land loss based on data mining technology

Zhu Xusen, Wang Zhongcheng, Niu Jiqiang

Computer Modelling & New Technologies 2014 18(12B) 469-472

As for Chinese society, land has bearing thousands of years of culture. Land change not only pulls social development, but also relates to the life of hundreds of millions of farmers. With the development of urbanization and industrialization, land resource is facing with the dilemma of constant loss. Thus a kind of technology is eagerly needed to excavate and utilize our land territory. This paper proposed the objective function and constraint system of land use regionalization, and designed the system framework of land use regionalization based on spatial data mining. This paper selectively analyzed the content and implementation strategy of data layer, knowledge layer and spatial data mining layer in system, and realized land use regionalization coupled and integrated by GIS and application analysis model.

Keywords: *land loss, land use regionalization, data mining, GIS*

Digital signal processing methods of hammer vibration energy analysis based on FPGA

Wang Peng, Sun Run, Ju Xi, Lv Zhigang

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The hammer of 630KJ is an advanced forge device, whose hit energy and hit power during forge process are the key elements to forge quality. Therefore, from analyzing mathematical model of hit power, the forge quality can be developed. In this paper, the device we designed can measure acceleration change during forge, from which the mathematical model between acceleration and hit power can be constructed according to the change discipline between them. The digital signal processing system of functional model based on FPGA is designed, in which Verilog HDL program language compiled by Quartus II environment is downloaded into FPGA to implement all the functions. Such method can improve the speed of digital signal processing, from

which the max hit power and the max hit energy can be got according to acceleration and displacement.

Keywords: *vibration energy, verilog HDL, digital signal processing*

Optimization of detailed information based on retinex algorithm for image enhancement

Chen Jing

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To solve the problem of poor processing of detailed information in image enhancement based on traditional Retinex algorithm, this paper proposes a kind of Retinex algorithm for image enhancement based on luminance block, which first introduces the background intensity to represent the stimulus intensity according to the Webb law in psychology, so as to segment the luminance block of image, and then use enhancement factors with different scales to enhance the segmented blocks; finally, after segmentation of the edge information of pixels, fuse the information of blocks in a way of proportion solution. Simulation results show that, the Retinex algorithm for image enhancement based on luminance block proposed by this paper has improved the information entropy than the original Retinex algorithm, and this method has a good effect in the application of image enhancement.

Keywords: *Retinex algorithm, image enhancement, optimization of detailed information, luminance block, optimization of information entropy*

Spreading mechanism of underground mine fire based on the complex network

Lu Na, Lu Caiwu

Computer Modelling & New Technologies 2014 18(12B) 483-488

Underground mine fire system often refers to an open and dissipative system with complex structure and behavior features. The purpose of this study is to investigate fundamental questions of structure, connectivity, information exchange and causality by complex networks to built system model and network model of underground mine fire. The complex network theory is employed to analyze model of underground mine fire network including the whole and individual attributes. The former consists of density, average degree, clustering coefficient and distance, while the latter contains degree centrality, betweenness centrality and closeness centrality. The relationship between nodes and disaster is gained, which has a great influence on fire network. The degree distribution of function is used to test and determine whether underground mine fire network has a small-world effect of complex network as well as scale-free property and network centrality to verify the underground mine fire system as a kind of complex network. Therefore, the topological structures of complex networks and changes of key parameters are applied to study evolution and spread dynamics of fire network.

Keywords: *underground mine fire network, complex network, degree distribution, topological structure*

Image scrambling algorithm based on image block and zigzag transformation

Pu Changjiu

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Image scrambling has wide application field in the protection of image information and secret. To achieve a satisfactory level of security, this paper introduces a color image scrambling algorithm based on image block, extended zigzag transformation and bit exchange technology. First, the algorithm converts the three-dimensional color image into two-dimensional gray image using matrix transformation according to the order of each component of image, then divides the image into blocks and completes block matching in couple, finally, the image is converted to cipher image using matrix transformation after permutation, substitution and bit exchange. Experiment simulations and theoretical analysis show that the algorithm can completely reach good scrambling effect and has the advantages of a large space of keys, high security, strong robustness and high sensitivity.

Keywords: *zigzag transformation, bit exchange, image block, image scrambling*

Database accessing middleware based on factory pattern and strategy pattern

Li Zhaohui, Yang Hongxia

Computer Modelling & New Technologies 2014 18(12B) 494-499

On the detail discussion of database accessing technology, this paper puts forward a database accessing middleware with combination of factory pattern and strategy pattern, and applying this database accessing middleware in the construction of a deli network trades platform. The actual application shows that this proposed middleware contributes to simplification of code fragment. Moreover, it enhances system extensibility and maintainability through the Factory and Strategy design pattern, and makes data processing more flexible, easier to modify and reuse.

Keywords: *database accessing middleware, trading platform, factory pattern, strategy pattern*

Power constraint communication-aware task scheduling in reconfigurable multiprocessors

Chen Xiaoming, Liu Yan, Li Renfa

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Heterogeneous multiprocessors with FPGA component have recently received a lot of attention due to its low cost and power consumption. However, most of existing works about task scheduling algorithm focus on minimization of system cost or power consumption. Actually, optimizing multiprocessor performance within a given power budget has recently received a lot of attention. Peak power consumption should be carefully controlled than directly improve computing performance. Furthermore, FPGA component in multiprocessors has essential parallelism ability to execute multiple tasks at same time using dynamic reconfigurable features. In this environment, tasks and communications should be carefully scheduled because their execution orders affect the performance of the whole chip. This paper presents an Integer Linear Programming (ILP) formulation that integrates the resource delay model and FPGA-component with pipelined scheduling and global power control. Moreover, to enhance the computation efficiency, a heuristic algorithm namely PCLS that integrates pipelined scheduling and global power control for heterogeneous multiprocessor architecture is proposed. Experiments show that our ILP method obtains the optimal results when task nodes are less than 35. Proposed PCLS heuristic algorithm achieves on average 10% higher makespan compare with DLS. For heavier synthetic task application, PCLS can provide only about 12% performance degradation under 70% power budgets based on different heterogeneous multiprocessor architectures.

Keywords: *multiprocessors, task scheduling, system-on-chip, power control*

Application of artificial fish swarm algorithm in image registration

Wang Yang, Zhang Wei, Li Hongxing

Computer Modelling & New Technologies 2014 18(12B) 510-516

As one of the fundamental tasks of image processing, image registration is the premise of image fusion and target recognition. This paper has discussed the principle and the detailed description of artificial fish swarm algorithm; analyzed the convergence performance of the algorithm and the effect various parameters of the algorithm play on convergence; applied artificial fish swarm algorithm in image registration; adopted normalized mutual information as the registration similarity principle with artificial fish swarm algorithm as the optimization search strategy and proposed an image registration method based on mutual information and artificial fish swarm algorithm. The experimental result shows that it has higher accuracy and reliability as well as rapid speed and that it can effectively perform image registration to apply artificial fish swarm algorithm in the image registration.

Keywords: *artificial fish swarm algorithm (AFSA), image registration, optimization search strategy*

Image edge detection based on quantum genetic algorithm

Tang Lin

Computer Modelling & New Technologies 2014 18(12B) 517-523

In asymmetric fingerprinting, the merchant can trace the traitors from a pirated copy by means of the embedded unique fingerprint, while the customer is immune of being framed due to the asymmetric property. In this letter, we propose an asymmetric fingerprinting scheme based on 1-out-of-n oblivious transfer, which is efficient from the bandwidth usage point of view. First, multicast that is an efficient transport technology for one-to-many communication is exploited, which can reduce the bandwidth usage significantly. Second, symmetric encryption instead of public-key encryption is performed on the multimedia content, which can reduce the complexity and communication cost.

Keywords: *asymmetric fingerprinting, oblivious transfer, multicast communication*

Self-adaptive wavelet threshold denoising based on multiresolution analysis

Yu Xiaojun

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Various noises are usually mixed in the collection, processing or transmission of digital image, which reduces the image quality and which is bad for the subsequent image analysis; therefore, the image denoising processing is an essential link to conduct subsequent image analysis. With continuous development and improvements of wavelet theory, its excellent time-frequency characteristics have led to its extensive applications in image denoising. By analyzing the basic principle of wavelet threshold denoising, this paper has proposed a denoising algorithm of self-adaptive wavelet threshold. This algorithm decomposes and reconstructs the signal by using multi-resolution analysis; designs and constructs appropriate threshold function and realizes a new self-adaptive threshold denoising algorithm by optimizing the threshold with the threshold function. The experimental result demonstrates that compared with median filtering algorithm and mean filtering algorithm, the algorithm of this paper can improve the signal to noise ratio; maintain the detail information and texture features of the image over denoising and have better denoising effects.

Keywords: *image denoising, wavelet analysis, multi-resolution*

Application of ant colony mixed algorithm in image enhancement

Pan Biao

Computer Modelling & New Technologies 2014 18(12B) 529-534

Image enhancement is a method of image processing to highlight some information and weaken or eliminate some irrelevant

information in the image or transform the original image into an image which is more suitable for humans or machines to perform analytical processing by using some specific methods. Applying intelligent algorithm in image enhancement, this paper has proposed a mixed algorithm, namely the genetic-ant colony mixed algorithm based on genetic algorithm and ant colony algorithm and found the optimal combination point between these two algorithms by analyzing their time-speed curves. Then it designs the algorithm for image enhancement, including the image pre-processing, the computational steps of the early genetic algorithm, and the connection of genetic algorithm and ant colony algorithm according to certain conditions and the operations of the later ant colony algorithm. The experimental simulation result shows that the algorithm of this paper is superior to simple genetic algorithm or ant colony algorithm and it greatly improves the visual effects of the image, effectively supplements the weak information of the image and reduces the influence of image overexposure for ease of the subsequent image processing.

Keywords: *genetic algorithm, ant colony algorithm, image enhancement*

Multi-focus image fusion based on multi-resolution analysis

Yang Zhaonan, Zhang Shu, Gu Zeyuan

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In order to further improve the effect of image fusion and the performance of fusion algorithm and on the basis of the in-depth analysis of various different image fusion strategies, this paper has proposed a multi-resolution neighborhood energy contract fusion algorithm based on wavelet analysis. This method can better abstract the important features and detail information of the source image and improve the information entropy reflecting the information richness, the average gradient of the image details and marginal information as well as the overall activity level of the image compared with other fusion methods. Moreover, it has better evaluation parameters than other fusion methods, suggesting that this method is effective in multi-focus image fusion and that it can achieve good effects.

Keywords: *image fusion; wavelet analysis; multi-resolution*

Image denoising based on wavelet analysis and quantumbehaved particle swarm optimization

Zhou Junhui, Liu Jie

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This paper investigates the basic principle of threshold denoising based on wavelet transform, including the selection of wavelet basis, the determination of wavelet decomposition level, the selection method of threshold and the threshold estimation method of wavelet coefficient. Additionally, it proposes an image denoising method based on quantum-behaved particle swarm optimization (QPSO), gives the optimization value based on the experiments and theoretical analysis and optimizes the dynamic threshold by using numerous advantages of wavelet transform in the field of image denoising and QPSO so as to realize the self-adaptive denoising of wavelet transform and reduce the influence of subjective factors. The simulation experiment shows that in addition to the effective denoising, the algorithm of this paper protects the image details and obtains better image denoising effects.

Keywords: *wavelet analysis, quantum-behaved particle swarm optimization (QPSO), image denoising*

Security framework for cloud data storage based on multi-agent system

Zhou Hui, Qin Shigang

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Cloud computing environment involves many aspects, including data, users, technology, resources, transactions, etc. It is necessary to establish effective security technology to ensure cloud computing reliable. Multi-agent system architecture is an effective framework to maintain system security. Therefore, we build a multi-agent architecture for cloud data storage issues. This security framework can bring better confidentiality, availability, accuracy, coordination of the operation of the cloud data for cloud computing. Through the analysis of the safety performance of this framework and operating data test, the effectiveness of cloud data storage security framework had been confirmed.

Keywords: *cloud computing, multi-agent system, cloud data storage, security framework*

An event-oriented real-time architecture for cyber-physical systems

Tan Pengliu, Zhang Sheng, Nie Yunfeng

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Cyber-Physical System (CPS) is an exciting emerging cross-over research area that faces many challenges. A CPS is a distributed and deeply embedded real-time system, which involves sensing, computation, communication, and control through heterogeneous and widely distributed physical devices and computational components. This paper extends our previous proposed CPS architecture and presents an event-oriented real-time architecture (EORTA) for CPS. CPS event is defined in words and formal method respectively. A CPS event is uniformly represented by a seven-tuples. According to the methods generating CPS Events, they are divided into Physical Event, Synthetized Event, Fused Event and Combined Event. Not only is EORTA characteristic of time-space, but also it can support the real-time QoS (Quality of Service) for CPS, which will meet the intrinsic

real-time requirements of CPS.

Keywords: *event-oriented, real-time architecture, cyber-physical systems*

Optimizing precision of SIFT algorithm in feature extraction of tennis video

Wu Changhong, Geng Haiyan, Geng Tianlin

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The traditional SIFT algorithm still has problems such as running slowly and low accuracy in the tennis video feature extraction and matching, an improved SIFT algorithm is proposed based on a tennis video feature extraction and matching. First, it limits the number of feature points to SIFT algorithm by adding the image texture features, which make the feature points to evenly distribute in each set of different scales of video image. Then measures the similarity of feature points by Euclidean distance, the measurement results transform with projection transformation relations, and then uses iterative arithmetic of random sampling consistency (RANSAC) algorithm to obtain maximum satisfy feature points of geometry model. Finally, uses the minimum root mean square error (RMSE) to determine the accuracy of registration. The simulation experiments show that the proposed improved SIFT algorithm based on tennis video feature extraction and matching has faster running speed and better matching precision.

Keywords: *improved SIFT algorithm, tennis video, feature extraction, feature matching, the texture features, projection transformation, random sampling consensus*

Real-time video transmission system based on embedded middle-ware TAO

Sun Jiangyan, Jia Xiaoqiang

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Analysis of the application of real-time video transmission system in the cluster operation platform, use thin clients Model, introduce the CORBA middleware, designed a program tailored to ACE + TAO dynamic program, development program as far as possible use smaller memory and smaller storage space, Combined with embedded real-time Middleware technology to construct distributed heterogeneous video transmission system. In order to verify the feasibility of the scheme and real-time, CORBA A/V services and CORBA Naming Service are combined with, and the real-time video transmission system of Embedded Middle-ware Based on TAO is realized. The system is composed of client and server, the client is composed of two parts and divided into sender and receiver according to the role, Use MFC and MiniGUI to develop user interface, run on Windows system and Linux system, the server is in VxWorks system for data forwarding function. With a 100Mbit/s bandwidth LAN environment, video of the subscription, the release, playing, pausing function has been realized by testing. In the aspect of real-time, video data, from collecting to playing with delaying in 150ms. Bandwidth in 352×288 pixel single collection of pictures, in case of 32 frames per second, the bandwidth consumption occupies only 500-540kbps, and realizes the low bandwidth consumption.

Keywords: *TAO, heterogeneous platform, video transmission, MFC, the thin client*

Analysis on aerospace software health metrics based on multifactor reliability growth model

Xie Weiqi, Cai Yuanwen, Cheng Long

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Software health management technology main includes the processes of real-time detection, fault diagnosis, health metrics and taking mitigation measurement, and health metrics is the important basis for taking mitigation measurement. An integrated software health metrics is put forward in this paper, and the software health is measured from the layer of task, function and resource. By constructing a multi-factor reliability growth model, the health of task is measured by reliability; the health of resource is measured by the usage of various resources; and the health of function is measured by the risk of failure models and their propagation distance. Finally, the integrated health metrics is built on the basis of the three areas, and the status of software health is divided by the number of health. Then, the status of software health provides theoretical basis for which mitigation measurement should be taken

Keywords: *aerospace software, software health, health metrics, task health, resource health, function health*

Energy efficient routing protocol of wireless sensor network

Lan Bing, Li Bingbing, Li Xiang

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The characteristics of traditional wireless sensor network (WSN) determine the constraint of its various properties. Combining the advantages of energy balanced and cross-layer optimized routing protocols, the paper proposed multiple-hop routing protocol of energy balancing, in which cross-layer optimization as well as multi-hop factor as a measure of the residual energy of cluster head nodes to make a reasonable judgment on its forwarded data. The constraint of multi-hop factor made cluster head nodes unable to forward information to the base station, thus balancing the energy consumption of the whole network and further optimizing the lifetime of sensor network nodes. Simulation results showed that the routing protocol could balance the energy consumption of the entire sensor network, which greatly prolonged the life cycle of wireless sensor network.

Keywords: *wireless sensor network, energy balanced, routing protocol*

An unbiased crawling strategy for directed social networks

Yang Xuehua, Li Hongbin

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Online Social Networks (OSNs) is a hot research topic and data crawling or collection is an important and based task for OSN analysis and mining. Due to the large amount of data, not open and other factors, the acquisition of social networking is different from the ordinary crawling technology. The quality of the data determines the effect of the majority of social network data mining analysis, data crawling technology is essential. Micro-blog is different from social network such as Facebook, the need for better crawling strategies to obtain the data set is huge. Improving Random Walking (RW) algorithm, an unbiased crawling strategy is proposed to crawling directed social networks. By contrast with the uniform sampling method, the strategy has been proved to ensure data crawling with all similar data at the same time to ensure the unbiasedness of the sampling data.

Keywords: *social networks, sample collection, unbiased directed graph, crawling strategies*

Partner selection of cloud computing federation based on Markov chains

Hong Liang, Gao Changyuan

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Cloud computing is currently a hot in the field of information technology, and cloud computing alliance is an important direction. In order to make the league better development of cloud computing and solve the problem of selecting partners of cloud computing federation. This paper builds the structure of cloud computing federation system and evaluation indicators system of federation partner selection, and proposes a dynamic comprehensive evaluation model based on Markov Chain and Analytic Hierarchy Process, further to get exact values of evaluation for different evaluating targets in different time periods. Based on the assessment analysis and simulation results there are a reasonable selection coalition partners. The example demonstrates the feasibility and rationality of the evaluating method and builds in this paper, which would guide partner selection of cloud computing federation.

Keywords: *cloud computing federation, partner selection, Markov chain, analytic hierarchy process*

Estimating fundamental matrix from uncalibrated images

Kan Jiangming, Zhan Chuandong, Feng Shuo, Li Wenbin

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Estimation of the fundamental matrix plays a significant role in the field of computer vision. Two different approaches are presented to estimate the fundamental matrix from uncalibrated images: one is an improved iterative approach; the other an improved robust estimation. The improved iterative approach, utilizing the least-squares technique, makes use of several point matches to compute the initial fundamental matrix and weights and determines the computation loop by concerning the Euclidean distance between matched points and epipolar lines. The improved robust estimation extends the original RANSAC approach by removing outliers from the points set every five inner loops after being evaluated with corresponded scores to get the optimal points set and then estimating the fundamental matrix through the orthogonal least-square algorithm at each iteration. Experimental results that the improved iterative performs better when both the variance of Gaussian noises and the percentage of outliers are small. Results reveal that the proposed technique of removing outliers works successfully and fine, especially with a high level of outliers; and it is superior to the original RANSAC in terms of means and standard deviation on real images.

Keywords: epipolar geometry, fundamental matrix, iterative computation, robust estimation

Energy-saving mechanism design for 6LOWPAN wireless sensor network

Chen Jianjun

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Combined with the wireless sensor network and distributed multi IPv6, IEEE802.15.4 technology is introduced into the network design and wireless sensor network carries out seamless misaiming with the internet, finally a new 6LOWPAN wireless sensor network energy saving mechanism will be obtained, its mechanism combines with the comprehensive power of optical fiber line, wireless sensor network node distribution optimization multi distributed IP technology to design energy-saving model, and uses C language to program the algorithm. In order to test the effectiveness and reliability of energy-saving mechanism, the energy-saving wireless sensor network is built, and the integrated Contiki environment is developed, finally the use of Firefox browser with B/S architecture tests the energysaving mechanism. Through the test, it can be found that when sending, receiving, idle and sleep in wireless sensor network, 6LOWPAN wireless sensor network can realize the network energy-saving effectively.

Keywords: *6LOWPAN network, distributed IPv6, IEEE802.15.4, C language, Contiki integration*

Image processing system based on space transformation

Wang Bo
Computer Modelling & New Technologies 2014 18(12B) 610-615

This paper proposes a novel method of shadow fast detection and recovery of remote sensing image based on color spatial alternation in light of the analysis and research on experimental data of remote sensing image on different color space. Compared to traditional shadow detection algorithm on the basis of pixel, this method enhances the precision and scope of application of detection. Meanwhile, on the recovery of shadow information, it is able to recover shadow information rapidly by analyzing the statistical characters of image element within the shadow. This method is to feature high speed, high automation and wide scope of application. Numerous tests on the application of high spatial remote sensing image show that this method has brought about satisfying results.

Keywords: *high spatial remote sensing, shadow detection, shadow recovery, image processing*

Wear particle image segmentation using a two-stage strategy

Guo Heng-guang, Qu Jun
Computer Modelling & New Technologies 2014 18(12B) 616-622

Wear particle image analysis is an effective and reliable method for equipment condition monitoring and fault diagnosis. Segmenting wear particle from image is an important but challenging problem. In this paper, a two-stage wear particle image segmentation strategy is presented, which consists of a rough segmentation stage and a fine segmentation stage. In the first stage, a wear particle image is divided into blocks, and clustering method is used to group blocks. This stage aims to get the rough boundary of the wear particle. In the second stage, color gradient is introduced into GVF snake to establish color GVF snake model, and rough boundary from the first stage is used as initial contour. This stage tries to extract the accurate boundary of the wear particle. Experimental results shows that the method proposed in this paper offers an accurate, minimally interactive, and efficient scheme for wear particle image segmentation, and increases the quality of wear particle image segmentation in compare with some state-of-art segmentation methods.

Keywords: *wear particle image segmentation, two-stage strategy, snake model, color gradient, color GVF snake*

Sparse representation of intricate natural image with multi-scale geometric dictionary

Yang Xingyu, Su Jinshan, Ma Jing, Deng Zhengfang, Jin Jing
Computer Modelling & New Technologies 2014 18(12B) 623-628

Sparse representation of natural image is the fundamental problem of multi-scale geometric analysis, deep learning and K-SVD learning method. Traditional multi-scale geometric analysis is based on simple mathematical model which cannot express intricate natural images, and learning methods rely on prior knowledge. In this paper, a complex sparse representation mathematical model of natural images which have non-smooth area, non-smooth contours and intricate texture features is proposed. The model is established from the perspective of highly nonlinear approximation and according to the theories of wavelet, ridgelet, contourlet, and dictionaries such as wavelet dictionary and multi-scale ridgelet dictionary. The model can represent all natural images without any learning and priori knowledge. Simulation comparison experiments which established by a new multi-scale geometric dictionary show that this model greatly improves the sparse ratio and peak signal noise ratio and has the progressive optimal expression of intricate natural images

Keywords: *intricate natural images, mathematical model, multi-scale geometric dictionary*

Analysis and study on the association of Website based on named entities of Websites

Gao Bo, Zha Zhiqin
Computer Modelling & New Technologies 2014 18(12B) 629-632

The vertical search engine is searched more in-depth with the professional website, it search in-depth into an industry, and depth mining for information need to use more technology and achieve it. This paper presents an analysis method based on the relation of the named entities for the professional website: use the traditional high-frequency words as features of webpage in a website, and then analysis the relation between the named entities. This method first uses extraction algorithm extracted the named entity of webpage from the website; then use the analyses method analysis the relationship between named entities of the website; finally using correlation analysis method to improve relations between named entities, obtained the feature information of the website and the characteristic of the website.

Keywords: *named entity, characteristic value, correlation analysis extraction algorithm*

An 3D face recognition approach based on facial curve analysis

Hou Xuexian , Zhou Xinzhi , Lei Yinjie
Computer Modelling & New Technologies 2014 18(12B) 633-641

In this paper, we present a novel 3D face recognition approach based on the analysis of facial curves, which are extracted from the semi-rigid facial regions. Our approach excludes the facial region which is most affected by facial expressions (non-rigid region) resulting in a set of indexed open geodesic curves. A novel open curve analysis algorithm combining the geodesic and

Euclidean distances is used to match the same level pairs of open geodesic curves of a probe and the gallery faces. In order to increase the accuracy of face recognition, a curve ranking and weighting algorithm is also developed to select, during a training phase, the most reliable curves and to assign different weights to the selected ones. During the testing phase, the selected reliable curves and their corresponding distances are weighted fused to perform face recognition. The proposed approach has been tested on the Face Recognition Grand Challenge (FRGC v2.0) dataset via a number of experiments and a superior recognition performance was achieved.

Keywords: *face recognition, facial curves, geodesic curves, FRGC v2.0*

Comparison of Kalman and H∞ filtering algorithm in the integrated navigation system

Su Wanxin

Computer Modelling & New Technologies 2014 18(12B) 642-646

The integrated navigation (SINS/GPS) makes the output velocity or position difference between strap-down inertial navigation SINS and GPS as the measured values, and then the error of integrated navigation system is estimated and corrected by one filtering method in real time. In this paper, Kalman filtering algorithm and H∞ filtering algorithm are compared by estimating the error, in colored noise filter's, in the velocity and position of the three∞conditions. It can be seen that Kalman filter estimate value error larger than H directions. Proved by simulation and experiment, H∞ filtering algorithm has better stability and robustness.

Keywords: *SINS/GPS, Kalman filtering, H∞ filtering, algorithm navigation*

The Grid with golden section

Yao Pirong, Meng Lin

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In a certain plane or space, the human creative act such as architecture, painting, calligraphy, etc., So the basis on certain rules and laws are not entirely out of conjecture; role in dividing the plane and space, Grid which originated in the Chinese civilization and the Golden Section for Western culture. They are consistent and uniform, but the Book of Changes in the Grid philosophy is based on more levels, also in the Sudoku game, it only represents the position, neither is the area of the region of space division. In the area of regional space segmentation, traditional Grid adopted Rule of Thirds segmentation method is not rigorous, but also not fully consistent with the actual application. If the Golden Section is introduced into the dividing line of the Grid positioning, can draw a consistent picture aspect ratio has nothing to do with the dividing line position; Grid dividing line that is no longer the average but by 28:44:28 the proportion of distribution. This new division ratio of the plane can provide more scientific and convenient help, including quick picture composition for photography and video, hieroglyphic writing exercises, architectural space layout and so on.

Keywords: *the Golden Section Grid, four grid dividing line, positioning and proportions, significance of philosophical, application in practice*

Cloud computing based mountain flood disaster monitoring and forewarning platform

Niu Yunjia, Yan Hua

Computer Modelling & New Technologies 2014 18(12B) 654-657

Aiming at the disadvantages of undeveloped data disaster recovery and inefficient data sharing measures of existing mountain flood disaster monitoring and forewarning platforms, this paper analyzes the defects and designs a new platform architecture based on cloud computing. From the perspective of practical application, a customized data disaster recovery plan is provided. To integrate platform resources, a design of SaaS architecture and applications is presented afterwards. The introduction of cloud computing provides a new way for the construction of mountain flood monitoring and forewarning platform.

Keywords: *cloud computing, mountain flood disaster, data disaster recovery, data sharing*

Telecom Data processing and analysis based on Hadoop

Lu Guofan, Zhang Qingnian, Chen Zhao

Computer Modelling & New Technologies 2014 18(12B) 658-664

For call tracking system to adapt to the needs of large data processing, combined with a strong competitive advantage in recent years in large data processing Hadoop platform, designed and implemented a Hadoop-based call tracking data processing model, in order to verify its feasibility. The call tracking processing system model contains an analog data source module, data processing module, and a GUI interface. Analog data source module from real data samples in the simulated data, and the data is written directly to the Hadoop distributed file system, then using Hadoop's MapReduce model to write appropriate Mapper and Reducer function, the distributed processing of the data. Detailed study based on the system design and implementation, system deployment topology, hardware and software conditions, and designed several comparative experiments to analyze some static indicators of system performance.

Keywords: *hadoop, MapReduce model, data processing, call tracking*

Research on communication model of IPv6-based intelligent lighting system

Li Rui, Ma Shilong

Computer Modelling & New Technologies 2014 18(12B) 665-671

Intelligent Lighting is the development direction of urban municipal lighting construction. IPv6 technology is considered as the key to solve the problems such as point light source controlled separately, multi-scene controlled flexible and user-friendly, control signal with minimal latency, plug and play heterogeneous devices, green energy and so on. In this paper, we introduce the IPv6 into the intelligent lighting system; build the communication model from three aspects which are information model, information exchanging model and general protocol according to the characteristics of information transmission in intelligent lighting system. At last, the usability of the communication model is analysed and verified by the landscape lighting control system which deployed in the Olympic central area.

Keywords: *IPv6, intelligent lighting, communication model, information model, information exchanging model, protocol*

EEG-based identification system for mobile devices

Hu Jianfeng, Mu Zhendong, Yin Jinghai

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The brain is the most mysterious and powerful of human organs, with the development of science and technology on the brain brainwave applied research, more and more brain-computer interface technology matures, making people use brain waves to control peripheral devices ideas become possible. With advances in hardware technology, portable EEG acquisition instrument has emerged, portable, miniature brain wave EEG acquisition instrument enables application developers to use in daily life has become a development trend of brain wave study. The development of mobile-related hardware and software technology, making all kinds of intelligent terminals become everyday essential goods. Mobile equipment has now become a new platform for information exchange, spend a lot of information exchange, how to effectively protect the mobile platform information security? Research has shown that, EEG signal can be used as identification tool, the user's information protection and good, this paper to protect the information security of mobile devices to research how to use EEG; the EEG signal is feasible for mobile equipment identification.

Keywords: *EEG, smart home system, system design, BCI*

FPGA-based implementation of task management in µC/OS-II operating system

Zhu Shihai

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Task management is one of the most basic functions of an operating system. We took µC/OS-II real-time operating system as an example in this paper, put forward hardware design scheme of task management based on FPGA, and carried out the simulation and verification by means of Xilinx ISE software. We mainly designed and implemented hardware logical circuits of task management module so that the potential parallelism of multitasking was greatly improved; In the meantime hardware logical circuits of interrupt task management module was also designed and implemented. Specifically speaking, as interrupt tasks, external interrupt requests enjoyed higher priorities than those of ordinary tasks. If external interrupt arrived, then corresponding task was set to ready state, thus task scheduling was triggered, and then interrupt task was given higher priority for processing in order that the response time was improved. The simulation results showed that task management implemented by hardware could obviously reduce the executing time of a task, thus greatly expanded the application ranges of µC/OS-II operating system.

Keywords: *RTOS, FPGA, task management, task scheduling, interrupt*

Data classification using Sparse and Robust model: least squares support vector machine with L1 norm

Wei Liwei, Yu Hao, Liu Junhua

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Least squares support vector machine (LS-SVM) has an outstanding advantage of lower computational complexity than that of standard support vector machines. Its shortcomings are the loss of sparseness and robustness. Thus it usually results in slow testing speed and poor generalization performance. In this paper, a least squares support vector machine with L1 norm (LS-SVM-L1) is proposed to deal with above shortcomings. This method is equivalent to solve a linear equation set with deficient rank just like the over complete problem in independent component analysis (ICA). A minimum of 1-norm based object function is chosen to get the sparse and robust solution based on the idea of basis pursuit (BP) in the whole feasibility region. Some UCI datasets are used to demonstrate the effectiveness of this model. The experimental results show that LS-SVM-L1 can obtain a small number of support vector and improve the generalization ability of LS-SVM.

Keywords: *data classification, LSSVM, data analysis*

A seamless switching system and method for continuous playback of audios

Guo Yi, Li Qiong

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The stability and continuity are very important for a Radio Digital Audio Workstation. The output of a workstation may be discontinuous because of audio file error, network and database connections error, broadcasting system software or hardware error, and the virus infections, etc. This paper presents a seamless switch method of the broadcasting audio files, which can ensure continue broadcasting of the file while the program file error, network and database error and other error statement. In addition, a realization of this method is given by DirectShow technology. This technology has been applied for Chinese national invention patents, which patent No is 201110144970.5.

Keywords: *seamless switch, directshow, buffer, broadcast*

Image processing strategy used for simulated phosphene map of artificial vision

Chen Longmin, Yan Fanghua, Gong Zezhi, Zheng Yayu

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Phosphene generating mechanism is the most important theoretical foundation and key technology for artificial vision. Simulating the mapping relationship between visual image information and limited phosphene maps remains a difficult problem. To satisfy the practical requirement of clinical trials, we present an image processing strategy for simulated phosphene map. Based on block segmentation, a reducing pixelated image processing method is proposed. Meanwhile, an electrode intensity control strategy based on brightness grading is carried out as well. Finally spatial response experiment is performed on the artificial vision platform based on DSP to prove the algorithm availability. The experiment indicates that under the premise of ensuring the electrode stimulation accuracy, this system can precisely extract the brightness information of the pixel block and the contour information and transform them into electrode stimulus. The speed of the image processing strategy based on DSP is up to 30 frames per second after being optimized, which meets the real time needs of visual centers system completely.

Keywords: *artificial vision, phosphene map, reducing pixelated, DSP*

Improved image analysis using digital media technology

Li YangBo, Xu ZeYu, Sun Dong

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Digital image correlation and image registration or matching are among the most widely used techniques in the fields of experimental mechanics and computer vision, respectively. Despite their applications in separate fields, both techniques primarily involve detecting the same physical points in two or more images. In recent years, with the requirement of high-resolution and real-time measurement, the computation speed of digital image correlation (DIC) has become increasingly important. At present, the DIC algorithms based on the iterative spatial domain cross-correlation algorithm are widely recognized as the most robust and rapid. In this paper, the integral image technique is extended to handle the complex items in the equations of the DIC algorithm in order to accelerate the calculation process. The influence of the interpolation method on the performance of the DIC algorithm is also investigated. In addition, the analysis of computational complexity and numerical experiment results are presented to illustrate the effectiveness of this method. The results successfully verify that the proposed method can improve the computation speed of the DIC algorithm greatly, and the improvement is more notable when the fast interpolation method is utilized. In this paper a modification of a high-speed correlation system for the purposes of mechanical structures modal parameters estimation is described. Together with hardware modification an original version of a program Modan 3D was created, which is a complex tool for execution of an experimental and operational modal analysis.

Keywords: *improved image analysis, digital media technology, digital image correlation*

The adaptive intelligent information processing system

Li Huan, Wei Wenhong, Hu Qinhua, Wang Chun

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With the fast development of computer science and the wide application of multimedia technology, a mass of digital videos have become an indispensable part of our lives. However, it takes too much time and manpower to check the monitor. In order to solve these problems, this paper proposes the adaptive intelligent information processing system. The method extracts video abstracts from the original monitoring videos and analyzes these video abstracts one by one. So within a short period of time, users can get those video events that are interesting to them. The realization of the system can help users find the monitoring information quickly and efficiently. This system can be used in public places such as airports and stations, where traffic accidents are most likely to happen

Keywords: *video abstract, key frame extracting, intelligent processing, intelligent recognition*

Face recognition based on EEG

Yin Jinghai, Mu Zhendong

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Human face is a mutual understanding between our daily life is an important factor, different face will reflect different people

play different, this reflects the different components of the brain waves can be interpreted in the same context, one's own photos and others brainwave ingredient photo is there a difference too, this paper respectively, from P1, N1, P2, N2 and P3 components in different modes to analyze the differences, in order to reveal the source of the photograph to stimulate brainwaves and the reasons for the difference between component .

Keywords: RRP components, photographs, difference

