Mathematical and Computer Modelling

The Research of K-medoids clustering algorithm based on density

Liu Ping, Zhou Hao, Yang Junping, Qiu Taorong

*Computer Modelling & New Technologies 2013 **17**(5A) 7-11*

In view of that the clustering result of the traditional k-medoids clustering algorithm being sensitive to initial cluster centers. A new kmedoids clustering algorithm based on density was proposed in this paper. It conducted a rough clustering to generate several particles at first. Then select the centers of the k densest particles as the initial clustering centers. Tested by using UCI data sets, the validity of the proposed algorithm is demonstrated.

Keywords: k-medoids, density, clustering, cluster centers

Research on the task scheduling algorithm optimization based on hybrid PSO and ACO in cloud computing

Wang Chunping, Chen Keming

*Computer Modelling & New Technologies 2013 **17**(5A) 12-16*

In cloud computing environment, there are a large number of users, which lead to huge amount of tasks to be processed by system. In order to make the system complete the service requests efficiently, how to schedule the tasks becomes the focus of cloud computing Research. A task scheduling algorithm based on PSO and ACO for cloud computing is presented in this paper. First, the algorithm uses particle swarm optimization algorithm to get the initial solution quickly, and then according to this scheduling result the initial pheromone distribution of ant colony algorithm is generated. Finally, the ant colony algorithm is used to get the optimal solution of task scheduling. The experiment simulated on CloudSim platform shows that the algorithm has good effect in real-time performance and optimization capability. It is an effective task scheduling algorithm.

Keywords: cloud computing, task scheduling, particle swarm optimization (PSO), ant colony optimization (ACO)

The adaptive genetic algorithm graphics design based on fuzzy entropy thresholding method

Yang Jianhui, Mu Ke

*Computer Modelling & New Technologies 2013 **17**(5A) 17-20*

In today's society with rapid development of science and technology, the computer figure image design can be widely used in various industries. The quality of graphics design plays a very important role in the film, television, advertising, exhibition, art, electronic play and so on. With the development of computer information technology, the design of the graphics technology will progress. This paper prompts an adaptive genetic algorithm graphics design method based on fuzzy entropy thresholding which can improve the quality of digital graph. The experiment shows that the AGA-FET method proposed in this paper overcomes such defects of the traditional FET method as low computation efficiency of the exhaust algorithm and poor adaptability to the various images resulting from presetting the bandwidth of membership function

Keywords: blurry images; adaptive genetic algorithm; image thresholds; fuzzy entropy thresholding method.

Research on the adaptive weighted mean algorithm for lightweight scheme of database encryption

Wang Xiaoyan, Sun Rui

*Computer Modelling & New Technologies 2013 **17**(5A) 21-24*

Database security is very important in an information system. Most database management systems (DBMS) use access control to protect database. But access control can't resist bypass threats. Database encryption can resist these threats well. Encrypting data can exist on different positions in a DBMS. This paper compares four database encryption schemes in DBMS and proposes six design criteria for database encryptions. According to these criteria, we implement a prototype in Postgre SQL compliance with the fourth scheme. Our design has not impact on other database functions and makes no changes on DBMS structure. So it is a good way to enhance database security especially existing DBMS. Finally, we compare performance of database between with encryption and without encryption. The downgrade of performance is little and tolerable.

Keywords: database encryption; key management: secure storage; adaptive weighted mean algorithm.

Research on the parameters of unit element indirect calibration method

Jun Shi

*Computer Modelling & New Technologies 2013 **17**(5A) 25-28*

The theory of unit element indirect calibration is introduced by this paper by the key parameters of unit element indirect calibration is how to precisely measure the induced electromotive force in the low cost cases. The relationship of measurement error between electromagnetic flow meter and small measurement tube was analyzed in detailed, and the specific expression was given. The comparison experiment was made between unit element indirect calibration and actual flow calibration; experimental results show that the analysis of small measurement tube precision is credible.

Keywords: unit element; indirect calibration; small measurement tube; measurement precision

A novel key establishment algorithm for distributed wireless sensor network

Ma Feng-Juan, Song Da-Wei

*Computer Modelling & New Technologies 2013 **17**(5A) 29-33*

In the security mechanism of distributed wireless sensor network, key management plays a fundamental role. Because the distributed wireless sensor network has a large scale, its node resource is very limited and distributed, key management mechanism of traditional wireless network is not suitable for it. Therefore, a security mechanism based on the combination of elliptic curve cryptosystem and public key is proposed, which realizes safe key establishment and certification. The security of the protocol is analyzed. Energy consumption of the proposed key establishment scheme is simulated and the results show that this protocol is feasible to be applied to wireless sensor networks.

Keywords: key establishment; distributed wireless sensor network; energy consumption.

Moving target-tracking algorithm based on sparse representation and particle filter

Yang Qiu-Fen, Li Can-Jun

*Computer Modelling & New Technologies 2013 **17**(5A) 34-40*

This paper proposes a target tracking algorithm based on 2-dimensional PCA (principal component analysis), which can solve the difficulty of current target tracking algorithm to adapt to the appearance change of target caused by the illumination, shield and position change. First of all, the 2-dimensional PCA method A and sparse representation are used to build the target appearance model, which can reduce the dimension of target; then, by introducing the update method of increment subspace to conduct online update of the target template, it can reduce the algorithm's requirement of memory space and increase the accuracy of target appearance description; finally, the simulation experiment is conducted. The simulation result shows that compared to other tracking algorithm for moving target, the algorithm proposed in this paper can more accurately track the moving target in the video image, which also shows great robustness to the illumination and position change, and it has significant advantages for the target tracking with serious shield.

Keywords: Object tacking, Sparse representation, Incremental learning, Appearance change

Digital media animation design based on max script language

Feng Qiaoqiao

*Computer Modelling & New Technologies 2013 **17**(5A) 41-45*

MAX SCRIPT can perform a large number of routine operation to solve the repetitive modelling task for us in the process of manufacture. This thesis mainly realizes wolf's character animation and the action of walking, running, jumping, falling down and finger gestures of character animation are designed. Modelling, pasting material, skeletal skin and importing code is investigated. And at the same time, Max Script of 3DMAX can make production of animation more rapid and precise.

Keywords: digital media, animation, Max Script

The application of unilateral single value control chart based on lognormal distribution

Xin Shibo, Wang Xi, Chen Yanquan

*Computer Modelling & New Technologies 2013 **17**(5A) 46-48*

The risk theory tells us that the short-term high risks exist at the right tail of the distribution. So we advocate the design and parameter estimation method, which the special figures that reflectshort-term risks are within the control limits of unilateral single value control chart based on lognormal distribution, and we also put forward how to use unilateral single value control chart through examples. This essay aims to monitor the short-term risks by means of control chart and reduce unnecessary losses of high risks.

Keywords: risk control, lognormal distribution, unilateral single value control chart

Research on the local fractional Hilbert Transform based on fractal theory

Yan-zhou Zhang, Dong-fang Xu

*Computer Modelling & New Technologies 2013 **17**(5A) 49-52*

With the development of computer technology and database technology, more and more MIS are implemented. In this paper, the local fractional Hilbert transform in fractal space is established. The characteristics of this local fractional transform ar e discussed in the following. Considering the basic properties of the local fractional Hilbert transforms, a kind of transform for local fractional is derived and analysed. The result shows that the transform can reach better performance.

Keywords: fractal space; local fractional Hilbert transform; local fractional derivative.

Research on the implementation of a database encryption system based on R algorithm

Xu Haiyan, Guo Jing

*Computer Modelling & New Technologies 2013 **17**(5A) 53-57*

With the development of computer technology and database technology, more and more MIS are implemented. Database is a basic platform in MIS, it stores a plenty of information, which is shared by many users. Therefore, database security technology has become the key technology in the development of MIS. According the security requirements of a MIS, this paper introduces R encryption algorithm, which adapts to database, and discusses the architecture and characteristics of a database encryption system based on application layer. Also the paper gives a detailed description about the implementation methods of key technology.

Research on the adaptive PID control algorithm based on RBF neural network

Yang Dong, Zhao Xing

*Computer Modelling & New Technologies 2013 **17**(5A) 58-62*

Aim at the limitation of traditional PID controller has certain limitation, the traditional PID control is often difficult to obtain satisfactory control performance, and the RBF neural network is difficult to meet the requirement of real-time control system. To overcome it, an adaptive PID control strategy based on (RBF) neural network is proposed in this paper. The results show that the proposed controller is practical and effective, because of the adaptability, strong robustness and satisfactory control performance. It is also revealed from simulation results that the proposed control algorithm is valid for DC motor and also provides the theoretical and experimental basis.

Keywords: PID; adaptive PID controller; RBF neural network; DC motor

A new boundary tracing algorithm of the contour of objects in the binary image

Sun Leimin, Huang Tianshuin

*Computer Modelling & New Technologies 2013 **17**(5A) 63-67*

By analysis of common boundary tracing algorithm in the binary image identification, this paper proposes a universal boundary tracing algorithm based on contour, which can judge the trend of contour according to the last boundary point. In search for the next boundary point, it only needs to judge 5 points on the candidate and then the next boundary point can be found. Thus, the method reduces search times and the boundary tracking is greatly reduced. The algorithm is also effective for line segment whose contour is not closed by scanning the contour to get information. Experiments show that the algorithm is not only fast, but also accurate about the contour recognition. For the object, which has complex images, algorithm can embody its superiority.

Keywords: image recognition, binary image, boundary tracing, contour of target objects, pattern recognition

The research of digital media instrument recognition method based on the distribution overlapping degree of the Gaussian mixture model

Long Huayun

*Computer Modelling & New Technologies 2013 **17**(5A) 68-72*

This article mainly studies the musical instrument recognition in digital media based on audio. First of all, the features ar e studied in this paper. so in this article we choose Gaussian mixture model as models of the instruments, we use K-means algorithm to initialize Gaussian mixture model, and use EM algorithm to train Gaussian mixture mode l. based on this, through the study we find that the convergence of EM algorithm relates to the overlap of Gaussian mixture model, therefore, we use the overlap of Gaussian mixture model to determine the convergence of EM algorithm, and carry out in the traditional Chinese musical instrument recognition system, through the experiments we find that when we use the overlap of Gaussian mixture model to determine the convergence of EM algorithm, the recognition rate can be obviously improved.

Keywords: musical instrument recognition; Gaussian mixture model; K-means algorithm; EM algorithm

Basketball Auxiliary Training Method based on Video Analysis Technology

Wei Liu

*Computer Modelling & New Technologies 2013 **17**(5A) 73-77*

In order to improve basketball training in university, video analysis is adopted. System requirement analysis and system function module is investigated. Then the key technique referring to video analysis is given. The results of the experiment show that the testing methods of the system can objectively reflect students' understanding on basketball tactical and ability of observation, analysis, decision-making on the match situation, as well as improve tactical awareness. Therefore, the study results can be effective for physical education services, and is expected to provide new ideas and methods for selection of the sports talent and physical education in university

Keywords: basketball auxiliary training; video analysis; JSP; Flash.

The improvement of particle swarm optimization algorithm based on stability analysis

Qun Jia

*Computer Modelling & New Technologies 2013 **17**(5A) 78-82*

Particle swarm optimization (PSO) is a very important swarm intelligence algorithm, which plays an effective role in searching the optimum point of space systems. The key to search for the optimum point is the behavior of each particle as well as the entire swarm. During their searching, the stability of the particles is the premise to ensure the convergence of the system. Only under the condition that the whole searching process is of stable convergence does pso algorithm effectively find the global optimum. This paper analyzes the relationship between PSO parameters from the aspect of stability and achieves the goal of ensuring the stable convergence of the algorithm.

Keywords: (PSO, swarm intelligence, Lyapunov theory, constraint parameters)