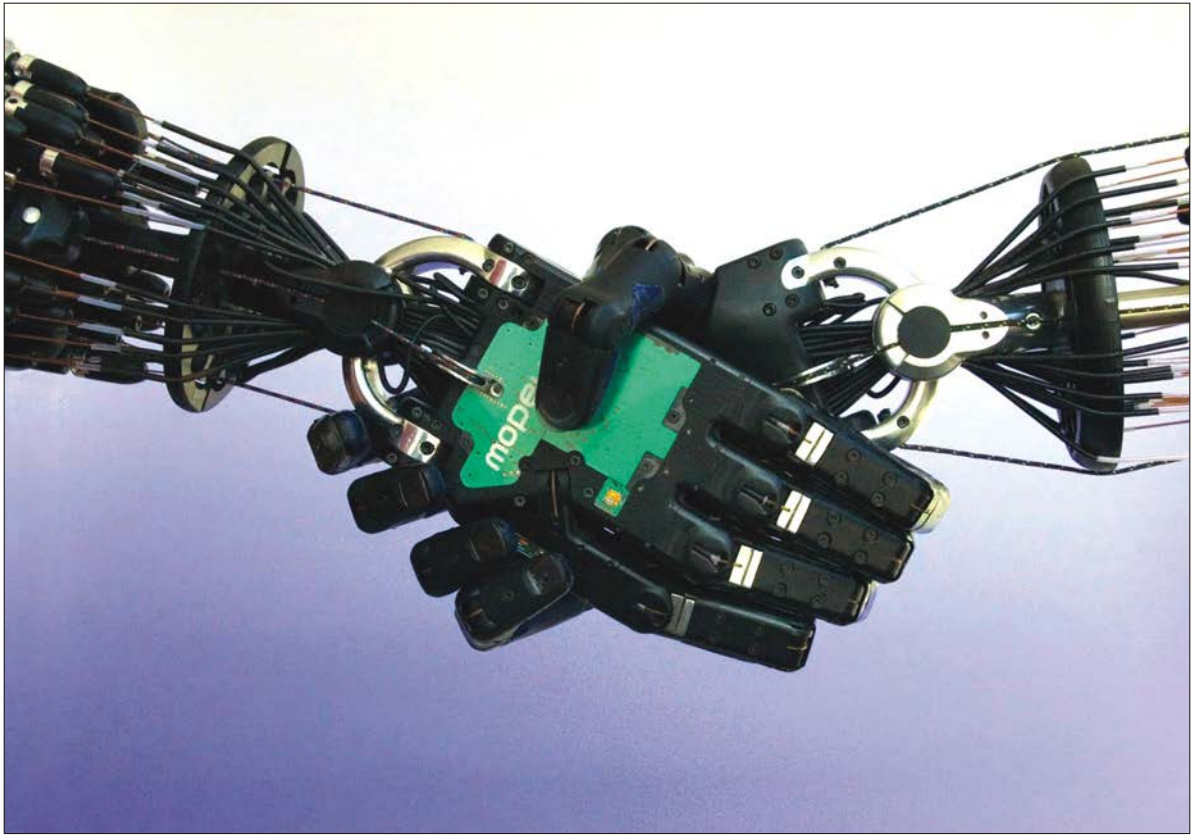




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Novel FTLRNN Model for Short Term and Long Term Ahead Prediction of Sun Spots Chaotic Time Series

Sanjay L. Badjate and Sanjay V. Dudul

Multi-Step ahead prediction of a chaotic time series is a difficult task that has attracted increasing interest in recent years. The interest in this study is the development of nonlinear neural network models for the purpose of building short term and long term ahead prediction of monthly sunspots chaotic time series. The solar activity has a measure effect on earth, climate, space weather, satellites and space missions and is a highly nonlinear time series. Such problems exhibit a rich chaotic behavior. In this study the authors compared the performance of three neural network configurations namely a Multilayer Perceptron (MLP), Self Organized Feature Map (SOFM) and Focused Time Lagged Recurrent Neural Network (FTLRNN) for 1, 6, 12, 18 and 24 months ahead prediction with regards to various performance measures Mean Square Error (MSE), Normalized Mean Square Error (NMSE) and regression (r). The standard back propagation algorithm with momentum term has been used for all the models. The various parameters like number of processing elements, step size, momentum value in hidden layer, in output layer the various transfer functions like tanh, sigmoid, linear-tan-h and linear sigmoid, different error norms L_1, L_2, L_3, L_4, L_5 to L_8 , different combination of training and testing samples and epochs variation are exhaustively experimented for obtaining the proposed robust model for the short term and long term ahead prediction. The results suggests that the FTLRNN Model can help in improving the prediction accuracy. (*Journal of Artificial Intelligence 2 (1): 1-16, 2009; doi: 10.3923/jai.2009.1.16*)

A Multi-Agent Framework to Facilitate Knowledge Sharing

Abeer EL-Korany and Khaled EL-Bahnasy

The aim of the study is to develop an intelligent web-based system that allows integration, easy access and sharing of domain specific Knowledge-Based Systems (KBSs). Development of KBSs requires continuous adaptation and extension of already deployed knowledge bases. Often, these modifications consider the improvement of the Knowledge Base (KB). Furthermore, examination of the KBSs in its actual user environment could broad the KB. The proposed knowledge sharing environment allows different clients to access, maintain and upgrade domain specific knowledge bases. The proposed framework

is generally applicable for KADS-based KBSs. As a matter of fact, we have applied it to agriculture diagnostic KBSs. (*Journal of Artificial Intelligence* 2 (1): 17-28, 2009; *doi*: 10.3923/jai.2009.17.28)

Intelligent Negotiation Agents in Electronic Commerce Applications

S.C. Ng, M.N. Sulaiman and M.H. Selamat

The purpose of study is to develop intelligent negotiation agents that can behave rationally so as to improve the final outcomes in a one-to-many negotiation. A Bayesian learning model of multi-attribute one-to-many negotiation, namely Bayes Improved-ITA is proposed. These agents employ Bayesian belief updating process to model their opponent's utility structure. The performance of Bayes Improved-ITA is promising when it is compared with the results of one-to-many negotiations that use genetic-based machine learning model and heuristic search algorithm. Results from the experimental work show that having knowledge of opponent's preferences and constraints, negotiation agents can achieve more optimal outcomes. (*Journal of Artificial Intelligence*, 2 (1): 29-39, 2009; *doi*: 10.3923/jai.2009.29.39)

Recommender System Based on Collaborative Behavior of Ants

P. Bedi, R. Sharma and H. Kaur

This study uses collaborative filtering approach and proposes an Ant Recommender System (ARS) based on collaborative behavior of ants for generating Top-N recommendations. Present proposed system ARS works in two phases. In the first phase, opinions from users collected in the form of user-item rating matrix are clustered offline using ant based clustering algorithm into predetermined number of clusters and stored in the database for future recommendations. In the second phase, the recommendations are generated online for the active user. The pheromone updating strategy of ants is combined with similarity measure for choosing the clusters with good quality ratings. This helps in improving the quality of recommendations for the active user. The performance of ARS is evaluated using Jester dataset available on the website of University of California, Berkeley and compared with traditional collaborative filtering based recommender system. (*Journal of Artificial Intelligence* 2 (2): 40-55, 2009; *doi*: 10.3923/jai.2009.40.55)

A Comparison Between Three Neural Network Models for Classification Problems

Essam Al-Daoud

This study reports the results from three artificial neural network models. Levenberg-Marquardt (LM), Generalized Regression Neural Networks (GRNN) and Learning Vector Quantization (LVQ) are applied to eight classification problems. Ten-fold cross validation is used to demonstrate the error rate of networks. The experiments show that the generalized regression neural networks outperform the other classifiers, where the average training performance is 0.0436, the testing error rate is 0.137 and the classification rate is 0.80. On the contrary, by using Levenberg-Marquardt, the average training performance is 0.092, the testing error rate is 0.169 and the classification rate is 0.59 and by using learning vector quantization the average training performance is 0.078, the testing error rate is 0.363 and the classification rate is 0.64. (*Journal of Artificial Intelligence 2 (2): 56-64, 2009; doi: 10.3923/jai.2009.56.64*)

Application of ANFIS to Agricultural Economic Variables Forecasting Case Study: Poultry Retail Price

S.M. Fahimifard, M. Salarpour, M. Sabouhi and S. Shirzady

It is well documented that many economic time series observations are nonlinear and nonlinear models estimated by various methods can fit a data base much better than linear models. Beside they can learn from examples, are fault tolerant in the sense that they are able to handle noisy and incomplete data, are able to deal with non-linear problems and once trained can perform prediction and generalization at high speed. Therefore, in this study, the utilization of Adaptive Neuro Fuzzy Inference System (ANFIS) as a nonlinear model and Auto-Regressive Integrated Moving Average (ARIMA) model as a linear model are compared to agricultural economic variables time series forecasting. As a case study the three horizons (1, 2 and 4 week ahead) of Iran's poultry retail price are forecasted using the two mentioned models. The results of using the three forecast evaluation criteria state that, ANFIS model outperforms ARIMA model in all three horizons. And consequently the effective role of ANFIS model to improve the Iran's poultry retail price forecasting accuracy can't be denied. (*Journal of Artificial Intelligence 2 (2): 65-72, 2009; doi: 10.3923/jai.2009.65.72*)

A Hybrid Architecture for a Decision Making System

Nabil M. Hewahi

In this study, we propose a theoretical general architecture for a decision making system. This architecture is domain independent and based on three main operations. The first operation is obtaining the decision tree from the given datasets. The second operation is injecting the extracted rules from the decision tree into a neural network using an algorithm which we call semi-KBANN algorithm and the final operation is using a heuristic function technique to help in making the final decision of a certain situation. The architecture mechanism is based on feeding each stage operation from the output of the previous stage. The operations are executed serially, stage 1, stage 2 and then stage 3. In stage 1, we extract classification rules from the induced decision trees. In the second stage, we incorporate the extracted rules into a neural network to be able to have more generalization that might be tied by decision trees and finally we use heuristic mechanism to help the system to take a proper decision. We assume that the dataset is cleaned from the outliers using any of the many well known algorithms. Outliers is beyond our study. (*Journal of Artificial Intelligence* 2 (2): 73-80, 2009; **doi**: 10.3923/jai.2009.73.80)

A Survey of 3D Document Corpus Visualization

X. Fang, C. Jacquemin, F. Vernier and B. Luo

This study proposes a survey on it mainly around 2 functions units in the visualization pipeline: spatial layout and interaction. For the former, 4 layout styles (node-link, cluster, virtual widget and miscellaneous) and 2 augmentation types (focus+context, photo-realistic rendering) are introduced and, for the latter, 4 interaction styles of (3D walkthrough, filter, specification placement and annotation) and 2 augmentation types (multimedia and animation) are also suggested. In addition, 7 application areas are also provided to present some interesting findings study and future directions. (*Information Technology Journal* 8 (1): 1-15, 2009; **doi**: 10.3923/itj.2009.1.15)

Visualization Systems Supporting the Reading of Arabic Document for non Arabic Speakers

R.J.R. Yusof, R. Zainuddin, M.S. Baba and Z.M. Yusoff

This study addresses a reading comprehension problem and visualization as the suggested solution. When one read, one would intend to understand the text being

read. It is absolutely an exception in the context of one Arabic document called the Quran. Thus, visualization techniques are then useful to support the understandability of the document for non-Arabic speakers such as the Malaysian and Indonesians. Descriptions and review of four prototype systems that use visualization techniques: scatter plot, trivariate plot, network diagrams, directory approach and hyperbolic. This study discusses reading and visualization theories, the problems encountered while reading the Arabic document (the Quran), comparative discussions on the prototype systems and functional requirement proposed to enhance the prototype. (*Information Technology Journal* 8 (1): 16-27, 2009; *doi*: 10.3923/itj.2009.16.27)

An Energy Efficient and Balance Hierarchical Unequal Clustering Algorithm for Large Scale Sensor Networks

Y. Wang, T.L.X. Yang and D. Zhang

Organizing Wireless Sensor Networks (WSN) into clusters enables the efficient utilization of the limited energy resources of the deployed sensor nodes. However, the problem of unbalanced energy consumption exists and it is tightly bound to the role and to the location of a particular node in the network. The so-called hot spot occurs when cluster heads closer to the sink node are burdened with heavier relay traffic and tend to die much faster. To mitigate or avoid the problem, the Partition Energy Balanced and Efficient Clustering Scheme (PEBECS) has been proposed, which divides the entire WSN into several equal partitions reasonably and groups the nodes into clusters of unequal sizes. Cluster heads in these partitions closer to the sink node have smaller cluster sizes than those farther, thus they can preserve some energy for the inter-cluster communications. Further, the cluster heads are elected by using a node-weight heuristic algorithm, where the node's residual energy, the node's degree difference and the relative location in WSN are considered, such that more balanced load is achieved. Simulation results show that PEBECS outperforms significantly in optimizing the cluster heads' energy consumption, balancing the nodes' energy consumption, prolonging the network lifetime and improving the network scalability. (*Information Technology Journal* 8 (1): 28-38, 2009; *doi*: 10.3923/itj.2009.28.38)

Application of the Two-Axle Robot Tracing Object System with Multithread Control Technology

K.C. Chen, K.S. Hsu, M.G. Her and M.C. Chiu

The main aim of this study is to promote the efficiency of a control system using a multithread digital control design. In this system, the management of a computer's

input and output information is handled appropriately by the program language. The multithread digital control design is used in the robotic arm's tracking system. The advantage of this multithread digital control design is to activate each procedure running simultaneously when the transient overload of the information's input and output in the control system occurs. Therefore, the time run in the multithread system will be shorter than that run in a traditional single thread system in which each procedure is lined up for running. In this study, case studies of multithread application used in image tracking and robot control are introduced. The results reveal that the speed of the tracking system can be improved by using the multithread technique under an immediate procedure plan. (*Information Technology Journal* 8 (1): 39-48, 2009; **doi:** 10.3923/itj.2009.39.48)

A Multifunctional System for Supporting Collaborating Works and Decision Making

H.T. Lin

The objective of this study is to present a brainstorming-based multifunctional system which supports collaborating works on creativity activity and decision making. Brainstorming has been recognized as an effective group decision supporting approach. Go with the technology shift, brainstorming has been evolved from traditional, electronic, to currently web-based version. There are advantages and disadvantages in each of version. The development of Information and Communication Technology (ICT) takes giant leap in last decade. In this study, a new version of brainstorming platform is proposed and constructed with multimedia and various ICT technologies. The objective of this proposed system is to keep and enhance the advantages of brainstorming approach and makes the disadvantages as few as possible. A comparison between several versions was made. This comparison shown that the proposed system is superior to others from system functions point's of view. A user satisfaction survey based on TAM model was conducted at a college in Taiwan. The result shown that these senior students felt this system was useful and easy to use for group creative tasks. (*Information Technology Journal* 8 (1): 49-56, 2009; **doi:** 10.3923/itj.2009.49.56)

An Energy-Balancing Unequal Clustering Protocol for Wireless Sensor Networks

J. Yang and D. Zhang

In this study, a novel energy-balancing unequal clustering protocol (EB-UCP) for wireless sensor networks is presented. EB-UCP achieves a good performance in

terms of lifetime by unequal clustering and balancing the energy load among all the nodes. An unequal clustering algorithm from probability view is employed to form clusters. Clusters closer to the sink node have smaller sizes than those farther away from the sink node, thus cluster heads closer to the sink node can preserve more energy for the purpose of inter-cluster data forwarding. In addition, the distribution of sensor nodes is deployed according to the energy-balancing layered algorithm and therefore the energy consumption in every layer is nearly equal. Finally, an energy-efficient data transmission mechanism on basis of the above is proposed. Simulation studies show that EB-UCP leads to more uniform energy dissipation and enlarges the lifetime of networks than EEUC (Energy Efficient Unequal Clustering) and LEACH (Low-Energy Adaptive Clustering Hierarchy). (*Information Technology Journal* 8 (1): 57-63, 2009; *doi: 10.3923/itj.2009.57.63*)

A Comparison of Support Vector Machine and Decision Tree Classifications Using Satellite Data of Langkawi Island

H.Z.M. Shafri and F.S.H. Ramle

This study investigates a new approach in image classification. Two classifiers were used to classify SPOT 5 satellite image; Decision Tree (DT) and Support Vector Machine (SVM). The Decision Tree rules were developed manually based on Normalized Difference Vegetation Index (NDVI) and Brightness Value (BV) variables. The classification using SVM method was implemented automatically by using four kernel types; linear, polynomial, radial basis function and sigmoid. The study indicates that the classification accuracy of SVM algorithm was better than DT algorithm. The overall accuracy of the SVM using four kernel types was above 73% and the overall accuracy of the DT method was 69%. (*Information Technology Journal* 8 (1): 64-70, 2009; *doi: 10.3923/itj.2009.64.70*)

Data Discovery in Grid Using Content Based Searching Technique

R. Renuga and Sudha Sadasivam

The aim of this study is data discovery in data grid using content based search technique. This study models scientific data grid as a large peer to peer based distributed system model. Content based discovery mechanisms are applied for data discovery using this model. Grids tie together distributed storage systems and

execution platforms into globally accessible resources. Data grid deals with large computational problems by providing geographically distributed resources for large-scale data-intensive applications that generate large data sets. Data grids provide collection management and global namespaces for organizing data objects that reside within a grid. This proposed mechanism has been investigated using the grid simulator gridsim. (*Information Technology Journal* 8 (1): 71-76, 2009; *doi*: 10.3923/itj.2009.71.76)

Optimal Weights for Consensus of Networked Multi-Agent Systems

Xiang-Shun Li and Hua-Jing Fang

In this study, a way to design the optimal weights associated with edges of undirected graph composed of multi-agent systems is presented. The optimal weights are designed to make the states of the multi-agent systems converge to consensus with a fast speed as well as the maximum communication time-delay can be tolerated. The method used in our research is based on linear matrix inequality theory. The convergence speed which is determined by the second-smallest eigenvalue of graph Laplacian matrix is assumed to be a given value, at the same time the maximum communication time-delay which is decided by the maximum eigenvalue of Laplacian matrix can be got. In order to get required second-smallest eigenvalue and optimal maximum eigenvalue, the order of Laplacian matrix is reduced by variable decomposition. Moreover, designing the optimal weights is equivalent to minimizing condition number of a positive-definite matrix. Simulation results are coincidental with theoretical analysis. (*Information Technology Journal* 8 (1): 77-82, 2009; *doi*: 10.3923/itj.2009.77.82)

Group-Based Unidirectional Proxy Re-Encryption Scheme

Chunbo Ma and Jun Ao

This study presents a unidirectional proxy re-encryption scheme for group communication. In this study, a proxy is only allowed to convert ciphertext for Alice into ciphertext for Bob without revealing any information on plaintext or private key. It is suitable for the environment in which no mutual relationship exists and transitivity is not permitted. Finally, this study proves the proposed scheme secure against chosen ciphertext attack in standard model. (*Information Technology Journal* 8 (1): 83-88, 2009; *doi*: 10.3923/itj.2009.83.88)

A High Precision Selective Harmonic Compensation Scheme for Active Power Filters

Geng Tao, Li Baoshen and Zhao Jin

This study proposes a high precision selective harmonic compensation scheme for active power filters, which compensates selective current harmonics detected by Kalman filter and harmonic current is tracked by a novel PI controller-recursive integral PI controller. As Kalman filter can detect each order harmonic separately, the compensation on delay time arouse from digital implementation is performed. Since traditional PI is subjected to inherent steady-state error, a recursive integral PI regulator is proposed to compensate for the harmonic current, which can eliminate steady-state error. The proposed scheme improves the stability of APF, prompts the precision of harmonic compensation and is applicable to both single phase and three phase inverters. The effectiveness of the scheme is verified by simulation. (*Information Technology Journal* 8 (1): 89-94, 2009; *doi*: 10.3923/itj.2009.89.94)

Logic Petri Nets and Equivalency

Y.Y. Du and B.Q. Guo

Logic Petri nets (LPN) can describe and analyze batch processing function and passing value indeterminacy in cooperative systems and its practical applications are shown with some nontrivial examples. This study focuses on the analysis of the modeling power of LPNs and the equivalency between LPNs and Petri nets with inhibitor arcs (IPN). The equivalency is proved formally and a constructing algorithm of equivalent IPNs from LPNs is proposed based on the disjunctive normal forms of logic input/output expressions. Moreover, the size of an LPN model is smaller than that of the equivalent IPN model. (*Information Technology Journal* 8 (1): 95-100, 2009; *doi*: 10.3923/itj.2009.95.100)

Car Park System: A Review of Smart Parking System and its Technology

M.Y.I. Idris, Y.Y. Leng, E.M. Tamil, N.M. Noor and Z. Razak

Due to the proliferation in the number of vehicles on the road, traffic problems are bound to exist. This is due to the fact that the current transportation infrastructure and car park facility developed are unable to cope with the influx of vehicles on the road. To alleviate the aforementioned problems, the smart parking system has been developed. With the implementation of the smart parking system, patrons can

easily locate and secure a vacant parking space at any car park deemed convenient to them. Vehicle ingress and egress are also made more convenient with the implementation of hassle free payment mechanism. With vehicle detection sensors aplenty on the market, the choices made may defer due to the different requirements in addition to the its pros and cons. Subsequently, the various sensor systems used in developing the systems in addition to the recent research and commercial system on the market are examined as vehicle detection plays a crucial role in the smart parking system. (*Information Technology Journal* 8 (2): 101-113, 2009; **doi**: 10.3923/itj.2009.101.113)

Smart Parking System using Image Processing Techniques in Wireless Sensor Network Environment

M.Y.I. Idris, E.M. Tamil, Z. Razak, N.M. Noor and L.W. Kin

This study aims to improve parking facilities by the introduction of a new Smart Parking Systems that would reduce empty parking space searching time. Most of the recent parking technologies relies on intrusive sensor to detect empty parking space and did not specifically guide patrons to specific parking lot. Therefore, the author proposed the implementation of Smart Parking System using image processing technique, Wireless Sensor Network (WSN) and shortest path algorithm in order to help patrons in finding vacant parking space. The pre existing security surveillance (CCTVs) will be used as a sensing nodes to identify vacant parking space. The captured image will be processed through the RabbitCore® Microcontroller and the processed data will be transmitted via ZigBee® to a central computer to store and update the occupancy status of available parking space vacancies in the database. The system will automatically assigned a space to patrons using A-Star (A*) shortest path algorithm based on the point of nearest entrance of the building. The patron will be guided to the specified location by referring to variable message sign and the map printed on the parking ticket. RFID technology will also be used to uniquely tag the reserved ID to the database. The information on the ID will be used to remind patrons of their parking location during payment upon leaving. (*Information Technology Journal* 8 (2): 114-127, 2009; **doi**: 10.3923/itj.2009.114.127)

Distance Based Outlier for Data Streams Using Grid Structure

Manzoor Elahi, Lv Xinjie, M. Wasif Nisar and Hongan Wang

This study deals with grid-based outlier detection method which can figure out most outstanding outliers from a high speed datastreams. It is capable to find

outliers even with the evolution of datastream where there is a chance that object properties may change with the time. Grid structure used in this study can help to save number of extra calculations in case of nearest neighbor queries and can provide a solid platform for applying distance based nearest neighbor approach for finding outliers. Proposed grid based method efficiently partition incoming stream into chunks and store these chunks one by one into a fixed width grid structure for further processing. Each chunk of stream is processed with the combination of fixed width grid structure and distance based nearest neighbor approach. Through efficient pruning of safe regions, proposed method only needs to operate over the candidate regions for finding outliers. This method takes into account both, local and global view of outliers and assign score to each detected outlier and does not sacrifice the correctness of its results for fast processing time. Proposed method can operate faster, need limited memory resources, having low computation cost and found to be highly efficient for data stream environment. Several experiments on real and synthetic datasets show the effectiveness of proposed method. (*Information Technology Journal* 8 (2): 128-137, 2009; *doi*: 10.3923/itj.2009.128.137)

Parking Guidance System Utilizing Wireless Sensor Network and Ultrasonic Sensor

M.Y.I. Idris, E.M. Tamil, N.M. Noor, Z. Razak and K.W. Fong

This study introduces a new approach of parking system by using Wireless Sensor Network (WSN) technology equipped with ultrasonic sensors. The system also implements shortest path algorithm to calculate the shortest distance from the parking berth to the nearest preferred entrance. The system operates by monitoring the availability of the vehicle berth and making the information collected available for patrons and car-park operator. The information gained from the detection sensor and calculation from the shortest path algorithm is used to guide patrons to parking berth. The car-park operators use the sensors' information to aid in overall management and planning. WSN is chosen since it enables reliable information gathering and measurement to be transmitted through wireless channel without having to install new cabling for network and electricity to reach each sensing device. (*Information Technology Journal* 8 (2): 138-146, 2009; *doi*: 10.3923/itj.2009.138.146)

Assignment of External Off-the-Job Training Courses to Employees Using Genetic Algorithm

Rong-Chang Chen, Ting-Tsuen Chen and Wei-Luen Fang

The purpose of this study is to employ a genetic algorithm to solve the assignment problem of external off-the-job training courses. External off-the-job training offers many benefits to enterprises and thus is considered as a competitive weapon for many companies. With such understanding, planning and offering suitable training programs to employees is crucial. In this study, GA is employed as an analytical tool to allocate training courses to employees. The allocation is decided by a system which takes the employees' preferences as well as the fairness of the allocation into consideration. The use of GA in solving the problem shows that the complex problem can be well solved and suitable allocations can be made. In addition, the system constructed by our approach is also easy to use and can facilitate the allocation under many different kinds of scenarios of the company. (*Information Technology Journal* 8 (2): 147-155, 2009; doi: 10.3923/itj.2009.147.155)

A Hybrid Heuristic Ant Colony System for Coordinated Multi-Target Assignment

Bo Liu, Zheng Qin, Rui Wang, You-Bing Gao and Li-Ping Shao

The aim of this study is to solve the target assignment of coordinated distributed multi-agent systems. Earlier methods (e.g., neural network, genetic algorithm, ant colony algorithm, particle swarm optimization and auction algorithm) used to address this problem have proved to be either too slow or not stable as far as converging to the global optimum is concerned. To address this problem, a new algorithm is proposed which combines heuristic ant colony system and decentralized cooperative auction. Based on ant colony system, the decentralized cooperative auction is used to construct ants' original solutions which can reduce the numbers of blind search and then the original solutions are improved by heuristic approach to increase the system stability. The performance of the new algorithm is studied on air combat scenarios. Simulation experiment results show present method can converge to the global optimum more stably and faster by comparing the original methods. (*Information Technology Journal* 8 (2): 156-164, 2009; doi: 10.3923/itj.2009.156.164)

Stability of Continuous-Time Vehicles Formations with Time Delays in Undirected Communication Network

Xiang-Shun Li and Hua-Jing Fang

This study mainly focuses on stability analysis of vehicles formations with time delays in the communication network. The network model with time delays of swarm vehicles for continuous-time systems is introduced. The vehicles exchange information according to a pre-specified (undirected) communication graph. The feedback control is based only on relative information about vehicle states shared via the communication links. Asymptotical stability of vehicles formations for both delay-independent and delay-dependent cases is analyzed. The sufficient conditions for vehicles formations stabilities are investigated based on tools from linear matrix inequality theory, algebraic graph theory, matrix theory and control theory. Finally, an illustrative example is used to show the validity of the theoretical results. (*Information Technology Journal* 8 (2): 165-172, 2009; doi: 10.3923/itj.2009.165.172)

Integrated Approach of Reduct and Clustering for Mining Patterns from Clusters

A. Arora, S. Upadhyaya and R. Jain

In this study, a method is presented for selection and ranking of significant attributes for individual clusters which lead to formulation of concise and user understandable patterns. Cluster is set of similar data objects and similarity is measured on attribute values. Attributes which have same value for majority of objects in a cluster are considered significant and rest non significant for that cluster. Reduct from rough set theory is defined as the set of attributes which distinguishes the objects in a homogenous cluster, therefore these can be clear cut removed from the same. Non reduct attributes are ranked for their contribution in the cluster. Pattern is then formed by conjunction of most contributing attributes of that cluster. (*Information Technology Journal* 8 (2): 173-180, 2009; doi: 10.3923/itj.2009.173.180)

Independent Global Constraints-Aware Web Service Composition Optimization

Xianwen Fang, Changjun Jiang and Xiaoqin Fan

In semi-automatic service composition, developers should construct the process model according to concrete application requirement and then the instance

services are bound automatically for every abstract task and make the composite service with optimal performance. This study presents independent global constraints-aware Web service composition method based on associate Petri net (APN) and genetic algorithm (GA). Firstly, an APN modeling methods which can describe multi-attribute multi-constraint relations and associate relation between component services is proposed. Secondly, combining with the properties of APN, GA is used to search a legal firing sequence with the biggest trust value in the APN model and the composite service corresponding to the legal firing sequence is the optimal solution. Finally, the experimental simulation is given out. Theoretical analysis and experimental results indicate that this method owns both lower computation cost and higher success ratio of service composition. (*Information Technology Journal* 8 (2): 181-187, 2009; doi: 10.3923/itj.2009.181.187)

Analysis and Application on Rate-Distortion Model Oriented Scalable Video Sequences

Mande Xie, Guiyi Wei and Yun Ling

According to the characteristic of the existing main R-D models, these R-D models are firstly classified into three categories: analytic, empirical and semi-analytic. And then their quantitative performances are evaluated. After the performances of the existing main R-D models are in-depth analyzed and compared, some general rules are proposed to select the best model for a target system. On this basis, an algorithm for establishing the piece linear R-D model and a method of property analysis and modification are proposed according to the feature of Peer to Peer (P2P) video streaming media system. The experience results show the piece linear R-D model is accuracy and the method of property analysis and modification is validated. (*Information Technology Journal* 8 (2): 188-194, 2009; doi: 10.3923/itj.2009.188.194)

Fuzzy Adaptive Proportional Integral and Differential with Modified Smith Predictor for Micro Assembly Visual Servoing

Linfeng Bai, Fugui Chen and Xiangjin Zeng

This study presents a control scheme based on fuzzy adaptive PID with a modified Smith predictor for the control of micromanipulation. For the vision delay, a timing modeling of visual servoing system is built. According to analysis for the position based dynamic look and move control scheme, the control scheme

employs fuzzy PID with a similar structure to the Smith predictor called modified Smith predictor to eliminate the vision delay. The simulations and experiments show that the vision control system with the proposed control scheme has better dynamic performance than the vision control system with a single PID controller. The proposed control scheme resolves the problems of vision servoing's inherent time delay, which meets the requirements of micromanipulation. (*Information Technology Journal* 8 (2): 195-201, 2009; **doi**: 10.3923/itj.2009.195.201)

Advantage of Digital Close Range Photogrammetry in Drawing of Muqarnas in Architecture

Murat Yakar, Hacı Murat Yılmaz, Saadet Armağan Gülec and Mustafa Korumaz

In this study, conventional method and digital close range photogrammetry is compared in sample study for measuring and drawing of muqarnas which is common in architecture. One of the most significant advantages of close range photogrammetry in documentation is giving opportunity to measure buildings or part of the buildings especially very high, very low, dangerous, not accessible or very detailed like muqarnas or damaged. It is a big facility to measure required measurement of the parts of the building from the photograph. Its another important thing in documentation that these data can be used in the future again and they can be shared with other users and they are easy to store in computer. (*Information Technology Journal* 8 (2): 202-207, 2009; **doi**: 10.3923/itj.2009.202.207)

Low Cost Quantum Realization of Reversible Multiplier Circuit

M.S. Islam, M.M. Rahman, Z. Begum and M.Z. Hafiz

Irreversible logic circuits dissipate heat for every bit of information that is lost. Information is lost when the input vector can not be uniquely recovered from the output vector. Theoretically reversible logic dissipates zero power since the input vector of reversible circuit can be uniquely recovered from the output vector. Reversible computation has applications in digital signal processing, low power CMOS design, DNA computing and quantum computing. This study presents an overview of the well-known reversible gates and discuss about their quantum implementation. A new PFAG gate and its quantum implementation are presented. Finally, this study proposes a novel low cost quantum realization of reversible multiplier circuit and compares its superiority with the existing counterparts. (*Information Technology Journal* 8 (2): 208-213, 2009; **doi**: 10.3923/itj.2009.208.213)

A Decomposition Based Algorithm of Graph Containment Query

Li Xian-Tong and Li Jian-Zhong

In this study, an algorithm ESGC is proposed to implement graph containment query problem, both exact and similar. The index of ESGC is built on two parts, the process of graph dataset decomposition and a hash table. The processing of graph dataset decomposition forms a structure which reduces the size of candidate answer set. And the hash table is composed by graph canonical code, through which the algorithm avoids subgraph isomorphism test during picking candidate answers out. The progress of the performance is coming from thus two parts. Experimental results illustrate that ESGC performs an efficient graph containment query and achieves right and entire answer set. (*Information Technology Journal* 8 (2): 214-219, 2009; *doi*: 10.3923/itj.2009.214.219)

Core Optimization Simulation for a Pressurized Water Reactor

A. Hussain and C. Xinrong

In this study, a research has been carried out for the design of an optimal core configuration for a TRISO fueled compact sized PWR core. This is a light water cooled and moderated reactor that employs TRISO fuel particles in zirconium-sheathed fuel rods. The combination of PWR technology and TRISO fuel has been preferred for research to get the benefits of TRISO fuel in terms of enhanced integrity against the release of fission fragments and high negative temperature coefficient of reactivity in well proven PWR technology. This PWR design possesses additional safety features associated with the default design of TRISO fuel particle, which makes its use suitable even in a densely populated area. The designed core can be utilized for heating and desalination purposes or at any remotely located research facility. The current research study has been focused on the core configuration, instead of selecting one of the standard fuel lattices which are mostly being used in nuclear power plants; an inventive fuel lattice has been suggested for the optimal design. The TRISO fuel particle size and fuel pitch have also been optimized to achieve a compact size core. Neutronic transport theory lattice code WIMS-D/4 was used for the calculation of group constants (D , Σ_a and $v\Sigma_f$) and infinite multiplication factor (k_∞). This calculated data were used in diffusion theory code CITATION for the purpose of achieving effective multiplication factor (k_{eff}) and estimated life of the core. The detailed and

thorough analyses revealed that core configuration plays a dominant role in determination of compactness and excess reactivity of the core. The amount of excess reactivity has been increased and core size has been condensed by designing an optimal core. (*Information Technology Journal* 8 (2): 220-225, 2009; *doi*: 10.3923/itj.2009.220.225)

A New Localization Algorithm for Iris Recognition

Ghassan J. Mohammed, Hong Bing Rong and Ann A. Al-Kazzaz

This study presents a new localization algorithm for iris recognition. Iris recognition systems have received increasing attention in recent years. Iris localization is very important for an iris recognition system. The proposed algorithm localizes both iris boundaries (inner and outer) and detects eyelids (lower and upper). In the localization of the iris inner boundary, the approximate pupil center is detected then Daugman's integrodifferential operator is applied. While for localizing the iris outer boundary, an approach based on boundary points detection and curve fitting is adopted. First, a set of radial boundary points is detected by performing image integral projection along angular directions within specified image blocks, then a circle is fitted to these points. Steps after localization are based on Daugman's iris recognition system. Thus, the 2D Gabor filter is employed for extracting iris code for the normalized iris image. Experimental results on CASIA V 1.0 iris image database and performance evaluation based on the analysis of recognition results, indicate that the proposed method has better performance in both iris segmentation and recognition. (*Information Technology Journal* 8 (2): 226-230, 2009; *doi*: 10.3923/itj.2009.226.230)

An Empirical Analysis of the Contributions of Information Technologies to the Production Process in Adana, Province of Turkey

Ahmet Ergülen

To cope with increasing and changing competition environment with globalisation, organisations have to achieve quality. And, it can be argued that information technologies, as an exceptional factor that is able to affect all units and functions of organisations, plays an important role in achieving quality. This study aims at determining the extent to which information technologies and systems are used in production lines for 162 SMEs (Small and Medium Size Enterprises) organisations

operating in various sectors in Adana Province. The results obtained from an analysis of the data, collected implementing a survey, employing exploratory factor analysis, indicates that information technologies contribute significantly to TQM (Total Quality Management) and to each dimension of TQM. In addition, empirical results show that information technology does not affect equally all the dimensions of TQM. (*Information Technology Journal* 8 (2): 231-235, 2009; *doi: 10.3923/itj.2009.231.235*)

The Algorithm of Short Message Hot Topic Detection Based on Feature Association

Qindong Sun, Qian Wang and Hongli Qiao

Aiming at the mobile short message (SMS) hot topic extraction, the text features and statistical regularity of SMS are analyzed in this study. The formal description of SMS hot topic is given and an algorithm of SMS hot topic extraction based on feature association analysis is proposed. According to the proposed algorithm, feature words of SMS can be clustered into different word bags by calculating the association degree of these feature words and the hot topic can be identified by means of word bags matching. Experiments results show that the proposed algorithm can detect the hot topic in the SMS messages effectively, which is useful to the analysis of SMS popular sentiments. (*Information Technology Journal* 8 (2): 236-240, 2009; *doi: 10.3923/itj.2009.236.240*)

Selecting and Combining Classifiers Simultaneously with Particle Swarm Optimization

Li Ying Yang, Jun Ying Zhang and Wen Jun Wang

A weighted combination model of multiple classifier systems based on Particle Swarm Optimization was reviewed, which took sum rule and majority vote as special cases. It was observed that the rejection of weak classifier in the combination model can improve classification performance. Inspired by this observation, we presented a problem that how to choose the useful classifiers in a given ensemble, especially in the reviewed model. In this study, a combination algorithm was proposed, which implemented classifiers' selection and combination simultaneously with particle swarm optimization. We describe the implementation details, including particles encoding and fitness evaluation. Nine data sets from UCI Machine Learning Repository were used in the experiment to justify the

validity of the method. Experimental results show that the propose model obtained the best performance on 5 out of 9 data sets, and averagely outperforms the reviewed model, majority voting, max rule, min rule, mean rule, median rule and product rule. The results were analysed from the point of the characteristic of data set. (*Information Technology Journal* 8 (2): 241-245, 2009; **doi:** 10.3923/itj.2009.241.245)

Adaptive Stream Multicast for Video in Heterogeneous Networks

Dilmurat Tursun and Wang Liejun

This study first proposes a novel adaptive stream multicast for MPEG-4 FGS video to meet these challenges. Based on the fine-granularity property of MPEG-4 FGS video coding technology, the scheme tries to delivery multimedia multicast service over the heterogeneous networks in a similar way as that to transport water in pipelines, where the valves in pipelines adjust water flux to next pipeline. A new method of computing PSNR is also first advanced to evaluate the MPEG-4 FGS video transmission. Simulated results indicate that the scheme could dispose the heterogeneity of networks and end-systems freely, with permanent stability, flexible scalability and unprejudiced fairness and TCP-friendliness. (*Information Technology Journal* 8 (2): 246-249, 2009; **doi:** 10.3923/itj.2009.246.249)

Review of Feature Detection Techniques for Simultaneous Localization and Mapping and System on Chip Approach

M.Y.I. Idris, H. Arof, E.M. Tamil, N.M. Noor and Z. Razak

In Vision Simultaneous Localization and Mapping (VSLAM), feature detection is used in landmark extraction and data association. It examines each pixel to find interesting part of an image that would differentiate the landmark and the less important image details. There are numerous studies in this field but they are scattered in many journals and proceedings which would require many hours just to find related material. Therefore, this research has grouped important studies done in this field to be analyzed by future researcher. Feature detection techniques such as Harris, Scale Invariant Feature Transform (SIFT), Speeded-Up Robust Features (SURF), Features from Accelerated Segment Test (FAST) and etc. is discussed in this study. A background history of each technique, their evolution and performance comparison is presented. (*Information Technology Journal* 8 (3): 250-262, 2009; **doi:** 10.3923/itj.2009.250.262)

Optimum Method Selection for Resolution Enhancement of Hyperspectral Imagery

F.A. Mianji, Y. Zhang and A. Babakhani

The study categorizes the most frequent researched areas of resolution enhancement in hyperspectral imagery and emphasizes on their applications, requirements, achievements and limitations of different approaches. An evaluation of the capabilities of different classes of super-resolution algorithms in hyperspectral imagery shows that there is no generic approach to optimally produce high-quality results on general hyperspectral images and the adequacy of an algorithm is a function of multiple factors, namely, access to multisource information, computational complexity, availability of reliable training data for learning-based methods, efficiency of the algorithm and the expected application. It is also shown that spectral mixture analysis based techniques are appropriate for developing high performance and fast super-resolution algorithms in hyperspectral imagery. (*Information Technology Journal* 8 (3): 263-274, 2009; *doi*: 10.3923/itj.2009.263.274)

An Index Structure for Fast Query Retrieval in Object Oriented Data Bases Using Signature Weight Declustering

I. Elizabeth Shanthi and R. Nadarajan

An important question in information retrieval is how to create a database index which can be searched efficiently for the data one seeks. One such technique called signature file based access method is preferred for its easy handling of insertion and update operations. Most of the proposed methods use either efficient search method or tree based intermediate data structure to filter data objects matching the query. Use of search techniques retrieves the objects by sequentially comparing the positions of 1s in it. Such methods take longer retrieval time. On the other hand tree based structures traverse multiple paths making comparison process tedious. This study describes a new indexing technique for object-oriented data bases using the dynamic balancing of B+ tree called SD (Signature Declustering) tree. The SD-tree represents all 1s in signatures in a compact manner that results in saving of insertion and searching time. Analytical experiments have been conducted by varying the signature length and the distribution of signature weight. The study clearly indicates the advantage of fast retrieval time in

a way quite different from the other methods suggested in the past. (*Information Technology Journal* 8 (3): 275-283, 2009; **doi**: 10.3923/itj.2009.275.283)

Robot Map Building in Unknown Dynamic Environment Based on Hybrid Dezert-Smarandache Model

Li Peng, Huang Xinhan and Wang Min

In this study, a new method of information fusion DS_mT (Dezert-Smarandache Theory) which is extended from Bayesian Theory and Dempster-Shafer Theory (DST) is introduced to solve the problem of robot map building in an unknown dynamic environment. The grid map method is adopted and a sonar sensor mathematical model is constructed based on DS_mT. Meanwhile a few of general basic belief assignment functions (gbba_f) are constructed to deal with the uncertain and imprecise, sometimes even high conflicting information obtained by sonar sensors with the application of hybrid DS_m model in the system and consideration of characteristics of sonar sensors. At last, Pioneer II mobile robot is used to carry out experiments of map building. The 2D general basic belief assignment (gbba) maps are structured and then correlative 3D gbba maps are built by openGL. The comparison of created ichnography with the real map testified the validity of hybrid DS_m model for fusing imprecise information and map building proposed by this research. (*Information Technology Journal* 8 (3): 284-292, 2009; **doi**: 10.3923/itj.2009.284.292)

The Deployment Algorithms in Wireless Sensor Net Works: A Survey

Jiming Chen, Entong Shen and Youxian Sun

In this survey we focus on a variety of sensor nodes deployment algorithms that have been proposed and studied by researchers through the years. Some recent development of this research topic is introduced in a classified manner. We discuss the random deployment, incremental deployment and movement-assisted deployment algorithms and make comparisons between them in term of features, pros and cons, etc. Some related research topics such as the sensor model, localization techniques, communication range and sensing range, convergence and termination conditions are investigated in detail. (*Information Technology Journal* 8 (3): 293-301, 2009; **doi**: 10.3923/itj.2009.293.301)

A Secure Non-Interactive Deniable Authentication Protocol with Strong Deniability Based on Discrete Logarithm Problem and its Application on Internet Voting Protocol

Bo Meng

In this study, firstly the status and security properties of deniable authentication protocol are discussed and then a secure non-interactive deniable authentication protocol based on discrete logarithm problem is developed. At the same time we prove that the proposed protocol has properties: completeness, strong deniability, weak deniability, security of forgery attack, security of impersonate attack, security of compromising session secret attack and security of man-in-the-middle attack. The security properties of several typical protocols and proposed protocol are compared. Lastly, an application of the proposed protocol, an internet voting protocol with receipt-freeness without strong physical assumption, is provided. (*Information Technology Journal* 8 (3): 302-309, 2009; doi: 10.3923/itj.2009.302.309)

Performance Evaluation of Wavelet Packet Modulation over Mobile Satellite Channel

W.Z. Zhong, Q. Guo and Y. Guo

The performance of WPM over the mobile satellite channel is presented and analyzed. The theory analysis and the simulation results show that the orthogonality of WPM can help the system be robust to the multipath effect and the extend period of WPM symbols can decrease the frequency selective fading of the system. The simulation result demonstrates that the performance of mobile satellite communication system using WPM is dependent on the support length of the wavelets, therefore a ratio decreasing algorithm is proposed in this study to improve the performance by weakening the support length effect. The simulation result shows that the better performance can be achieved by using proposed method. (*Information Technology Journal* 8 (3): 310-317, 2009; doi: 10.3923/itj.2009.310.317)

Influence of Silicon Carbide Composite Barrier on Electrical Tree Growth in Cross Linked Polyethylene Insulation

A. Samee, Z.H. Li, C.H. Zhang and Z.P. Huang

The aim of research is to study the interaction between electrical tree and nonlinear barrier. The propagation of electrical tree in solid insulation is of great particular

concern for power engineering industry as it is regarded as most significant mechanism for dielectric breakdown in high voltage equipment. Composite material with barriers and surrounding matrix polymers are used to extend the breakdown time of the insulation. The major influence of barriers on propagation of electrical trees is investigated in this study with experiments and software simulation. The very low conductivities of modern insulating material do not permit the dissipation of accumulated space charge and charge at the extremities of the propagating electrical tree channel. High field non-linear conductivity characteristics of SiC were employed at the barrier to influence the electrical tree growth as they impinge upon on the barrier. The electrical tree growth was greatly reduced and time to breakdown extended. The tree propagation characteristics were studied by needle plane electrode geometry with five different concentration of SiC at the barrier (5, 10, 20, 40 and 60% by weight). The results show that propagating electrical tree channels did not penetrate the barrier when SiC has high field non-linear conductivity characteristics i.e., percolation threshold >35% SiC. As a result of this phenomenon, the tree growth and barrier penetration is inhibited, leading to extended lifetime of insulation. (*Information Technology Journal* 8 (3): 318-325, 2009; *doi*: 10.3923/itj.2009.318.325)

Feasibility and Critical Success Factors in Implementing Telemedicine

H.M. Judi, A.A. Razak, N. Sha'ari and H. Mohamed

The objectives of this study are the evaluation of feasibility and critical success factors in the telemedicine implementation in Malaysian hospitals. A sample of hospitals located in Klang Valley, an area that surrounds the capital of Malaysia, Kuala Lumpur were contacted in order to seek their perspectives in this matter. A questionnaire survey was used to gather the data and descriptive analysis was performed to analyze the data. The results show that only small number of participating hospitals have telemedicine applications and suggest that many of Malaysians hospitals are not yet ready for the application. Feasibility evaluation based on four factors: operational, time, economic and technical criteria. The study finds that operational and technical component of feasibility factors are more important than time and economic dimension. The ability to attract customers and opportunity to acquire latest infrastructure and skills justify the need of telemedicine in hospital. Successful implementation of telemedicine is related to the availability of three factors: strong fundamental knowledge and infrastructure, planning and management of health information and technology and fulfilment of legal and ethical issues and constant evaluation of telemedicine implementation. (*Information Technology Journal* 8 (3): 326-332, 2009; *doi*: 10.3923/itj.2009.326.332)

A Secure Remote Mutual Authentication and Key Agreement without Smart Cards

Han-Cheng Hsiang and Wei-Kuan Shih

This study proposes a new and secure scheme for remote mutual authentication without using the smart cards. The scheme may satisfy all of the essential security requirements. In the last couple of decades the Internet technology has advanced so rapidly. It leads to the spreading and penetration of the technology to the network services and applications. Remote user authentication is a very effective means to check the legality of a user. Among many schemes, password authentication has been commonly used. Also in many schemes proposed for the remote user authentication, smart card has been intensively used to store the secret information for authentication. However, the smart card and its reader are not always available everywhere and in anytime. With this scheme, the user can login to the remote server from anywhere and in anytime to access the secure service. This may be more practical and easy-to-use. (*Information Technology Journal* 8 (3): 333-339, 2009; **doi**: 10.3923/itj.2009.333.339)

Missile Fault Detection Based on Linear Parameter Varying Fault Detection Filter

Cui Yu, Huang Xin Han and Wang Min

Focusing on the problem of fault detection and isolation (FDI) for a missile in the cruise phase, a solution based on Linear Parameter Varying (LPV) Fault Detection Filter (FDF) is proposed. The missile LPV model incorporating faults is established and converted to a suitable form for the appliance of LPV FDI via simplifying and other tools. Based on that, a fault detection system of missile is proposed for fault detection and isolation, of which the LPV filter bank can be designed using standard geometrical approach. Simulation results demonstrate that the designed fault detection system will alarm in a short time once faults happen and then locate the fault part correctly. Since the designed fault detection system is suitable for the high maneuverability of the missile and the on-line calculation load is small, the solution is of great practical value. (*Information Technology Journal* 8 (3): 340-346, 2009; **doi**: 10.3923/itj.2009.340.346)

Steady-State Modeling of Static Synchronous Compensator and Thyristor Controlled Series Compensator for Power Flow Analysis

M.O. Hassan, S.J. Cheng and Z.A. Zakaria

In this study, steady-state modeling of Static Synchronous Compensator (STATCOM) and Thyristor Controlled Series Compensator (TCSC) for power flow studies has been represented. STATCOM is modeled as a controllable voltage source in series with impedance and firing angle model for TCSC is used to control active power flow of the line to which TCSC is installed. Proposed model for TCSC takes firing angle as state variable in power flow formulation. To validate the effectiveness of the proposed models Newton-Raphson method algorithm was implemented to solve power flow equations in presence of STATCOM and TCSC. Case studies are carried out on 9-bus system to demonstrate the performance of the proposed models. Simulation results show the effectiveness and robustness of the proposed models; moreover the power solution using the Newton-Raphson algorithm developed incorporating firing angle model possesses excellent convergence characteristics. (*Information Technology Journal* 8 (3): 347-353, 2009; **doi:** 10.3923/itj.2009.347.353)

Convergence and Runtime of an Ant Colony Optimization Model

X. Yu and T. Zhang

This study considered a model of an Ant Colony Optimization (ACO) algorithm for the general combinatorial optimization problem. The model proved that it can converge to one of the optima if only this optimum is allowed to update the pheromone model and that it can not converge to any of the optima if two or more optima are allowed. The iteration complexity of the model can be computed easily. And then a lower bound of time complexity of a real ACO algorithm for the general combinatorial optimization problem can be obtained. (*Information Technology Journal* 8 (3): 354-359, 2009; **doi:** 10.3923/itj.2009.354.359)

Artificial Immune-Chaos Hybrid Algorithm for Geometric Constraint Solving

Xue-Yao Gao, Li-Quan Sun and Da-Song Sun

Geometric constraint solving can be transformed into optimization problem which is non-linear and multi-variable. Geometric constraint solving based on artificial

immune algorithm and improved chaos search strategy is proposed in this study. The local optimal solutions obtained by artificial immune algorithm are used as the heuristic information and the global best solution is searched by improved chaos search strategy in the neighborhood of local optimal solutions. In order to enhance precision and searching speed, chaos search area is controlled in the neighborhood of local optimal solutions by reducing search area of variables. This algorithm differs from current optimization methods in that it gets the global best solution by excluding bad solutions. Experiment results show that the proposed method is better than artificial immune algorithm and can deal with geometric constraint solving efficiently. (*Information Technology Journal* 8 (3): 360-365, 2009; **doi:** 10.3923/itj.2009.360.365)

Efficient Remote Mutual Authentication and Key Agreement with Perfect Forward Secrecy

Han-Cheng Hsiang and Wei-Kuan Shih

This study will demonstrate both Juang's scheme and Shieh-Wang's scheme do not provide perfect forward secrecy and are vulnerable to a privileged insider's attack. Besides, their scheme has the problem of slow wrong password detection and user cannot change his password freely. To remedy these flaws, this study proposes an efficient remote mutual authenticated and key agreement scheme with perfect forward secrecy. The proposed scheme not only provides perfect forward secrecy but also satisfies all the security requirements needed in remote mutual authentication and key agreement scheme. (*Information Technology Journal* 8 (3): 366-371, 2009; **doi:** 10.3923/itj.2009.366.371)

A Bandwidth-Aware Job Grouping-Based Scheduling on Grid Environment

T.F. Ang, W.K. Ng, T.C. Ling, L.Y. Por and C.S. Liew

This study explores the feasibility of job scheduling strategies and extend the job grouping-based approach using the idea of bandwidth-awareness. As today's best-effort network generally experiences low bandwidth and high delay, we aim to maximize the Grid resource utilization and reduce the delay by considering the bandwidth criterion. A simulation environment using GridSim is developed to model job scheduling process. Exploiting the simulation environment, a job scheduling strategy that encompasses the job grouping concept coupled together with bandwidth-aware scheduling is proposed and evaluated. The proposed

scheduling strategy focuses on grouping independent jobs with small processing requirements into suitable jobs with larger processing requirements and schedules them in accordance with indeterminist network conditions. The simulation result demonstrates that the proposed strategy succeeds in minimizing the total processing time by at most 82% as compared to its counterpart. (*Information Technology Journal* 8 (3): 372-377, 2009; **doi:** 10.3923/itj.2009.372.377)

A Hybrid Path Matching Algorithm For XML Schemas

A. Rajesh and S.K. Srivatsa

The approach proposed in this study uses a simple path matching algorithm to perform the structural matching. The novelty in this approach is that the path matching algorithm considers only the paths to leaf nodes in the schema trees for the matching process there by eliminating the need for repeatedly parsing the elements of the schema tree as in the other approaches. This greatly reduces the time required to identify the matches. And the paths are treated as a set of strings comprising of the labels of the nodes in the path. Treating the paths as set of strings greatly simplifies the matching process as the same approaches used in the linguistic matching process can be used in the path matching process. (*Information Technology Journal* 8 (3): 378-382, 2009; **doi:** 10.3923/itj.2009.378.382)

Planar Displacement Detection with Point Feature Matching

Chen Feng-Dong, Hong Bing-Rong and Liu Guo-Dong

A novel planar displacement detection method is implemented using Scale Invariant Feature Transform (SIFT) point feature matching on a calibrated optical grating-vision measuring platform. SIFT is a method for extracting and describing image key-points, which are robustly invariant to scale, rotation and translation as well as robust to illumination changes and limited changes of viewpoint. The platform is moved along its x axis step by step and a series of images are captured with corresponding grating sensor values. SIFT feature points are extracted and matched between the successive images through a K-Dimension Tree (KD-Tree) based feature matching algorithm to detect the displacement of each step. The detected values are compared with the corresponding grating sensor values. Experimental results prove that the accuracy of the method is less than 10 μm in this environment. (*Information Technology Journal* 8 (3): 383-387, 2009; **doi:** 10.3923/itj.2009.383.387)

A Novel Dynamic Video Summarization Approach Based on Rough Sets in Compressed Domain

Li Xiang-Wei, Zhang Ming-Xin, Zhao Shuang-Ping and Zhu Ya-Lin

In this study, a novel dynamic video summarization approach based on Rough Sets (RS) is developed. It can not only rapidly generate video summary that minimizes the visual content redundancy for input video sequences, but also specify the number of frames to get various summary according to user demand. First, DCT coefficients and DC coefficients, the most important video visual features are extracted from raw video sequences to represent video information. Second, an Information system is constructed with DC coefficients. Third, a new and concise Information system is achieved by using the reduction theory of RS, meanwhile, the effective representation of frames and its corresponding reduced frame numbers are recorded, i.e., dynamic video summarization. Experimental results indicate that the proposed algorithm is more effective and intelligent than conventional methods in video summarization generation. (*Information Technology Journal* 8 (3): 388-392, 2009; *doi*: 10.3923/itj.2009.388.392)

The Cardinal Orthogonal Scaling Function in Higher Dimension

Guochang Wu, Yadong Zhang and Zhengxing Cheng

In this study, the cardinal orthogonal scaling function in higher dimension is classified by the relation the highpass filter coefficient and wavelet's samples in its integer points, thus, the sampling theorem in the wavelet subspace is obtained. Then, the symmetry property of cardinal orthogonal scaling function is discussed, and some useful characterizations are given. At last, two examples are constructed to prove the theory. (*Information Technology Journal* 8 (3): 393-397, 2009; *doi*: 10.3923/itj.2009.393.397)

Artificial Neural Networks Modelling of Non-Asbestos Brake Lining Performance Boric Acid in Brake Pad

Ibrahim Mutlu

In this study, the friction coefficient-temperature and time experiments are carried out for the produced non-asbestos brake linings. For the evaluation of brake linings with different ingredients the mean value the friction coefficient and the

standard deviation which gives the variation of the friction coefficients are calculated experimental. Recently, the ANN is successfully implemented for the prediction of experimental results in many areas. This is due to the capability of ANN in modeling of non-linear relation. The prediction of experimental results is advantageous for time and cost. In this study the ANNs are used for the prediction of mean value of friction coefficient and standard deviation for produced brake linings with different amount of organic dust and barite. The values of samples not included in education are compared with real values. (*Information Technology Journal* 8 (3): 398-402, 2009; **doi:** 10.3923/itj.2009.398.402)

Hardware/Software Co-Design Implementations of Elliptic Curve Cryptosystems

Turki F. Al-Somani, Esam A. Khan, Ahmad M. Qamar-ul-Islam and Hilal Houssain

This study presents a survey of hardware/software co-design implementations of Elliptic Curve Cryptosystems (ECCs). A critical study of the underlying finite field, the representation basis and the partitioning schemes of these implementations is conducted. The study shows that all implementations are implemented over binary fields $GF(2^m)$ and the implementations that use polynomial basis are more than implementations that use normal basis for finite field arithmetic. The study also shows that the best partitioning scheme, among the surveyed implementations, implements the finite field arithmetic on hardware and the remaining operations of the ECC on software. (*Information Technology Journal* 8 (4): 403-410, 2009; **doi:** 10.3923/itj.2009.403.410)

UMQA: An Internal Algebra for Querying Multimedia Contents

Zongda Wu, Zhongsheng Cao and Yuanzhen Wang

For internal query processing, we in this study discuss an operator-based algebraic language called UMQA, whose operators are formally similar to those of the relational algebraic system. To deal with UMQL's extensions for structure, feature and spatio-temporal queries, UMQA is also introduced with some new operators: structure selection (σ^{SE}), structure expansion (η), feature selection (σ^{FE}) and spatio-temporal selection (σ^{SP}), which make UMQA of equivalent capability with UMQL on multimedia query specification, but more suitable for internal query

processing due to it representing multimedia queries in an algebraic way. We also introduce an approach to translate UMQL queries into UMQA plans equivalently and a powerful set of algebraic translation formulas that is important for query optimization by algebraic rewriting. Last, we summarize a UMQL prototype information system which uses UMQA as its internal processing algebra and briefly discuss the efficient implementation of UMQA operators. (*Information Technology Journal* 8 (4): 411-426, 2009; **doi:** 10.3923/itj.2009.411.426)

Finding Related Web Pages in Parallel by Using Grouped Link Structures

Shen Xiaoyan, Chen Junliang, Meng Xiangwu and Zhang Yujie

In this study, a block co-citation algorithm is proposed to find related pages for a given web page in two steps. First, all hyperlinks in a web page are segmented into several blocks according to the HTML structure and text style information. Second, for each page, the similarity between every two hyperlinks in the same block is computed. Then the total similarity from one page to the other is obtained after all web pages are processed. For a given page u , the pages which have the highest total similarity to u are selected as the related pages of u . The block co-citation algorithm was implemented in parallel to analyze a corpus of 37, 482, 913 pages sampled from a commercial search engine and demonstrate its feasibility and efficiency. Experimental results for 28 pages pertaining to 7 topics indicated that the performance of the block co-citation algorithm is superior to traditional co-citation algorithm. This method is very suitable for application in commercial search engines. (*Information Technology Journal* 8 (4): 427-440, 2009; **doi:** 10.3923/itj.2009.427.440)

Study on Method of Robust Multidisciplinary Collaborative Decision for Product Design

Lijun Yan, Zongbin Li and Xiaoyang Yuan

A robust method for decentralized multidisciplinary collaborative decision was presented which adopts interval to describe the uncertainty of decision variables and non-cooperative game theory to model the relationship between design teams under decentralized decision environment. Considering the Rational Reaction Sets (RRS) from non-cooperation game theory as design constraint in the decision

space, multidisciplinary collaborative decision is described as interval based constraint solving problem and then a two-step solving approach was proposed to obtain final robust decision scheme of product design. The first step is to eliminate initial range of decision variables using consistency algorithm and the second step is to search the robust decision point in consistent interval with design capability indices as judgment rule of robustness. A new kind of feasibility censor based immune chaotic algorithm for model solving was designed. Design of bear and rotor system involves complex coupled relationship of dynamic and tribology and is a typical multidisciplinary conflict and decouple problem. A robust and powerful decision method between different disciplines can not only quicken design process of bear and rotor, but also improve the design quality. To show the problem, a typical elastic bear and rotor system with single disk is used as example to validate the effectiveness and reliability of proposed decision approach. (*Information Technology Journal* 8 (4): 441-452, 2009; **doi:** 10.3923/itj.2009.441.452)

A Tolerance Rough Set Based Semantic Clustering Method for Web Search Results

Xian-Jun Meng, Qing-Cai Chen and Xiao-Long Wang

The objective of this study is to present a new web search results clustering algorithm which uses the tolerance rough set based approach to find the different meanings of the query in web search results and then organizes these results into different clusters according to their related meanings about query. Each meaning of the query can be represented by its contexts in each result and if there is a significant correlation between two context words, it is more likely that these two words represent the same meaning of query and also suitable as good indication of the meaning of query. In this study, the search results are organized in groups that each group of results relates to context words with high correlations and then these groups are merged into the final clusters representation using both cluster contents similarity and cluster documents overlap. The correlated context words with high documents coverage are selected as the labels of each cluster. Some experiments were conducted on different search results sets based on various queries. The results and comparisons of the proposed algorithm with that of the popular search results clustering algorithms through an empirical evaluation establish the viability of this proposed approach. (*Information Technology Journal* 8 (4): 453-464, 2009; **doi:** 10.3923/itj.2009.453.464)

A Novel Visual Tracking Approach Incorporating Global Positioning System in a Ubiquitous Camera Environment

Hsien-Chou Liao and Pao-Tang Chu

Global Positioning System (GPS) is popularly used in object tracking. Current GPS tracking system is mainly based on a digital map of a GIS (geographic information system) and marks the location of an object on the map. However, it is insufficient to perceive the situation of the object. On the other hand, the deployment of cameras is toward a ubiquitous camera (UbiCam) environment, especially in the urban area. If GPS can be incorporated with UbiCam environment, the visual information acquired from a camera is useful to improve the problem of current GPS tracking systems. In this study, an approach called GODTA (GPS-based Object Detection and Tracking Approach) is proposed in this study. GODTA is mainly based on the coordinate transformation method. The transformation is according to the parameters computed from a set of five calibration points. If the transformed image coordinate is within the rectangle range of the camera image, it means the object is within the FOV (Field-of-View) of the camera and then the object can be labeled on the image. Two experiments, fixed position and continuous tracking, were also designed to evaluate the performance of GODTA. The lowest average Locating Error (LE) of the transformed image coordinate is 42 and 38 pixels, respectively. The results show that GODTA is feasible for fulfilling GPS-based visual tracking service and incorporates GPS system and UbiCam environment successfully. (*Information Technology Journal* 8 (4): 465-475, 2009; *doi*: 10.3923/itj.2009.465.475)

Clustering Large Spatial Data with Local-density and its Application

Guiyi Wei, Haiping Liu and Mande Xie

In this study, a new algorithm LD-BSCA is proposed with introducing the concept of local MinPts (a minimum number of points) and the new cluster expanding condition: ExpandConCIId (Expanding Condition of CIId-th Cluster). We minimize the algorithm input down to only one parameter and let the local MinPts diversified as clusters change from one to another simultaneously. Experiments show LD-BSCA algorithm is powerful to discover all clusters in gradient distributing databases. In addition, we introduce an efficient searching method to reduce the runtime of present algorithm. Using several databases, we demonstrate the high quality of the proposed algorithm in clustering the implicit knowledge in

asymmetric distribution databases. (*Information Technology Journal* 8 (4): 476-485, 2009; *doi*: 10.3923/itj.2009.476.485)

A Novel Method for Segmentation of the Cardiac MR Images using Generalized DDGVF Snake Models with Shape Priors

Lixiong Liu, Yuwei Wu and Yuanquan Wang

In this study, a novel method is presented for segmentation of the endocardium and epicardium of the left ventricle in cardiac magnetic resonance images using snake models. We first generalize the DDGVF snake model by introducing two spatially varying weighting functions which characterize the boundary information; this generalized DDGVF snake can conquer the spurious edges raised by artifacts while maintaining the desirable properties of DDGVF of distinguishing the positive and negative boundaries. This is especially helpful for the tasks on hand because the endocardium and epicardium of the LV in MR images can be characterized as positive and negative boundaries. Observed that the left ventricle is roughly a circle, a shape constraint based on circle is introduced into the snake model. This new constraint can prevent the snake contour from being trapped and leaking out so as to maintain the global shape of the snake contour during evolution. In addition, fourth-order PDEs are employed for noise removal. We demonstrate the proposed approach on an *in vivo* dataset and compare the segmented contours with manual collections; the results show its effectiveness. (*Information Technology Journal* 8 (4): 486-494, 2009; *doi*: 10.3923/itj.2009.486.494)

Objective Based Flexible Business Process Management Using the Map Model

A. Bentellis and Z. Boufaïda

In the proposal, a flexible business process management axed on the objective concept and for the process lifecycle is presented. The main feature of this approach is that the map model is used as the key element to drive the construction and execution of flexible business processes. An analysis phase starts with a model which fully considers the objective and sub-objectives of the business process, when defining it. A design phase uses the map model for specifying and representing the possible plans that are capable of achieving the predefined objective and this will be done in a modular manner. Examples are presented from a case study in the travel agency Numédia. The architecture of the execution engine for, so defined, business process map modeling is presented for its

interpretation and its execution. Finally, an evaluation of the degree of flexibility brought by proposed management is given. (*Information Technology Journal* 8 (4): 495-503, 2009; **doi**: 10.3923/itj.2009.495.503)

A Maekawa Set Based Marking Scheme

Zaihong Zhou, Dongqing Xie and Bingwang Jiao

This study describes a novel Maekawa-set-based probabilistic Marking Scheme (MMS). It aims at the disadvantages of the FMS scheme, which are the large number of false positives caused by fragment marking and the need of network topology in node exclusive-or (XOR) restore, etc. The MMS scheme is to split the edge, which is composed of the IP addresses of two neighboring routers into fragments and allocates fragment-id for each fragment. Then, it will generate a Maekawa set based on those fragment-ids. The number of subset is m and the length of subset is k for the Maekawa set. While packets pass through a router, the router will write the k fragments orderly to the IP header by m times with an optimal probability, where the fragments are split from the edge and recombined in Maekawa subset way. There is no false positive in this MMS scheme after the attack path is reconstructed theoretically. In addition, it has several other advantages, it requires fewer packets to reconstruct the attack path; computation overhead is low; it does not require the network topology support as well as is able to prevent the hijacked router from forging the markings. (*Information Technology Journal* 8 (4): 504-512, 2009; **doi**: 10.3923/itj.2009.504.512)

Numerical Simulation of Flow Around a Row of Circular Cylinders Using the Lattice Boltzmann Method

S. Ul Islam and C.Y. Zhou

This study describes a numerical study of flow past a row of circular cylinders at different Reynolds numbers with different distances between the cylinders using the Lattice Boltzmann Method (LBM). Numerical simulations are performed to investigate the blockage effect for the ranges of $Re \leq 200$ and $B = W/R \leq 25R$, where, Re , R and W are the Reynolds numbers, the radius of the cylinders and the distance between the center of the cylinders, respectively. The Strouhal number and drag forces exerted on the cylinders are quantified jointly with the flow patterns around the cylinders in the form of vorticity contours. It is found that both the drag coefficient and Strouhal number increase when B decreases. It is also observed that the Strouhal number, in general increases as Re increases for a fixed

value of B for the ranges of R_c and B studied. The distance B , between cylinders is limited within 25 in this simulation because of computational resources. (*Information Technology Journal* 8 (4): 513-520, 2009; doi: 10.3923/itj.2009.513.520)

On-Line Analytical Processing Queries for eXtensible Mark-up Language

Mourad Ykhlef

eXtensible Mark-up Language (XML) is emerged as a standard to exchange data over the Web. A large amount of heterogeneous data is now available on the Web in different sources; these data are generally represented or published in XML format. A XML data warehouse is an integrated repository of different XML data sources enabling analysts to gain insight through fast access to a variety of possible views on XML data which are organized in a dimensional model. XML data warehouse can be queried by On-Line Analytical Processing (OLAP) queries. This study proposes XML data cube model which is a well-founded approach to represent OLAP data using XML. XML data cube enables the use of external XML data for selection and grouping. Recently a SQL-like query language XRQL is proposed to query XML data. The XRQL queries capture the flavour of SQL queries while offering constructs for navigation, XML data construction and grouping. This study shows how OLAP queries can be expressed by using XRQL in a natural way and extends XRQL by GROUP BY CUBE and GROUP BY ROLLUP operators to enable analysts to express more complex OLAP queries on XML data cube. (*Information Technology Journal* 8 (4): 521-528, 2009; doi: 10.3923/itj.2009.521.528)

A Component-based Management Platform for Multi-source Spatial Data

Wensheng Wang, Chao Li, Zeze Wu, Yibing Luo, Qingtian Zeng, Xiaorong Yang, Nengfu Xie and Xiangwei Zhao

This study introduces a component-based management platform for multi-source spatial data. The four-layer architecture and the main functions designed for the management platform are addressed in details. The main components, including the integration component for multi-source spatial data, the role-based security management component for spatial data, the user-friendly mapping component and the sharing component for spatial data are presented, respectively. Finally, as a

typical application case, the platform has been used to manage the county-range agricultural spatial data in China. (*Information Technology Journal* 8 (4): 529-536, 2009; **doi:** 10.3923/itj.2009.529.536)

Guaranteed Cost Fault-tolerant Controller Design of Networked Control Systems under Variable-period Sampling

Xuan Li and Xiao-Bei Wu

This study investigates the problem of integrity against actuator failures for networked control systems under variable-period sampling. Assuming that the distance between any two consecutive sampling instants is less than a given bound, by using the input delay approach, the networked control systems under variable-period sampling are transformed into the continuous-time networked control systems under time-varying delays. Then the existence conditions of guaranteed cost fault-tolerant control law is testified in terms of the Lyapunov stability theory combined with Linear Matrix Inequalities (LMIs). Furthermore, the guaranteed cost fault-tolerant controller gain and the minimization guaranteed cost can be obtained by solving a minimization problem. A numerical simulation example demonstrates the conclusions are feasible and effective. The proposed control method resolves the problems of variable-period sampling and actuator failures, which meets the requirements in industrial networked control systems. (*Information Technology Journal* 8 (4): 537-543, 2009; **doi:** 10.3923/itj.2009.537.543)

A Benchmark for Perceptual Hashing based on Human Subjective Identification

Hui Zhang, Qiong Li, Haibin Zhang and Xiamu Niu

This study proposed a novel benchmark for evaluating the robustness and discriminability properties of perceptual hashing algorithms. Firstly, two major problems neglected by traditional benchmark are analyzed thoroughly with a concrete experiment. One problem is the inconsistency between the subjective feeling and the objective perceptual distance, the other is the partiality of the performance for different attacks. And then, in order to overcome the problems, a new benchmark for perceptual hashing based on human subjective identification is proposed and the corresponding evaluation methods are presented by illustrative experiments and examples. Present benchmark methods are fairer and more comprehensive than the traditional methods. (*Information Technology Journal* 8 (4): 544-550, 2009; **doi:** 10.3923/itj.2009.544.550)

Analysis of the Constraints and Effects of Frequency Source Noise on High-resolution DBS Imaging

Xie Xianming and Pi Yiming

Doppler Beam Sharpening (DBS) technique is one of high-resolution radar imaging technique. DBS images are widely used in tactical reconnaissance, terrain matching and navigation, as well as target identification, etc. Range walking correction technique and azimuth dechirping technique can increase the coherent accumulated time of DBS imaging system, which provides greater space for high-resolution DBS Imaging. However, the resolution of DBS images will be limited by frequency source phase noise. This study addresses the effects of frequency source phase noise on the high-resolution DBS imaging. Quantitative estimates are derived analytically based on the second-order statistics characteristic of oscillator phase noise. The research results could further consummate high-resolution DBS imaging theory and provide theory basis for DBS imaging system design. (*Information Technology Journal* 8 (4): 551-557, 2009; **doi:** 10.3923/itj.2009.551.557)

Screen-Based Prototyping: A Conceptual Framework

E. Kheirkhah, A. Deraman and Z.S. Tabatabaie

In any software development process, Requirements Engineering (RE) has been recognized as a critical factor in determining the quality of the software projects. In this study, an efficient technique, that is screen-based prototyping, is proposed to increase users' involvement in RE tasks and bridge the communication gap between end-users and software developers. This prototyping technique can be employed by most of requirements engineering methodologies. Screen-based prototyping employs the use-case driven approach in constructing prototypes and realize each use-case using a sequence of screens. Graph structure and related concepts are used to implement the prototypes and create various scenarios of use-cases. (*Information Technology Journal* 8 (4): 558-564, 2009; **doi:** 10.3923/itj.2009.558.564)

Adaptive Handoff Algorithm in Next-generation Cellular Networks

A.L. Yusof, M. Ismail and N. Misran

The objective of this research is to propose an adaptive handoff algorithm which can effectively deal with hotspot cells in next-generation cellular networks. Under

the proposed algorithm, the signaling burden is evenly distributed and the regional network boundary is dynamically adjusted according to the traffic load, handoff type and speed of mobiles in advance, before handoff execution. A simulation model is developed to investigate the handoff performance. The simulation results find that the proposed algorithm is better than traditional handoff algorithm. Therefore, this algorithm enhances the service quality of users by flexibly manage the overloaded cells. (*Information Technology Journal* 8 (4): 565-570, 2009; *doi: 10.3923/itj.2009.565.570*)

Knowledge Management Strategy Determination in Programs: A Case of Iran Tax Administration Reform and Automation

M.R. Mehregan and M.S. Zanjani

This study aims to examine the determinant role of program dimensions onto knowledge management strategies. The research proposes a new framework for classifying different KM strategies in programs and makes propositions about how the size, geographical desperation and the nature of programs affect the portfolio of strategies suitable for each program. Prior studies tend to examine only one dimension of knowledge management strategies: personalization versus codification. In this study, personalization versus codification and generalization versus specialization are highlighted as two distinct dimensions of KM strategies. The study highlights that codification is more suitable for large, geographically dispersed programs; while generalization is more suitable for programs conducting projects that are more standardized and routine in nature. To achieve the main research goals; two-phase research strategy is employed. At first, knowledge derived from an analysis of the literature is used in order to design the conceptual framework of the research. Then, the results of the case study of Iran Tax Administration Reform and Automation program employed to evaluate the research propositions. The results show that the program is used personalization-specialization knowledge management strategy. The study gives valuable information, which hopefully will help programs to accomplish knowledge management. (*Information Technology Journal* 8 (4): 571-576, 2009; *doi: 10.3923/itj.2009.571.576*)

Optimization of Adaptation Gains of Full-order Flux Observer in Sensorless Induction Motor Drives Using Genetic Algorithm

Hui Luo, Yunfei Lv, Xin Deng and Huajun Zhang

This study presents a new optimization method of the adaptation PI gains of the full-order flux observer in the sensorless induction motor drives. The new method

employs a Genetic Algorithm (GA) based optimization routine that can be implemented off-line. A suitable fitness function is defined to assess the tracking performance, the noise sensitivity and the stability of the rotor speed estimation system when each individual's parameters are employed. The tournament selection is used to choose the parent individuals and a large mutation probability is used to prevent the evolution from the prematurity. The PI gains calculated according to the design guidelines are put in the initial population to quicken the optimization procedure. With the help of the proposed method, the desirable PI gains can be obtained and the optimization procedure is fast and efficient. Simulation results show that the estimated speed tracks the practical speed well when the obtained PI gains are employed. Simulation results validate the proposed method in the study. Since, the efficient optimization ability, the Genetic Algorithm (GA) is pretty suitable for the optimization of the adaptation PI gains of the full-order flux observer in the sensorless induction motor drives. (*Information Technology Journal* 8 (4): 577-582, 2009; **doi:** 10.3923/itj.2009.577.582)

A Novel PCM/FM Multi-symbol Detection Algorithm for FPGA Implementation

Zhilu Wu, Nan Zhao, Shuying Li and Guanghui Ren

In this research, a Baseband Quadrature Complex Rotation Multi-Symbol Detection (BQCR-MSD) algorithm is proposed. It can greatly reduce the computational complexity of MSD due to the partial correlation and complex rotation techniques applied, so is more suitable for implementation on large scale digital device such as Field Programmable Gate Array (FPGA). Simulation results also show that despite of the computational complexity decrease, the performance of BQCR-MSD algorithm is excellent and very close to that of MSD. (*Information Technology Journal* 8 (4): 583-588, 2009; **doi:** 10.3923/itj.2009.583.588)

Knowledge Transfer Optimization Simulation for Innovation Networks

Chuanrong Wu and Deming Zeng

Based on the characteristics of knowledge transfer in innovation networks, an optimization model of the discount expectation of profits is presented, which can

determine the optimal time of knowledge transfer. Important factors, such as knowledge absorption capacity, update rate of knowledge in the network, discount rate, the time of knowledge transfer, market share, product life cycle, etc. are taken into account in the model. A large number of simulated experiments are implemented to test the efficiency of the optimization model. Simulation experimental results show that the calculated results are in accordance with the actual economic situation. The optimization model can provide useful decision support in knowledge transfer time for enterprises. (*Information Technology Journal* 8 (4): 589-594, 2009; *doi*: 10.3923/itj.2009.589.594)

Facial Expression Recognition Using Improved Support Vector Machine by Modifying Kernels

W. Liejun, Q. Xizhong and Z. Taiyi

This study proposes a novel facial expression recognition approach based on improved Support Vector Machine (SVM) by modifying kernels. The idea comes from the work of Amari that enlarging the spatial resolution around the margin by a conformal mapping, such that the separability between classes is increased. Experiments on Japanese Female Facial Expressions (JAFPE) database show that the Classification Accuracy Rate (CAR) is remarkably improved after modifying the Gaussian kernel. Experiments also show that the importance of selecting an appropriate parameter when modifying the kernel. (*Information Technology Journal* 8 (4): 595-599, 2009; *doi*: 10.3923/itj.2009.595.599)

Performance Comparison of UDP-based Protocols Over Fast Long Distance Network

Yongmao Ren, Haina Tang, Jun Li and Hualin Qian

As massive data generated in large scale e-Science projects such as High Energy Physics (HEP) and astronomical observation (e-VLBI) needs to be transported internationally over fast long distance network, high performance transport protocol is needed. Based on UDP, some reliable transfer protocols are designed. This research mainly studies the principles of these protocols and compares their performance by experiments. It is found that they far outperform TCP, but still have some limitations and can't satisfy the requirement of bulk data transfer perfectly. (*Information Technology Journal* 8 (4): 600-604, 2009; *doi*: 10.3923/itj.2009.600.604)

New Evolutionary Algorithm Applying to a Type of Facility Location Problem

Wang Lai-Jun, Sun Xiao-Ling and Shi Zhongke

Mathematical model is built for solving a type of Facility Location Problem (FLP) in this study first. Then, genetic algorithm using symbolic coding is proposed. Based on this GA, a new evolutionary algorithm is proposed using of the basic idea of Particle Swarm Optimization (PSO). Symbolic coding method is still used in the new algorithms, which makes the model scale decrescent and reflects its characteristics. But the selection operator and mutation operator are all abandoned here. Furthermore, a type of total probability crossover is performed and the evolutionary policy of particle swarm optimization is absorbed into the new algorithm, which reduces the complexity and enhance the efficiency greatly. The model and the algorithm have been applied to a government-funded traffic project. The process of constructing the evolutionary algorithm based on total probability crossover dispensed with any especial condition, so our algorithm is universal to all facility location problem. (*Information Technology Journal* 8 (4): 605-609, 2009; *doi*: 10.3923/itj.2009.605.609)

Rough Sets based Temporal-spatial Color Descriptor Extraction Algorithm in Compressed Domain for Video Retrieval

Li Xiang-Wei, Li Zhan-Ming, Zhang Ming-Xin, Wang Yi-Ju and Zhang Zhi-Xun

In this study, based on Rough Sets (RS), a compact and efficient temporal-spatial color descriptor extraction algorithm is developed in compressed domain. Firstly, Discrete Cosine Transform (DCT) coefficients and Direct Current (DC) coefficients, the most important video visual features are extracted from raw video sequences to represent video information. Secondly, an information system table is constructed using DC coefficients. Thirdly, a novel and concise information system table is achieved by using the reduction theory of RS, i.e., core of information system. The core contains major visual color information and eliminates the redundant video information. Furthmore, DC coefficients also contain important spatial information of each frame, so the core of information system can regard as effective temporal-spatial color descriptor for video retrieval. Compared to existing technologies, the proposed algorithm enjoyed the following three advantages: the extracted descriptor consider not only visual color feature and temporal information, but also spatial information of each frame, the algorithm introduced attributes reduction theory of RS and the more redundant video

information are eliminated and the whole process accomplished in compressed domain, so the volume of video data also decreased dramatically. Effectiveness is documented by experimental results. (*Information Technology Journal* 8 (4): 610-614, 2009; *doi*: 10.3923/itj.2009.610.614)

A Novel Minimax Probability Machine

Mu Xiangyang and Zhang Taiyi

This study presents an empirical study for Minimax Probability Machines (MPM) for prediction. Considering that the Euclidean distance has a natural generalization in form of the Minkovsky's distance, a novel MPM using Minkovsky's norm in Gaussian kernel function is proposed. The performance of proposed method is evaluated with the prediction for Ethernet traffic data. Result shown that the novel MPM here in using Gaussian kernels with Minkovsky's distance ($\alpha=1$) and ($\alpha=5$) can achieve better prediction accuracy than the Euclidean distance. (*Information Technology Journal* 8 (4): 615-618, 2009; *doi*: 10.3923/itj.2009.615.618)

Anti-collusive Self-healing Key Distribution Scheme with Revocation Capability

ChunLai Du, MingZeng Hu, HongLi Zhang and WeiZhe Zhang

This study proposes an anti-collusive self-healing group key distribution scheme with revocation using dual directional hash chain. The session key is computed from three parts: forward key, backward key and random session number. The former two parts are built on dual directional hash chain. Users are provided with a set of private secrets according to their legal lifetimes. In terms of communication cost, the proposed scheme is more efficient than the previous schemes not based on one-way hash chain and is slightly increased compared with the previous scheme based on one-way hash chain. According to the security analysis results, the proposed scheme can resist the collusion of revoked users and newly joined users. (*Information Technology Journal* 8 (4): 619-624, 2009; *doi*: 10.3923/itj.2009.619.624)