Foreword and Editorial

International Journal of Hybrid Information Technology

We are very happy to publish this issue of an International Journal of Hybrid Information Technology by Science and Engineering Research Support Society.

This issue contains 34 articles. Achieving such a high quality of papers would have been impossible without the huge work that was undertaken by the Editorial Board members and External Reviewers. We take this opportunity to thank them for their great support and cooperation.

The paper “A Novel Local Maximum Potential Point Search Algorithm for Topology Potential Field” states that topology potential field is a novel model to describe interaction and association of network nodes, which has attracted plenty of attention in community detection, node importance evaluation and network hot topics detection. The local maximum potential point search is a critical step for this research. Hill-climbing is a traditional algorithm for local maximum point search, which may leave out some local maximum potential points, and search performance is greatly influenced by initial node sequence. Based on the detailed analysis of local maximum potential points’ characteristics, this paper presents a novel local maximum potential point search algorithm.

The paper “Low Bit Rate Analysis of Adaptive Synthesis Filter Banks for Image Compression” aims to analyze the performance of adaptive synthesis filter banks for image compression at low bit rates. In adaptive synthesis filter banks, analysis section comprises of linear phase filters whereas, synthesis section manages a combination of linear phase and nonlinear filters (in form of delay filters). The adaptive synthesis filter banks have advantages over conventional adaptive filter banks because they have no synchronization issues between analysis and synthesis filters and are compatible with the existing subband coding systems.

Paper “Speed Control of Doubly Star Induction Motor Using Direct Torque DTC Based on Model Reference Adaptive Control (MRAC)” presents the analysis and simulation of the control of double star induction motor, using direct torque control (DTC) based on model reference adaptive control algorithm (MRAC). The DTC is an excellent solution for general-purpose induction drives in very wide range the short sampling time required by the TC schemes makes them suited to a very fast torque and flux controlled drives as well the simplicity of the control algorithm. DTC is inherently a motion sensorless control method. The model reference regulator (MRAC) can improve the double star induction motor performance in terms of overshoot, rapidity, cancellation of disturbance, and capacity to maintain a high level of performance.

The paper “Ant Colony Optimization Algorithm Based on Dynamical Pheromones for Clustering Analysis” presents an improved clustering algorithm with Ant Colony optimization (ACO) based on dynamical pheromones. Pheromone is an important factor for the performance of ACO algorithms. Two strategies based on adaptive pheromones which improved performance are introduced in this paper.
The paper “Optimized Parameter of Contactless Energy Transmission System Realized by Optimum Energy-Efficiency Product” discusses that energy coupling realized by contactless magnetic tank transformer as new approach of rotator excitation in synchronous machine could replace brushes and slip rings of traditional excitation. For new contactless energy transmission (CET) system, its research about energy-efficiency quality still remains a low level because application and research of CET isn’t comprehensive, especially how to improve transfer power and efficiency isn’t enough. According to characteristics of contactless energy transmission system, mutual inductance model was used to describe the loosely coupled connection between primary and secondary winding. Then, optimum energy-efficiency product was proposed.

Paper “The Research of Velocity Compensation Method Based on Range-Profile Function” discusses that in the high-resolution radar imaging system, step-frequency radar signal is very important in getting the high-resolution range-profile, which can be used for target’s detection and recognition. However, target radial velocity will produce many problems, therefore, moving-targets imaging is a bottleneck for step-frequency radar signal. In this paper, an effective motion compensation methods is presented, which is based on the function of Range-profile Contrast.

In the paper “Drafting Blueprints for Car System Requirements”, capture, specification, and communication of requirements is now a critical issue in the product development process. Systems Modeling Language (SysML) was developed to address systems engineering needs. In this approach, use cases are developed along with lists of actions necessary to put them into practice. This paper focuses on the early phases of applying textual and diagrammatic narratives in requirements specification and examines a SysML-based representation of a development process as an example. The paper shows that the series of SysML representations lacks a nucleus around which the various phases of the development process can evolve. The paper produces a sample core by using a Flowthing Model (FM) and contrasts it with the multifarious textual and graphical descriptions of SysML to demonstrate the viability of FM for modeling of requirements and design phases.

The paper “A Clustering Routing Protocol for Energy Balance of Wireless Sensor Network based on Simulated Annealing and Genetic Algorithm” discusses that the LEACH is a popular protocol used in wireless sensor network analysis and simulation. This paper analyses the advantages and disadvantages of LEACH protocol and then puts forward a clustering routing protocol for energy balance of wireless sensor network based on simulated annealing and genetic algorithm.

In the paper “The Method of Moving Target Tracking Based on 2DPCA and FLDA Face Recognition Algorithm”, moving object tracking technique is to find the exact location of the target in the next frame, and feedback to a tracking system for tracking and to provide an important basis and foundation for the analysis and understanding of the video sequence. Face recognition refers to the method to extract somehow be able to describe the characteristics of each individual's personality. Using 2DPCA image feature extraction, feature dimension reduction is simpler and direct, so the calculation efficiency is relatively high, and it can greatly shorten the training time of the sample collection of images. This method is the first application the 2DPCA optimal representation of characteristics for the original sample matrix, and then apply FLDA optimal discriminate feature for the original sample. The paper
proposes the method of moving target tracking based on 2DPCA and FLDA face recognition algorithm.

In Paper “A Failure Testing System with March C- Algorithm for Single Event Upset”, a testing system has been designed to detect the single event upset failure of SRAM chips in this paper: a visual test bench for failure monitoring is developed based on LabVIEW, it could perform the task of data acquisition, storage and results analysis. At the testing board, the test vectors based on March C- algorithm are written to the reference SRAM and the under-test SRAM through FPGA.

The paper “Pre-Load Torque Responses for Flexibility in Single Link Manipulator” states that the Research article includes Model Torque Responses for flexibility of single link manipulators using Linearization Technique named as a LCQ. Manipulators are nothing but one type robotic arms commonly used in the industry. Here the controller design technique used for controlling manipulator was Linear Quadratic Controller Design. Generally the robotic arms are non-linear in nature. In order to control the non-linearity of manipulator and angular displacement, state space technique is used. The topology explains dynamic characteristics occurring in abnormal working condition torque responses are modified by using Linear Quadratic Controller Design Technique. The design method approach in state space control strategy.

In the paper “Applying the Extension Model to Management of Smart Objects”, considering the management problem for Internet of Things, existing IP-based network management protocols such as Simple Network Management Protocol (SNMP) and the Network Configuration (NETCONF) protocol may possibly be utilized to manage smart objects (the main components in Internet of Things). Based on the thinking of extension indicated by some network management standardizations, this paper tries to introduce Extenics into the study on management of smart objects. This paper proposes a simplified formalization for management of smart objects based on the extension model, and formalizes information, knowledge and policy related to Manager, Agent and Management Information Base (MIB) for management of smart objects by making use of basic-elements, composite-elements, extension transformations, dependent functions and extension sets.

Paper “Disturbance Modeling, Simulation and Testing of Solar Array Drive Assembly” states that a Solar panel is an important structure of the spacecraft, SADA (Solar Array Drive Assembly) is often used as the drive organ to realize the step-skipped gesture adjustment. Firstly, the disturbance mechanism impact, which was produced from working SADA, to the electro-mechanism and payload coupling has been taken into account, and the dead, rigid and flexible load SADA disturbance model was established and validated through simulation and experimental measuring. Secondly, implemented the experimental check, calibration and correction to the mathematical model. Finally, the definition of electrical rigidity was proposed to analyze the disturbance mechanism of SADA, and verified its existence through simulation and testing.

The paper “A Hash-based RFID Search Protocol for Mobile Reader” states that mobile readers are used more and more remarkably, so a persistent connection between a backend server and mobile readers cannot be guaranteed, it brings higher security requirements for RFID systems. RFID search protocol which is used to find specific tags has many applications such as inventory management, supply chain management. In this paper, a hash-
based RFID search protocol for mobile readers is proposed, it can meet all known major
attacks in RFID systems, and it can protect the privacy of mobile reader holders especially.

The paper “Multi-Core Program Optimization: Parallel Sorting Algorithms in Intel Cilk
Plus” states that new performance leaps has been achieved with multiprogramming and multi-
core systems. Present parallel programming techniques and environment needs significant
changes in programs to accomplish parallelism and also constitute complex, confusing and
error-prone constructs and rules. Intel Cilk Plus is a C based computing system that presents a
straight forward and well-structured model for the development, verification and analysis of
multi-core and parallel programming. In this article, two programs are developed using Intel
Cilk Plus. Two sequential sorting programs in C/C++ language are converted to multi-core
programs in Intel Cilk Plus framework to achieve parallelism and better performance.

Paper “R&D and Software Firms’ Productivity and Efficiency: Empirical Evidence of
Global Top R&D Spending Firms” aims to investigate the impact of corporate research and
development (R&D) activities on firm performance. To this end, the stochastic frontier
technique is used on a unique balanced longitudinal dataset comparing top global software
enterprises over the period 2005-2010. The software companies is divided into system
software companies, application software companies and service software companies
according to the types of product or service of software companies. In this framework, this
study analyzes the effect of R&D, capital and employment on sales, and quantifies technical
inefficiency of individual firms.

In the paper “An Empirical Study of the Online Demand for Imports in China – A Product
Analysis for International Trade”, considering the further opening of China’s economy and
the growth of the people’s income, there is a lot of room of growth of demand for imports.
This paper is an attempt to identify the demand of different types of imported products in
China, which could be the guideline for the international trade for these trading corporations
to maximize their profits. GRA and Fuzzy TOPSIS are employed to evaluate the demand of
different types of imported products.

The paper “Satisfiability Transition and Experiments on a Random Constraint Satisfaction
Problem Model” states that random constraint satisfaction problem models play a significant
role in computer science. They provide instances for benchmarking algorithms, help inform
the design of algorithms and heuristics, and provide insight into problem hardness. In this
paper, model RA which was revised from classical model A, was studied.

The paper “Another New Complexity Metric for Object-Oriented Design Measurement”
presents a new complexity metric for Object-Oriented (OO) design measurement to find at
the design stage whether the classes become more complex, Moderate complex or less
complex. The proposed metric is theoretically evaluated against the Weyuker’s properties as
well as empirically evaluated against three open source software system. Furthermore, for
validating the validity of new complexity metric, the paper has also presented the comparison
of proposed metric with some well known complexity metrics like Weighted Method per
Class (WMC) metric of Chidamber and Kemerer (CK), Class Complexity (CC) metric of
Balasubramanian, and Complexity Metric for OO Design (CMOOD) metric of Rajnish and
Bhattacherjee (RB) against the same three open source software system...Automated tool were
used to generate the metric values and for analyzing the results, IBM SPSS software used.
The paper “Sparse Kernel Principal Components Analysis for Face Recognition in RGB Spaces” presents a kind of information fusion algorithm based on multi-channel color image. The color face image is first separated into three pseudo grayscale images: R, G, and B, then the partial characteristics of face is extracted by use of Gabor wavelet transform from each component to be eigenvector in series connection, which will be through dimensionality reduction by sparse kernel principal components to be recognized and classified by the nearest classifier.

In the paper “A Clustering Algorithm Based on Multi-agent Meta-heuristic Architecture”, a clustering algorithm is proposed in this paper, which is based on discussion of multi-agent meta-heuristic architecture of the ant colony optimization algorithm. The multi-agent architecture of ant colony optimization meta-heuristic includes three levels. Level-0 agents build solutions, level-1 agents improve solutions and level-2 agents update pheromone matrix. The updated pheromone then provides feedback information for the next iteration of solution construction. Mutation probability ρ and pheromone resistance ρ are the adaptive parameters, which can be adjusted automatically during the evolution progress. With the adaptive variable, the algorithm can solve the contradiction between convergence speed and precocity and stagnation.

In the paper “Performance Analysis of a New Type of Automated Container Terminal”, container transportation has gradually become the main direction of the development of shipping today. With the ship's large-scale, specialization and modernization the development of handling capacity of modern container terminal plays a key role in low-cost transportation, and efficient circulation. Automated container terminal can not only improve the utilization rate of equipment, reduce operating costs, but also greatly improves the efficiency of terminal. This paper analyzes the efficient and economical automation container terminal based on the frame-bridge handling technology of transport vehicles independently developed by the ZPMC And on this basis put forward the improvement of handling technology, and compare models created to validate the superiority of its improvement plan.

In the paper “Ant Colony System: An Improved Approach for Robot Path Planning”, in Robot Colony System(RCS), based on the swarming nature of Ants, the path for the agent robots is designed to perform to search operation to find the shortest path from source to destination for collection of objects and go back to their hive-like home node. The agent always moves through the shortest path to reach to the destination. There is a possibility of having a number of paths in between the source and destination as defined in the Path Map (PM) in offline mode. If the preferred shortest path is blocked by means of some obstruction, there must be another way to reach to the destination which has the weight of minimum among the other possible paths. The algorithm shown in this paper for shortest path, based on Kruskal’s Algorithm, shows the way to find the alternative shortest path and the moving direction of the agent. In this paper, the junction-to-junction connectivity is proposed where the path search is replaced by the node search which minimizes the computational time and hence increases the effectiveness and efficiency in agent moving towards the destination from source and also in its reverse direction.

The paper “A Syntax Parsing Method Based on Adaptive Genetic Annealing Optimization HMM” states that in order to further enhance the performance of syntax parsing, for the shortcomings of hidden Markov model (HMM) in the parameter optimization, an improved syntax parsing method based on adaptive genetic annealing and HMM was presented. First,
an adaptive hybrid genetic annealing algorithm was adopted to optimize HMM initial parameters. Second, the improved HMM was trained by Baum Welch algorithm, and then a modified Viterbi algorithm was used to recognize various types of phrases at the same layer, finally a hierarchical analysis algorithm and Viterbi algorithm were combined together to solve hierarchy and recursion in the sentence. In the adaptive genetic annealing HMM algorithm, genetic operators and parameters of simulated annealing (SA) were first respectively improved, subpopulations were classified according to the adaptive crossover and mutation probability of GA in order to realize the multi-group parallel search and information exchange, which could avoid premature and accelerate convergence, then SA was taken as a GA operator to strengthen the local search capability.

The paper “Backlash analysis of RV reducer based on Error Factor Sensitivity and Monte-Carlo Simulation” discusses that error factors of RV reducer are not completely considered, leads to backlash precision is limited, so an improved backlash estimation model is proposed. RV reducer structure and working principle is deeply analyzed, a variety of error factors are considered, and the backlash estimation model is improved according to error propagation.

Paper “N-Best Re-scoring Approaches for Mandarin Speech Recognition” discusses that the predominant language model for speech recognition is n-gram language model, which is locally learned and usually lacks global linguistic information such as long-distance syntactic constraints. Authors first explore two n-best re-scoring approaches for Mandarin speech recognition to overcome this problem. The first approach is linear re-scoring that can combine several language models from various perspectives. The weights of these models are optimized using minimum error rate learning method. Discriminative approach can also be used for re-scoring with rich syntactic features. To overcome the speech text insufficiency problem for discriminative model, they proposed a domain adaptation method that trains the model using Chinese pinyin-to-character conversion dataset. Then they presented a cascaded approach to combine the two re-scoring models in pipeline that takes the probability output of linear re-scoring model as the initial weight of the discriminative model.

In the paper “Removal of an Anionic Dye from Wastewaters by Adsorption on Modified Rice Husk and Sugarcane Bagasse”, the removal of sunset yellow dye from aqueous solutions using low-cost materials as adsorbents such as modified Rice husk (MRH) and sugarcane bagasse (SB) by a batch system were investigated. Experiments were carried out as a function of contact time, initial concentration, pH and adsorbent dosages. The equilibrium adsorption of sunset yellow dye on adsorbents was analyzed by Langmuir, Freundlich and Temkin models. The results indicate that the Freundlich model provides the best correlation for sunset yellow-MRH system and the Langmuir model provide the best correlation for sunset yellow-SB system and also pseudo-second-order model was best applicable to the sorption data.

The paper “Self-Organization Mechanisms for Service Composition in Cloud Computing” discusses that cloud computing is becoming an interesting alternative as a flexible and affordable on-demand environment for deploying custom applications in the form of services. In this work, a self-organizing system model based on dynamic relation network is proposed. In the model, autonomic element can self-adapted to the weight of the relationship under the guidance of the self-organizing policy. Based on this organization model, Authors present the service-oriented dynamic self-organizing algorithm in Cloud computing, which implement autonomic element self-organization through service finding, service composition, task implementation and service optimization.
The paper “Bayesian Estimation and Prediction of Burr Type XI Distribution under Singly and Doubly Censored Samples” aims to address the problem of estimation and prediction of the Burr type XI distribution under Bayesian framework based on censored samples. Five informative and non-informative priors have been assumed under five different (symmetric and asymmetric) loss functions for posterior analysis. The expressions for Bayes estimators, posterior risks, credible intervals, posterior predictive intervals have been derived and evaluated. The simulation study has been carried out in order to assess and compare the performance of Bayesian point and interval estimators. The study indicated that for Bayesian estimation and prediction of the said distribution, the gamma prior along with quadratic loss function can efficiently be employed.

Paper “Missing Data Imputation Based on Grey System Theory” proposed a new weighted KNN data filling algorithm based on grey correlation analysis (GBWKNN) by researching the nearest neighbor of missing data filling method. It is aimed at that missing data is not sensitive to noise data and combined with grey system theory and the advantage of the K nearest neighbor algorithm.

The paper “Flower Classification using Combined $a^*$ $b^*$ Color and Fractal-based Texture Feature” states that flower classification is a useful way for grouping a flower in certain class using specific features. This research proposes a new method of flower classification system using combination of color and texture features. The first phase is getting the crown of the flower, which is localized from a flower image by using pillbox filtering and OTSU’s thresholding. In the next phase, color and texture features are extracted from the crown. The color features are extracted by removing L channel in L*a*b* color space, and taking only $a^*$ and $b^*$ channel, because of ignoring different lighting condition in flower image.

In the paper “The Agents Coordination and Templates Aggregation in Distributed Modeling”, to group the agents from various areas for the solution modeling of large-scale, sophisticated systems or issues, we has developed a distributed modeling methodology and its networked supporting platform. The upcoming problems are, however, how to coordinate (organize, supervise, evaluate) such distributed modeling agents, and how to aggregate a number of modeling templates for the best solution(s). The Soft-Agents system is designed to perform coordinating user-agents teams. Such coordination enables judgment on working characteristics and modeling quality of each team and individual separately. To work out the best solution(s), the individual template is aggregated by using Analytic-Hierarchy-Process and multiple templates are aggregated by the Ordered-Weighted-Geometric algorithm.

Paper “Fault Diagnosis of LPRE Ground-testing Bed Based on PCA-SOM” states to effectively diagnose the deterministic faults of a LPRE ground-testing bed, the fault diagnosis method based on PCA and SOM is proposed. The dimension reduction process of PCA not only reduces data size, but also reduces noise influence. It also implements a visualization of fault status identification and fault variable orientation by SOM.

The paper “The Improved Radial Source Recognition Algorithm Based on Fractal Theory and Neural Network Theory” states that nowadays, the traditional parameters recognition method cannot match the requirements of the increasing new modulation radar signals. In order to solve this problem, in this paper, it proposes the improved radar signal recognition algorithm based on fractal theory and Neural Network theory. Taking the advantage of the
characteristics of relevant dimension which will be able to measure the relevant complex degree of the radial source signals, the relevant point were extracted as the input of neutral network in order to recognize and classify the signals.

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