Foreword and Editorial

International Journal of Multimedia and Ubiquitous Engineering

We are very happy to publish this issue of an International Journal of Multimedia and Ubiquitous Engineering by Science & Engineering Research Support soCiety.

This issue contains 39 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.

In the paper "Joint Replenishment and Delivery Problem with Resource Constraint for Deteriorating Item", the joint replenishment and delivery model with deterministic resource restriction for deteriorating item is developed. The model is formulated as cost minimization problem, including the ordering cost, the inventory holding cost, the transportation cost, the customer waiting cost and the deterioration cost. Differential evolution (DE) algorithm is proposed to solve the model. Numerical illustrations of the model and algorithm are presented and the sensitivity analysis with respect to deterioration rate of item is performed. The comparison between DE and genetic algorithm (GA) for solving the model are also made.

Authors of the article entitled "An Efficient Approach to Face Recognition Using a Modified Center-Symmetric Local Binary Pattern (MCS-LBP)" present a novel face recognition method called Multi-scale block Center-Symmetric Local Binary Pattern (MCS-LBP). The face recognition process mainly consists of three phase: face representation, feature extraction, and classification. However, the most important phase is extraction, in which unique features of the face image are extracted. The Center-Symmetric Local Binary Pattern (CS-LBP) feature can be viewed as a combination of texture-based features and gradient-based features. However, it has less dimensional area; the bit-wise comparison made between two single pixel values is significantly affected by noise and sensitive to image translation and rotation. To address this problem, they present a modified feature called MCS-LBP.

Paper "Blocking Variable Step Size Forward-Backward Pursuit Algorithm for Image Reconstruction" proposes a novel blocking variable step size forward-backward pursuit (BVSSFBP). This paper proposed variable step size forward-backward pursuit algorithm by introducing the concept of sparse phase and variable step size to deal with different situations. The algorithm also divides two-dimensional image into blocks, in order to reduce the scale of observation matrix during single processing, reduce the single processing speed and the overall running time.

In the research paper "Research on Target Detection in Sports Video", for moving objects detection, a background subtraction algorithm based on adaptive Gaussian mixture model is proposed in order to extract moving regions. The OTSU algorithm is researched in order to adapt to the changes in the background images; In order to accelerate model updating rate, a novel mechanism is the combination of expected sufficient statistics and L-recent window.

The purpose of the paper "The Speed of Golf Ball after Impact with Golf Club" is to calculate the speed of the club head, the impact, the speed of flying ball after the impact, the moving directional pattern of the ball after impact, etc.

In the paper "A Variable Step-Size Least-Mean-Square Adaptive Filtering Algorithm: Design and Application", This paper briefly analyses and discusses the advantages and disadvantages of the commonly used LMS adaptive filtering algorithm, proposes a new nonlinear functional relationship between step factor μ and error signal e (n). And improve methods for variable step-size LMS algorithm appropriately. The algorithm utilizes the correlation value e (n) e (n - D) of output error signal to adjust the step factor μ, solves the inconsistency problem of error performance and convergence time.

Paper "Efficient Head Pose Determination and Its Application to Face Recognition on Multi-Pose Face DB" proposes an efficient head pose determination method and its application to face recognition on a multi-pose face DB in order to solve the pose variation-related problem. The first step is to detect a facial region using Adaboost. Next, after undergoing preprocessing on the detected face, a mask is placed to cover it. At the detected facial region, the pose is determined by relations of the position of the centroid points of the eyes and lip regions detected by using ellipse-fitting method. Finally, face recognition is conducted by applying template matching between a set of facial images in multi-pose face DB pertinent to the determined head pose and the input face image.

In the research paper "Mechanical Characteristics of Vacuum Circuit Breaker: A Simulation Based Experimental Study", electrical industry is with the rapid development. Vacuum circuit breaker, with advantages of good arc resistance, suitable for frequent operation, long electrical service life, high reliability, long maintenance cycle, has been widely used in many applications. Modern conditions need high voltage vacuum circuit breaker and it has a difference with common vacuum circuit breaker. Mechanism characteristics are a most important aspect for the vacuum circuit breaker and more attention should be paid attention. In this paper, mechanism characteristics are studied for a certain model of vacuum circuit breaker and a simulation method is developed. With the method, curves variation of travel, speed, length increasing of contact spring with time has been developed and given in the paper. With responsible device, some parameters are tested in the experiment.

In the study entitled "Effect of Light Intensity on Close-Range Photographic Imaging Quality and Measurement Precision", to test the effectiveness of flash intensity in digital close-range photogrammetry, test methods for the light intensity adjustment of a ring-flash on close-range photographic imaging quality and measuring precision were researched respectively. First, according to the efficiency of the flash, the imaging characteristics, and the gray distribution of the mark points of the image, the identified method of the image gray value for subjective visual analysis was presented, and a quality standard for the close-range photographic image was provided. Then, as a precondition to obtaining the best image quality, based on the estimation theory governing measurement adjustment precision, the changes in measuring precision under conditions of different light intensity and different photographic distances were analysed, and the relationships between measurement precision and light intensity, or photographic distance, were obtained.

Paper "Average Analysis Method in Selecting Haralick's Texture Features on Color Co-occurrence Matrix for Texture Based Image Retrieval" presents an approach to overcome the problem. The approach focuses on extracting local Haralick's texture feature based on a predetermined region using the color co-occurrence matrix method, the selection of the

'significant' Haralik's texture features and evaluation of the performance of the combination of the 'significant' features. The proposed method which is an Average Analysis and a well known method, Principal Component Analysis were applied to obtain 'significant' features. In order to compare the performance, a series of experiments were carried out for both methods, which is the proposed Average Analysis and the Principal Component Analysis.

In the paper "Research on Three-Component Geomagnetic Field Differential Measurement Method for Underwater Vehicle", a kind of underwater vehicle three-component geomagnetic field differential measurement method is presented based on the ideas of the difference. The three-component geomagnetic field mathematical model of traditional measurement method is improved and new differential measurement model(DMM) is established. Difference expressions of measurement magnetic field in the DMM obviously reduce the impact of interference magnetic field in the process of geomagnetic field measurement and improve the measuring precision of the three-component geomagnetic field. Finally, the method's effectiveness is validated by simulation.

In the paper entitled "Design of an Static Reconfiguration Based on FPGA System", Aiming at the problem of limited logical resources of FPGA and low rates of internal resource utilization, the design of the static reconfiguration system was introduced in this paper. Based on the structure of CPLD matching FPGA, the static reconfiguration system is able to enhance the scalability of the FPGA device. Major functionality in the static reconfiguration system is accomplishing field reconfiguration of the FPGA device without PC. Users are able to flexibly change the different configuration files in FPGA for that the internal resources of FPGA are occupied by the configuration files of different function at different times.

In the paper "4 Port Mobile Phone MIMO Antenna for the Femtocell Communications", a 4-port broadband mobile phone multiple input multiple output (MIMO) antenna is designed and implemented for use in femto cell communications. The assembly consists of 4 antennas with one main antenna that covers the entire design band and 3 sub antennas that cover the data communication bands. Each of the antennas is located on the top and bottom corners of the bare board, and they tested them on a PC board with the same board ground circumstances as practical phone ground.

In the study "Research on an Improved Quantum Particle Swarm Optimization and its Application", the quantum particle swarm optimization (QPSO) algorithm exists some defects, such as premature convergence, poor search ability and easy falling into local optimal solutions. The adaptive adjustment strategy of inertia weight, chaotic search method and neighborhood mutation strategy are introduced into the QPSO algorithm in order to propose an improved quantum particle swarm optimization (AMCQPSO) algorithm in this paper. In the AMCQPSO algorithm, the chaotic search method is employed to promote the quality of initial population. The adaptive adjustment strategy of inertia weight is used to adjust the global search ability and local search ability of particles in the running process of QPSO algorithm. The neighborhood mutation strategy is used to increase the diversity of population and avoid premature convergence. Finally, in order to evaluate the performance of the AMCQPSO algorithm, several well-known benchmark functions are selected in this paper.

Authors of the paper "Fast Lossless JPEG Image Geometric Transformation by DCT Coefficient Changes" propose a fast and lossless JPEG image transformation in spatial domain based on changes of discrete cosine transform (DCT) coefficient in frequency

domain. The key idea of their proposed approach is that permutation and/or sign changes of DCT coefficients in JPEG image results in geometric change without any information loss.

In the paper entitled "Thermal Field Balance and Efficiency Analysis of Plate Type Electromagnetic Induction Heating", owing to flat plate induction heating can't guarantee to heat equally, especially the existence of no heated zone, it haven't been used in these industrial fields like SMD which require high accuracy and easy to control while heating. But some places need its characteristic of contact heating, eco-friendly and high efficiency, for this reason, it is fundamental to research the heating style further as well as the no heating zone. Because induction heating is based on eddy current, firstly, the relationship between eddy current and induction heating is explained and several factors which would influence the eddy current are put forward. Then finite element analysis and calculation of eddy current field is mainly done. At last, the conclusion is obtained by analyzing the results of calculation. Due to the analysis above, after improving the structure of the iron plate, the problem of no heating zone is solved. At the same time, the efficiency evaluation is brought out. It can make the following research more easily.

The paper "Implementing Innovative Routing Using Software Defined Networking (SDN)" is focused on optimizing the routing implementation of SDN (i.e. SDN Controller). They have used the Floodlight Open Source SDN Controller in their experimentation. The Floodlight controller provide source Java libraries and APIs.. It uses Dijkstra's algorithm to calculate the shortest path between any source and any destination within the network. However, the default routing implementation of Floodlight Controller is such that, while calculating any path, it ignores the actual bandwidth of the link as it takes a unit value for each link. The resultant calculated path becomes a least hop path. This least hop path may be an optimal path where all the links in the network have equal bandwidth and may not be optimal where the networks have unequal link bandwidth. However, today's networks are mostly consisting of unequal link bandwidth.

The paper "Support Vector Machine Prediction Model Based on Chaos Theory" put forward a kind of online public opinion prediction model (PSR-SVR) with the combination of chaos theory and support vector regression. First of all, the original data of online public opinion were obtained throughout topic segmentation, hotspot extraction, and data aggregate. Then, time sequence of online public opinion was reconstructed throughout phase-space reconstruction. Finally, the reconstructed time sequence of online public opinion was input support vector regression for modeling and prediction, and then it was compared with other online public opinion prediction model by experiment.

Paper "A Fast Decision Algorithm for High Efficiency Video Coding" presents a new algorithm for fast CU size decision and mode decision in HEVC intra coding. First, the size of the coding unit is pre-determined according to judging the coding unit whether has the sub-block whose depth is 3 and analyzing the depth of the adjacent CU. Then a judgment by block-DCT coefficients is made on the texture direction of image block, determining candidate mode set based on the calculated direction and the best prediction mode of the adjacent block, which can reduce the number of candidate mode, thereby reducing the amount of computation to save coding time.

The paper entitled "A Study on the Ways of Performing Voice Match with Voice Analysis Methods Using Spectral Contents", In order to verify the integrity of the original voice and determine the voice match, researches on analyzing speakers' own voice have been undergoing. However, spectrogram and waveform analysis technologies that are

currently used have issues of lack of accuracy and reliability when determining the voice match.

In the study "Enhanced Data Driven Model-Free Adaptive Yaw Control of Unmanned-Aerial-Vehicle Helicopter", an enhanced data driven model-free adaptive yaw control tracking control scheme is proposed for the yaw channel of an unmanned-aerial-vehicle helicopter that is non-affine in the control input. By dynamic linearization and observer techniques, the proposed control algorithm is only based on the PPD parameter estimation derived online from the I/O data of the controlled system, and Lyapunov-based stability analysis is used to prove all signals of close-loop control system are bounded. Compared with the traditional model free adaptive control, the proposed enhanced model free control algorithm can make the closes-loop control system with stronger robustness and better anti-jamming ability.

The paper "Research on Multiple Cell Linear Parameter Varying Model Predictive Control" presents an improved multiple cell linear parameter varying model predictive control method for carrier-based aircraft. After establishing the lateral dynamic model of carrier-based aircraft for multiple cell predictive controller, the output-feedback linear parameter varying control based on states observation should be implemented.

In the study "Effects of Varying Numbers of Probes on RT-based CIT Accuracy", the accuracy of an RT-based Concealed Information Test (CIT) was examined by varying the numbers of probes used for the test. Results suggested that the RT-based CIT produces accurate lie detecting outcomes as the number of probes increases from a single probe to three probes. When five probes were used, however, the accuracy level did not improve from the level achieved with three probes. Interestingly, the accuracy decreased when the stimuli for the RT-based CIT were constructed with numeric elements of an event such as the amount of money. Further discussed are possible explanations in regards to the differences observed in the RT-based CIT accuracy rates dependent on the numbers of probes.

The paper "A PID Controller of Fish Pond Aerator Based on Optimal Smith Predictor Algorithm" proposed a PID control algorithm with optimal Smith predictor, to eliminate negative effects caused by delay component. The result of experiment data indicates that the optimal algorithm can reduce settling time and overshoot, and has better robustness and disturbance rejection performance than traditional PID controller. Meanwhile, a hardware circuit design plan based on ARM Cortex-M3 embedded processor is supposed, which gets stronger performance than C51 MCU control system with traditional PID algorithm. The hardware selection and plan design realize high cost performance, it is valuable to small and medium freshwater aquaculture enterprises.

In the paper "Particle Swarm Optimization and Dempster Shafer Approach to Achieve Internet of Things Context Fusion Using Quality of Context", Context fusion is a very important aspect in a system that has to adequately simplify a required task in achieving context awareness in the Internet of things (IoT). IoT generates a large amount of data, which are massive, multi-source, heterogeneous, dynamic and sparse. Context information fusion is an important tool in the manipulation and management of these data in order to improve processing efficiency, provide advanced intelligence and increase reliability. Context information fusion can reduce the amount of data traffic, filter noisy measurements, and make predictions and inferences in any stages of data processing in IoT. As such when context is acquired from this domain, it has low confidence level due to reliability factors.

The study "RST Invariant Reversible Watermarking for 2D Vector Map" presents a RST (rotation, scaling and translation) invariant reversible watermarking method for 2D vector maps. Firstly, the proposed algorithm selects two reference vertices to calculate the normalized quantization step. Then, for each vertex, the Euclidean distance between a reference vertex and the vertex is divided into equal segments using the normalized quantization step. According to the segment which the vertex is divided into, a watermark is embedded by moving the vertex within its corresponding segment in a revertible manner. This algorithm not only recovers the original content after watermark extraction, but also correctly extracts the embedded watermarks after RST transformations. In addition, to control the distortions introduced by watermark embedding, the embedding parameter is carefully selected.

The paper "Research on Nonlinear Vibration Characteristics of Spiral Bevel Gear", Based on the concentrated parameters theory, a 7-freedom coupled vibration dynamic model of the spiral bevel gear transmission system is established, which includes transmission error, time-varying mesh stiffness and the tooth backlash clearance. In the model, the axial vibration, the torsion oscillation of the gear pair aroused by tooth meshing force and the lateral oscillations resulting from flexional deformation of the gear shaft are taken into account. The mesh stiffness fluctuation is developed as 5-order Fourier series and the tooth backlash clearance is fitted by 7-order polynomial function. Through the Gear method, the dynamic response of the system is obtained, and the vibration characteristics are analysed.

Authors of the study "An Advanced Celestial Map Rendering Platform with 3D Graphics Support" represent a 3D celestial map rendering platform which reproduces the virtual night sky at the specific time and location. With the OpenGL-based full 3D-graphics features, their platform brings a sense of spatial realism, with user-friendly interfaces. For the more accurate celestial map rendering, they referred to a set of more than 10,000 stars from the famous celestial lists such as the Messier list, the Yale BSC list, and others. For each celestial object, their system provides three-dimensional views and additional two-dimensional simulations for more details. Since it is developed on typical PCs, their system can provide accurate celestial maps in an interactive manner, without any special equipment.

The paper entitled "The Real Time Infrared Image Acquisition and Processing System Design Based on FPGA", Field programmable gate array (FPGA) has the characteristics of high speed, low power consumption, high integration, flexibility and, small size, etc. In this paper, I design a real time infrared image processing and display system based on FPGA for the requirement of real time infrared image processing, which will realize the transmission, transformation, and storage of the image information, and then complete the infrared image edge detection based on $Sobel$ algorithm by using this system as a platform. At last, the advantages of infrared image processing with this system compared with other methods will be verified in this paper.

In the paper "Agent Based Performance Analysis of Strategic Algorithms in Prisoner's Dilemma", to create a system that provides a comparison of multiple algorithms that may be tested in the Prisoner's Dilemma decision problem using two subjects in a dual agent environment. As an addition to understanding the effects of various algorithms and logic that helps influence a single agent's decision, their system aims at analysing the performance of the same algorithms in iterative and multi agent systems. The results are obtained by using concepts of Swarm Intelligence, Multiple Agent Systems and Super Agents within the testing system.

Paper "Numerical Simulation on Crater Characteristics of Different Shape of Projectiles Hypervelocity Impact on Thick Plates" states that Hypervelocity impact by space debris can cause direct damage to spacecraft internal subsystem, and even lead to catastrophic failure of manned spacecraft. To research the crater characteristics of different shape of projectiles hypervelocity impact on semi infinite thick aluminum alloy plates, Lagrange and SPH (smoothed particle hydrodynamics) coupling method in AUTODYN is used. By analyzing the influence on crater characteristics by different impact velocity of spherical projectile, different ratio between length and diameter and different impact velocity of cylindrical projectile, they obtain the law of crater characteristics of the semi infinite thick plates.

Authors of the paper "A Novel Image Segmentation Combined Color Recognition Algorithm through Boundary Detection and Deep Neural Network" present a novel image segmentation combined color recognition algorithm through boundary detection and deep neural network. The deep learning algorithm can largely increase the accuracy of classification whereas cut down the processing time consumed, they adopt the deep neural network and support vector machine to extract image features both in RGB and YUV color spaces. Boundary detection in sudden change, by contrast, is more global in nature, such as texture, so need to integrate the whole information of the image. Under the guidance, they modify the current segmentation methods with boundary detection technique to serve as the pre-processing step before classifying colors.

Paper "Fuzzy Detection on Color Image" describes a new color image edge detection method. Edge detection application based on fuzzy set theory is introduced in this paper. First of all, they design fuzzy inference engine to detect image edges. In inference engine step, two Gaussian membership functions in two directions (horizontal and vertical) are used for input signals. Finally, two triangle and one Gaussian membership functions were used for defuzzification step. By using fuzzy process and defuzzification, they obtain a relationship between input and output values.

In the study about "Research on the Optimization about Air-Gap Magnetic Field of AC-Excited Generator", due that the air-gap harmonic wave magnetic field impacts the motor torque property, additional loss and vibration noise, it is critically important to accurately calculate the electromagnetic field, particularly the air-gap magnetic field distribution. On the basis of the research of structure of AC-excited generator, a field-circuit-motion coupled analysis model for AC-excited generator is established using field-circuit-motion coupling method. For investigating the relationship among the air-gap magnetic field, slot of rotor, air-gap and width of rotor slot, the distribution diagram of air-gap magnetic field is provided under different states. By harmonic analysis of the air-gap magnetic field of different model, the method to reduce the air-gap harmonic wave magnetic field is proposed. It provides the theoretical support for the optimization design of AC-excited generator.

The study "Sparsity Based Denoising of PET-CT Images" propose an improved method for the removal of additive Gussian white noise from PET-CT images. Different from the traditional sparse representation based denoising methods, their method is composed of two distinctively steps such as the preliminary denoise and the detail compensation. By constructing a sparse representation model, denoising is formulated as an optimization problem that can be solved on an over-complete dictionary. The proposed method effectively trains this dictionary by using K-SVD algorithm with atom replace model. Then the preliminary denoised image is reconstructed through improved OMP algorithm with the fidelity factor of SSIM (Structural Similarity). The detail compensation image is obtained by using the difference between the noisy image and the preliminary de-noised

image, and the improved OMP algorithm is employed again to get the denoised detail compensation image. Finally, the final denoised image is reconstructed by adding the denoised detail compensation image to the preliminary denoised image.

The paper entitled "State Recognition Based on Hidden Markov Model" puts towards the improvement of the HMM algorithm, then proposed the HMM state identification model of the electronic equipment. It is verified by examples of the experiment, which results show that the HMM state recognition effect is better, recognition rate can reach 94%.

Authors of the study "Evaluation on Content Aware Video Transmission in DiffServ Domain" try to find how to reserve proper amount of resources for video streams by evaluating transmission of various video sequences. Results show that (1) video transmission performance is content aware and is determined by data rate, data rate variation and continuous burst of the video. Reserved bandwidth of a video should be proportional to its data rate. If data rate variation is significant, more bandwidth should be reserved. If continuous burst occurs, additional bandwidth is required. (2) If accurate data rate and its variation can be obtained and data rate variation and/or continuous burst are remarkable, adaptive bandwidth reservation is recommended. Otherwise, fixed reservation is better. (3) Large buffer size in routers will improve the video receiving quality.

February, 2016

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**Editor of the February Issue on
International Journal of Multimedia and Ubiquitous Engineering**