Editorial Preface

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Dear readers,

Welcome to the third issue of *IJAEC* in 2012. We are pleased to invite our readers to enjoy all the valuable contributions sent by the members of the Editorial Board for helping us in starting *IJAEC*.

Even though the rapid advancements in evolutionary computation, however, the increased computational capacity embedded in vigorous mathematical models still does not excellently deal with the real-world problems. In this issue, applications of various evolutionary algorithms and evolutionary computation models have successfully solved problems in a wide variety of fields such as nurse scheduling problem (NSP), software testing efficiency, localization diagnosis, state diagram translation software, weather prediction by cloud image type analysis, etc. *IJAEC* will continue receiving numerous interesting and high quality submissions.

Each paper selected in this issue has been carefully reviewed, totally, there are six feature contributions with addressing wide applications of improvements of the single evolutionary algorithm, such as improved genetic algorithm (cooperative genetic algorithm, CGA) in nurse scheduling problem (NSP), Cuckoo Search algorithm in most error prone parts of the program software testing, cascaded evolutionary estimator in localization under 2D-laser-range-finder environment, weather prediction, and functional link ANN in software cost estimation.

The first article, by Ohki from Tottori University (Japan), proposes an effective mutation operator for cooperative genetic algorithm (CGA) to be applied to a practical nurse scheduling problem (NSP). NSP is a complex combinatorial optimizing problem for which many requirements must be considered. In real hospitals, the schedules change frequently, the changes of the shift schedule yields various problems, for example, a drop in the nursing level. CGA is superior in ability for local search by means of its crossover operator, but often stagnates at the unfavorable situation because it is inferior to ability for global search. The author proposes a mutation operator activated depending on the optimization speed. This

mutation yields small changes in the population depending on the optimization speed. Then the population is able to escape from a local minimum area by means of the mutation. However, this mutation operator is composed of two well-defined parameters. To solve this problem, the author also proposes a periodic mutation operator which has only one parameter to be defined itself. This simplified mutation operator is effective over a wide range of the parameter value.

The second paper, by Srivastava, Singh, Kumhar, and Jain from Birla Institute of Technology & Science (India), proposes a method for increasing software testing efficiency by identifying the optimal test sequences in the state machine diagram. The method employs an evolutionary algorithm, namely Cuckoo Search, to investigate best paths in the diagram. It tries to provide a technique for exhaustive coverage with minimal repetition which ensures all transitions coverage and all paths coverage at least once with minimal number of repetitions of states as well as transitions. The algorithm works by maximizing an objective function which focuses on most error prone parts of the program so that critical portions can be tested first. State machine diagram is given as input, and Cuckoo Search is performed to generate a list of test sequences as output.

The third article, by Jaroslav Moravec (Czech), proposes a method permitting effective interference filtration using sensor data applied for localization possibilities in the known environment using 2D-laser-range-finder. The so-called cascaded evolutionary estimator is utilized for filtration mechanism consisted of up to five serially arranged strategies that are able to navigate successfully in useful data for example an autonomous unit in the known environment within interference. The novelty of the cascaded estimator includes successful evolutionary computations replacing high-performance accelerator with keeping all necessary features of the original algorithms. A behavioral analysis of various estimators is performed for verification of features of individual types with application of brute force and classic gradient algorithm. Comparison of efficiency and time requirements is executed utilizing evolutionary methods together with robustness demonstration and reliability of selected types in various kinds of environment.

The fourth article, also by Srivastva, Naruka, Alam, Agarwal, and Shah from Birla Institute of Technology & Science (India), employs ant colony optimization to generate non-repetitive transitions from the input state diagram to verify that the complete coverage of software requirements can be translated into state transition diagram or other UML diagrams. Authors have taken the state transition approach to model the system and shown the different sequences of the model during the execution. The proposed approach has less redundant transitions and also gives uncovered transition in successive paths instead of giving whole redundant path again and again. Experimental results show that the performance of the ACO is better than approaches (such as GA, Bee colony) to those of other population-based algorithms with the advantage of employing fewer control parameters.

The fifth article, by Peng and Gan from Kunming University of Science and Technology (China), employs gray-scale of various types of clouds image collected over the Kunming area were analyzed based on statistical theory and methods in order to achieve recognition the pattern of the weather conditions. The results show that there are remarkable differences in normal distribution on the gray-scale histogram and the recurrence plot for different weather conditions. It is shown that the gray-scale method is simple, feasible, timely, reliable, and accurate. That would provide theoretical support and methods for meteorological and other related departments.

The last article in this issue, by Sridhar from Sri Ramakrishna Mission Vidyalaya College of Arts and Science (India) and Balasubramaniam from JSS University (India), proposes an extended Triangularisation algorithm to cover the area of point data as a polygon, where fractal dimension is often used as a measure of how fast length, area, or volume increases

or decreases with increase or decrease in scale, or as a measure of complexity of a system. In addition, box counting algorithm is applied on those point data to calculate the fractal values, which in turn work as an input to prediction plot linear model, to show that fractal value increases or decreases as perimeter of polygon increases or decreases. To validate this model, crime data was used and its results were analyzed. It provides information to police officials about the intensity of crime, area of patrolling and deputation of police in the sensitivity area. This model could be applied for any Geo-referenced point data such as cancer data, hypertension data and so on.

I wish that the papers in this issue will receive attentions and opportunities that are continually inspiring new ideas in evolutionary computation fields. In closing, I would like to thank the IGI Global publisher, for making *IJAEC* possible. In addition, since *IJAEC* is a collaborative effort from all members of the Editorial Board, the composited work reveals the diverse topics in EC, I would like to take this opportunity to thank each member for her/his valuable cooperation. All papers submitted to *IJAEC* undergo a comprehensive review process under the valuable suggestions from each member of Editorial Board. Each paper receives at least five reviews, based on which the Editorial Board member makes a recommendation. The Editorial Board members ensure all papers receive in-depth reviews before any decision is made. These decisions are reviewed by the Editor-in-chief. I would also like to thank the authors who have chosen *IJAEC* as a medium to publish their research results. I hope that readers will find these articles useful, informative, and innovative and I am looking forward to hearing your comments, criticisms and suggestions to continuously enhance it and serve you better. You are also invited to contribute to *IJAEC* according to your interests and expertise.

Enjoy your reading and do not hesitate to send us your thoughts about these papers as well as your own research paper in the exciting field of evolutionary computation. We look forward to reading from you soon, and stay with us.

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