

Preface:

Special Issue on Recent Advances on Information Science and Big Data Analytics

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Nowadays, information science in big data context has become a new, hot research topic among academics and the industry community. Big data refers to a collection of data sets that are too large or too complex for efficient processing and analysis using traditional database management tools. The development of information science in big data context will enhance decision making, insight discovery, and process optimization. However, there are still numerous technical challenges and issues that need to be improved and broadly explored.

The analysis of the performance and operational strategies of Heating Ventilation and Air Conditioning (HVAC) systems becomes very important for the effective usage of energy. Although ANN has been proven to be a useful tool in modeling in refrigeration and air-conditioning system for performance consumption, quite a few studies being done on AAC with fuzzy neural network. The first paper by Mao-Hsiung Hung¹ et al. develop a Fuzzy Neural Network (FNN) model for air-conditioning system of a passenger car to predict the cooling capacity, compressor power input and the Coefficient Of Performance (COP) of the Automotive Air-Condition (AAC) system. The result values to the real experimental data indicates that their proposed FNN model performs high accuracy prediction for automotive air-conditioning systems.

Currently, more and more practical problems in science, economics, engineering and other fields can be formulated as global optimization problems. However, the existence of multiple local minima of a general non-convex objective function makes global optimization become a great challenge. To face this challenge, Fei Wei et al. propose a new filled function with two parameters in the following paper to solve the global optimization problem. Through the numerical experiment, they show the effectiveness of the new filled function algorithm. Moreover, for large scale global optimization problems, Evolutionary Algorithms (EA) is an efficient and helpful especially when little knowledge of the optimization problem is known since they use the function value or transformed function value as the fitness instead of gradients. However, EA will face a huge challenge, and their efficiency and effectiveness will be much reduced. To enhance their efficiency and effectiveness, in the fourth paper, Fei Wei et al. present a Problem Adaptive Variable Grouping Strategy (PAVG), which can group the variables into several non-interacting subcomponents. Then, combining with PAVG, they further propose a cooperative co-evolution algorithm with problem adaptive variable grouping strategy (CCPA). In this way, a large scale problem can be decomposed into several small scale problems to ensure both the high solution quality and low computational consumption. The experimental results show that their proposal is more efficient and effective than other state-of-the-art approaches. Moreover, in order to help EA escape the local optima and improve the algorithm's performance, in the sixth paper, Haiyan Liu et al. design a basin escaping auxiliary function method, which adopts the idea of the filled function to move from a local minimum to better ones successively. They study and discuss the properties of this new auxiliary

¹ Y. Xia, M.-H. Hung, R. Hu, Performance Prediction of Air-conditioning Systems Based on Fuzzy Neural Network, Journal of Computers 29(2)(2018) 7-20.

function, and show its effectiveness through the experiment.

Pattern Matching (PM) was historically one of the key problems in computer science, and the Multi-Pattern Matching (MPM) is a primitive but important technique which can be used in many applications such as Information Retrieval (IR), Intrusion Detection System (IDS), Anti-virus System (AVS), Bio-informatics, etc. Since the number of patterns to be matched becomes huge in some applications, how to design efficient MPM algorithms for large-scale pattern matching has become a challenge in the big data context. In the third paper, Zhan Peng et al. propose an adaptive architecture for multi-pattern matching (AAMP), which is based on a new data structure called adaptive matching tree (AMT) to efficiently match the patterns. The experimental results show that, AAMP has a strong robustness on pattern sets with short patterns, and it can offer an excellent support for large pattern sets.

Model checking technique is widely applied in the design and verification of a finite-control concurrent system. In the fifth paper, Hua Jiang et al. study the partial ordering relation among the intermediate results in the computation process of model checking of μ -predicate ambient logic, and designs a kind of high performance algorithm, and further algorithm complexity analyzing presents that it is close to the demand of practical application. This is the first algorithm which exponent of time complexity is $d/2+2$, the exponent of space complexity is $d/2$ (d is the alternate nesting depth of fix point operator in the formula) and this is the third model-checking algorithm for predicate ambient logic with recursion.

The key issues in the development of Web service composition are the dynamic and efficient reliability prediction and the selecting component services appropriately. In the last paper, Weitao Ha et al. discuss reliability prediction and Quality of Service (QoS) optimal selection in the Web service composition. In particular, they propose a reliability prediction model based on Petri net, and then they propose a new skyline algorithm based on a R-tree index. The experiment results show that their approach is quadratic in term of selection and service size, in the majority of cases, which is the best solution in terms of QoS.

We hope this issue represents an interesting combination of current research activities in information science and big data analytics and provides valuable research results. And, we would like to thank all the authors who submitted papers to this special issue and the reviewers for their efforts and excellent work.