

Editorial Preface

Special Issue on New Technologies in Big Data Era

Zhigao Zheng, Central China Normal University, Wuhan, China

In the era of big data, the complexity of data analysis and information extraction has grown dramatically. There is an increasing demand for scalable solutions that can handle the storage and acquisition bandwidth of current sensing and data analysis systems. Every discussion on Big Data usually includes a passing reference to the ubiquity of sensors: as we collect more data through sensors, we'll need tools to take advantage of data. The focus has been primarily on the tools that help you store & manage, visualize & summarize, and finally analyze and make sense of Big Data collections. Since the leading Big Data innovators have tended to be web companies, data acquisition has often involved data exhaust or crawled data. The mechanics and details of collecting data from the physical world has garnered less attention.

Rather than store and discard many signals/measurements, it would be more efficient if one can acquire only the necessary signals to begin with. Nowadays, to keep abreast with the development in computational technologies, the big data processing system and the information management system have undergone a great change with the new computation method is getting more popular and the internet technology has also evolved swiftly, the new method has impact on the big data processing and information management system changes.

There are 68 submissions, we accept 5 papers after peer review, which focused on new technologies in big data era. Recently, many issues are still waiting for solution in this area. This special issue aims to bring, for academics as well as industrial practitioners, a set of articles discussing the recent patents on core topics of heterogeneous computing era, including heterogeneous computing design, application of heterogeneous computing and so on. The list of papers is as follows.

1. “Real-time Unspecified Major Sub-Events Detection in the Twitter Data Stream That Cause the Change in the Sentiment Score of the Targeted Event” by Ritesh Srivastava, and MPS Bhatia performed the real-time analysis of the tweets related to a targeted event (e.g. election) to identify those potential sub-events that occurred in the real world, discussed over Twitter and cause the significant change in the aggregated sentiment score of the targeted event with time. Such type of analysis can enrich the real-time decision-making ability of the event bearer. The proposed approach utilizes a three-step process: (1) Real-time sentiment analysis of tweets (2) Application of Bayesian Change Points Detection to determine the sentiment change points (3) Major sub-events detection that have influenced the sentiment of targeted event. Experiments show the paper works well than traditional method.
2. “A Model Transformation Approach for Specifying Real-Time Systems and Its Verification Using RT-Maude” by Messaoud Bendiaf, Mustapha Bourahla, Malika Boudia, et. al. proposed an

approach based on model transformation to apply formal verification techniques to demonstrate the correctness of system designs. Firstly, the author describes real-time systems by state chart (machine) diagrams, as source models to generate RT-Maude models (target models). Then, the author uses the result models to verify the real-time systems against specified LTL properties using Maude LTL Model-Checker. At the last, the author designed some experiments to verify the proposed method.

3. “Study on Secure Dynamic Covering Algorithm for E-logistics Information in a Cloud Computing Platform” by Y. He proposed a secure dynamic covering algorithm for e-logistics information based on the basis of directional clustering for the envelope of optimization solution vectors. A data network distribution model of e-logistics information on a cloud computing platform is constructed to extract features of e-logistics information and to construct time series of information flows. The directional clustering algorithm for the envelope of optimization solution vectors is introduced to schedule features of e-logistics information. The experimental results show that the proposed algorithm has higher coverage rate, smaller error, and increases performance of e-logistics information transmission and higher application value on a cloud computing platform.
4. “The big data processing of HF sky-wave radar sea echo for detection of sea moving targets” by Q.Z. Lei, Z.X. Wu, L.X. Guo, et al. proposed a set of data processing methods, and then implemented the methods on the sea moving target detection. By setting the HF sky-wave radar parameters, after the initial data processing, the gotten HF sky-wave radar data were saved. Then a new HF sky-wave radar data processing method was provided, this method was the so-called three-step detection method (TSTM) which based on the constant false alarm rate (CFAR) technique. By using TSTM, setting the decision threshold G , with false alarms being ruled out, a moving target was detected out at last, its speed was calculated. The results also proved that TSTM could effectively reduce the sea clutter, and greatly lessen the echo-broadening and double-image caused by ionosphere contamination.
5. “HDAC High-dimensional Data Aggregation Control Algorithm for Big Data in Wireless Sensor Networks” by Z.Y. Sun and X.H. Ji proposed a High-dimensional Data Aggregation Control Algorithm for Big Data (HDAC). The algorithm uses information to eliminate the dimension not matching with the specified requirements. Then it uses the principal components method to analyze the rest dimension. Thus, the simplest method is used to reduce the calculation of dimensionality reduction as can as it possible. In the process of data aggregation, the self-adaptive data aggregation mechanism is used to reduce the phenomenon of network delay. Finally, the simulation shows that the algorithm can improve the performance of node energy-consumption, rate of the data post-back and the data delay.

We hope that new researches and applications in this exciting field are interesting and helpful. The authors listed are all experienced researchers of the field, have already published high-level papers in this area.

Zhigao Zheng
Guest Editor
IJITWE