

---

## Editorial

---

### Marimuthu Karuppiah

School of Computing Science and Engineering,  
VIT University,  
Katpadi, Vellore, 632014, India  
Email: marimuthume@gmail.com

**Biographical notes:** Marimuthu Karuppiah is now an Associate Professor from the School of Computing Science and Engineering, VIT University, Vellore, India. He has authored or co-authored more than 50 research papers in journals and conference proceedings of international repute. He is a life member of Cryptology Research Society of India (CRSI) and Computer Society of India (CSI). He is a senior member of IEEE and member of ACM. His main research interests include cryptography and wireless network security, in particular, authentication and encryption schemes.

---

## 1 Background

The development and successful applications of wireless sensor networks (WSNs) have promoted the information processing of a huge amount of data in various fields. Such big data requires exceptional technologies to efficiently process large quantities of data within tolerable elapsed times. As WSNs become remarkably progressed in terms of their network equipment and hardware, it is critical to design self-organising and efficient protocols for various WSN applications, such as data acquisition from distributed sensor devices, data processing and analysis, efficient communication and management, and environmental monitoring and control. For instance, vehicular networking and communication systems represent an area of significant importance in our increasingly connected and mobile world. Effective vehicular connectivity techniques can significantly enhance efficiency of travel, reduce traffic incidents, improve safety, mitigate the impact of congestion, and make our experience more comfortable.

This special issue shall throw light on recent technical advances and research issues in data acquisition, processing and analysis, communication and management for big data inspired by WSN technologies and applications. This special issue has acknowledged overwhelming responses from researchers, and it has received many high-quality submissions from various countries around the world. All the submitted papers have been reviewed by at least three independent experts. We expect that this special issue focusing on recent technical advances and research issues in data acquisition, processing and analysis, communication and management for big data inspired by WSN technologies and applications, and it also delivers stimulations for future research.

## 2 Papers in special section

In the paper entitled ‘Design of candidate schedules for applying iterative ordinal optimisation for scheduling technique on cloud computing platform’, Monika Yadav et al. created a set of 30 candidate schedules denoted by set  $U$ . The set  $U$  is used in the exhaustive search of the best schedule. After analysing the set  $U$ , an ordered schedule vs. makespan graph is plotted. So in this work, set  $U$  is defined and created a base for applying IOO method to get optimal schedules. In this work, CloudSim version 3.0 has been used to test and analyse policies.

The paper of Jianfeng Cui and Weina Fu entitled ‘Mobile self-organising network positioning algorithm based on node clustering’ proposes the narrative principle of mobile self-organising network based on node clustering is completed by building RSSI ranging model. Then, the transmission loss is converted into the node propagation distance, and the node position of the mobile self-organising network is calculated. The simulation experiment results show that node coverage of DV-hop positioning algorithm is higher than traditional algorithm. Besides, the spatial localisation of mobile self-organising network nodes is conducive to expanding the network space node coverage rate, thereby improving the positioning accuracy.

In the paper entitled ‘The information security scheduling method of vehicle self-organising system for wireless sensor’, Ming Cheng Peng and Hui Lu proposed a wireless sensor-based information security scheduling method for vehicle self-organising systems. Then compared with differences of dispatch route length and management time of traffic dispatch for traditional neural network system and our proposed system security scheduling method, the superiority of our proposed method is reflected. Experimental results show that schedule length obtained by our proposed method is at least 200 m shorter than those results obtained by the traditional method in the comparison of evacuation dispatch route length of traffic jam. At the same time, time consuming is at least shorter than those results obtained by the traditional method in the comparison of evacuation dispatch management time for traffic jams.

The paper of Yunfan Lu et al. entitled ‘Research on algorithm of information transmission path planning in big data environment’ proposes an information transmission path planning algorithm based on an ingress-priority under big data environment. Based on this algorithm, a method for evaluating the information transmission path planning is obtained. Then analysis model of the information transmission path planning is constructed. Based on these, dynamic information transmission path planning is implemented by utilising priority multi-actuators. Experiments show that our proposed method can effectively improve the efficiency of information transmission path planning, ensure the accuracy of information after transmission and improve the quality of information transmission.

In the paper entitled ‘Research on virus diffusion prevention method for computer singularity in complex sensor networks’, Lei Ma et al. proposes a new SIS propagation model is proposed based on mean field theory for the case of infectious vector and propagation delay. The influence of computer virus infectious vector and propagation delay in complex sensor networks on the propagation property is analysed. Experimental results show that target immune network connectivity factor ratio of our method is only 0.18, lower than 0.37 multiples of nearest neighbour immunity which indicates that viral immune infection density of our method is low.

The paper of Yongjun Qin and Gihong Min entitled ‘Outlier data mining of multivariate time series based on association rule mapping’ proposes an outlier data mining method of time series based on association mapping. By using association rule mapping between datasets, the association rule of datasets is determined. The mining factor and relative error are introduced to improve the precision of data mining. The shuffled frog leaping clustering algorithm is applied to cluster the mining factor. The cluster-based multivariate time series classification is used for classification of clusters based on training set category of time series combined with modified K-nearest neighbour algorithm to achieve classification of time series data and outlier data mining. Experimental results show that running time is only 12.9 s when the number of datasets is 200.

In the paper entitled ‘Trust-based fruit fly optimisation algorithm for task scheduling in a cloud environment’, Priya Govindaraj and Jaisankar Natarajan proposed a novel trust-based fruit fly optimisation (TFOA) algorithm for task scheduling. Even though traditional scheduling algorithms, namely first come first serve, round robin, ant colony optimisation and so on are used broadly in cloud computing process but still efficient scheduling is not achieved. In general cloud service provider desires to receive the customer task in a faster rate and the resource allocation to the task is to be done in a proper way. In this proposed work, tasks are allocated on the most trustworthy resource by using TFOA. Simulation outcomes show that the proposed algorithm performs better than the existing transitional algorithms like round robin and particle swarm optimisation (PSO) in terms of reduced makespan and turnaround time and efficient resource utilisation.

The paper of Jasem M. Alostad entitled ‘Reliability in IoUT enabled underwater sensor networks using dynamic adaptive routing protocol’ focuses a trade-off between the energy consumption and network lifetime. This paper proposes an optimal routing protocol called the energy dynamic adaptive routing (DAR) protocol. The DAR protocol maintains a trade-off between the reliability or packet delivery ratio (PDR) of sensor nodes and bit error ratio (BER) using an optimal dynamic adaptive routing approach. The proposed approach operates on three different phases, namely: initialisation, dynamic routing and transmission. During the initial phase, all the nodes in the UWSN share location and residual energy information among all the nodes in the network. During the dynamic routing phase, an optimal directed acyclic graph (DAG)-based route selection is exploited to select the neighbour and successor nodes.

In the paper entitled ‘Multi-source remote sensing image big data classification system design in cloud computing environment’, Xuan-Yue Tong et al. proposed the multi-source remote sensing image data classification system under cloud computing. Following the line string transmission protocol architecture, relevant information is processed, transformed and fused. Data are transported to the host through protocol transmission. Based on above principle, the system hardware and software are designed. Detailedly, designing hardware system refers to designing image sensor interface and system processing interface. The design of the system software part can be divided into two parts, including the two-wire serial protocol formulation and the image big data classification algorithm that provides users with initialisation operations.

In the paper entitled ‘Research and analysis on sensitive data encryption method in accounting information processing system’, Heng Li proposes a hybrid encryption method for sensitive data of accounting information processing system in order to improve the security of encryption. Firstly, the sensitive data was preprocessed. Then,

based on the elliptic curve encryption mechanism, the additive and multiplicative homomorphic encryption methods of sensitive data were constructed respectively. Experimental results showed that the cryptographic running time obtained by our proposed method was relatively small and the increase in decryption computation overhead was smaller than the traditional method.