Editorial

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1   Introduction

With the rapid development of the Internet of Things (IoT) (Xhafa et al., 2020), the edge computing paradigm is emerging as an attractive solution for processing the data of IoT applications. In the edge environment, IoT applications are executed by the intermediate computing nodes, as well as the physical servers in cloud data centres. Fog computing aims to connect existing resources in the vicinity of the IoT smart devices and sensors for providing cloud services in a timely manner with minimum accesses and supporting Quality of Service (QoS) factors to the cloud data centres. Owing to the highly variable and unpredictable edge environment, resource management issues are one of the challenging problems to be taken into account in the edge landscape. Hence, for the reasonable management of fog nodes, even for case studies, high security is necessary to increase the edge computing efficiency. Therefore, we can focus on some of the important resource management issues as well as resource placement, resource scheduling, resource allocation, and resource provisioning.

On the other hand, an IoT device needs to select only secure and energy efficient edge service providers. Therefore, security, privacy, trust, energy and reliability factors in resource

management techniques are needed because not all smart devices will be secure and IoT devices have low power energy-saving capacity to provide requested services based on Service Level Agreements (SLA). Finally, the intelligent evaluation of the functional and non-functional properties of resource management solutions are challenging in fog computing.

2   Papers in this special issue

This special issue finalised and collected various scientific contributions, and 11 research studies have been accepted following a double blind peer review process.

Liu et al. in 'Web data mining algorithm based on cloud computing environment' present an enhanced C-means clustering algorithm, and a web data mining algorithm based on cloud computing environment for Hadoop platform. The experimental results in terms of effectiveness and acceleration ratio show that the improved and optimised algorithm in this paper solves the problem of insufficient speed and efficiency in the clustering process.

Ji et al. in 'Neural network classifier based on genetic algorithm image segmentation of subject robot optimisation system' propose a hybrid neural network based on genetic algorithm on image segmentation in the optimisation edge system of a classifier subject robot. The experimental results illustrate that the proposed hybrid algorithm has the obvious advantages of small error, high efficiency and applicability.

In their research 'Deep learning-based comprehensive monitor for smart power station', Zhong et al. present a novel inspection system based on deep learning and edge computing techniques. Using deep Q-learning, the experiment and simulation results demonstrate the reliability and efficiency of the proposed system in the case of autonomous substation monitoring.

In other research, Gao and Zhang, 'Power transmission line anomaly detection scheme based on CNN-transformer model', proposed a new intelligent method for anomaly detection in a power transmission grid system.

Liu and Zhou in 'Intelligent manufacturing system based on data mining algorithm', propose an evaluation model of intelligent manufacturing system based on a data mining algorithm in cloud computing.

In another study, 'Visualisation technology in digital intelligent warehouse management system', Tang and Zeng propose a visualisation technology for digital intelligent warehouse management, which combines Radio Frequency Identification (RFID) technology and Web Geographic Information System (GIS) technology, proposes software architecture, designs a database, and finally designs an intelligent warehouse management system based on visualisation technology.

He, in 'Image recognition technology based on neural network in robot vision system', analyses the application of image recognition technology based on neural network in a robot vision system. This research uses the CamVid training decoder to train the model, then fine-tunes the parameters on the collected data, labels the manually collected data with LabetMe annotation tool, and cross-verify the image and scene with a neural network algorithm and image recognition principle technology.

Wang in 'High-performance polar decoder for wireless sensor networks' presents an optimised polar belief propagation decoding algorithm through investigating approximation and several types of factor. Moreover, the systematic coding of polar codes is used to further improve the error-correction performance by increasing the acceptable encoding complexity. The proposed algorithm reduces the energy consumption and improves the information transmission reliability, which is suitable for the battery-operated low-complexity WSN applications.

Yang and Qi in 'Rapid analysis and detection algorithm and prevention countermeasures of urban traffic accidents under artificial intelligence' present a rapid analysis and detection algorithm and preventive countermeasures of urban traffic accidents under the artificial intelligence threshold. The experimental data show that the artificial intelligence-based urban traffic accident risk prediction model constructed in this paper can effectively predict the possible and potential accidents.

Dong and Bi in 'Mechanical fault detection method of weighing device sensor faced on internet of things' propose a mechanical detection method based on the sliding window principle and the load sensor fault of the internet of things, that is, the standard zero-drift fault detection method. By setting a threshold, the system can indicate a potential failure very early before reaching the absolute limit, and ensure that maintenance is performed in advance to continue proper operation of the machinery.

Finally, Li et al. in 'A medical specialty outpatient clinics recommendation system based on text mining' propose a speech-to-text, text mining (Jieba and the CRF model), and machine learning method to develop a medical specialty outpatient clinics recommendation model. They have also developed a prototype system that is combined with a chatbot-based interface for web- and mobile-based applications, and is designed to guide patients to select medical departments and specialties appropriate to their medical needs, thus reducing waiting times and the workload of front-line hospital staff.

3   Conclusion

This special issue includes peer-reviewed original articles that present new efforts to solve new challenges of resource management techniques in edge computing. These contributions represent several different aspects of intelligent methods based on data mining, machine learning, swarm intelligent algorithms and linear programming for edge computing in internet of things environments.

Reference

Xhafa, F., Kilic, B. and Krause, P. (2020) 'Evaluation of IoT stream processing at edge computing layer for semantic data enrichment', *Future Generation Computer Systems*, Vol. 105, pp.730–736.