# Guest Editorial: Special Issue on "Advanced Technologies of Mobile Cloud Platforms"

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Since 2015, the use of mobile Internet access has increased compared to PC. In addition, with the current activation of 5G and the introduction of 6G, services using mobile will be further increased. As a result, the use of mobile cloud is increasing, and the technology of mobile cloud is continuously developing. Therefore, in this special issue, we are looking for papers dealing with various technologies in the mobile cloud platform.

Areas relevant to mobile cloud platforms include, but are not limited to, new mobile cloud architecture and infrastructure, recent technologies of mobile cloud storage, recent technologies of mobile cloud networks, computation and data-intensive mobile cloud applications, task scheduling algorithms and techniques for mobile cloud platforms, resource management for mobile cloud platforms, serverless computing architecture and applications, container-based virtualization, hyper-converged infrastructure technologies, and artificial intelligence, machine learning, and deep learning technologies for mobile cloud platforms.

However, the collection is not limited to mobile cloud, but covers a wide range of areas including fog computing, edge computing, and cloud computing. We have selected the following four papers and would like to introduce them to you.

This paper [1] propose a deep learning-based dynamic cloud scheduling technique using intelligent agents, which intelligently adapt to users' requirements and selective quality of services based on distributed learning in edge-cloud computing environments. The proposed cloud task scheduling method is composed of two logical components: distributed learning management (learning distribution and aggregation) and intelligence management of multi-agents, which are independent of each other. The first component (distributed learning management) allows multi-agents to communicate with the parameter server and process local learning. The second component (intelligent management) lets each local agent perform intelligent orchestration of learning. The performance results show that the self-employed agents intelligently adapt to their environments and perform hyperparameter learning for efficient and effective task scheduling in edge-cloud computing environments. Overall, our cloud task scheduling technique adapts to the system environment using intelligent multi-agents based on requirements, quality of services, and service-level objectives.

This paper formulate the cloud task scheduling problem and edge-cloud computing environments with the fog management layer. Paper reveal the limitations of existing cloud task scheduling techniques with mini benchmark results. Paper design and implement a deep learning-based dynamic cloud scheduling technique using intelligent agents, which intelligently adapt to users' requirements and selective quality of services based on distributed learning. Paper compare the performance results with state-of-the-art studies based on deep Q-learning and deep reinforcement learning techniques. Paper propose two fundamental distributed algorithms, that is, 1) task scheduling algorithm for intelligent multi-agents and 2) adaptive learning process for an agent.

This paper [2] proposes a graph-enhanced spatio-temporal interval aware network (GESTIAN) to recommend the next POI.

With the rapid spread of mobile devices, technologies in mobile cloud increased quick and introduce huge volume of mobile data and computation. Human movement between POIs are recorded in mobile cloud, which indicate personalized behaviors. Most POI recommendation method in mobile cloud proposed to utilize recurrent neural networks and self-attention mechanism to discover users' potential movement behaviors. However, it is highly challenging due to the complexity of the urban geospatial structure and the highly nonlinear spatial and temporal dependence on human mobility and heterogeneity in mobile cloud platform. Cold start, which is the most common and unavoidable problem in the field of recommendation systems. Generally, existing POI recommendation models need to learn the potential users' movement patterns based on certain historical trajectory sequences. The difficulty of capturing the spatio-temporal relationship between non-adjacent check-ins. The user's travel preferences are complex with real-time and dynamic features, even distinguished behavior across different mobile cloud platforms.

In GESTIAN, authors propose a graph-based general pattern learning module to learn common behavior patterns based on a global trajectory flow graph to address the challenges caused by cold start. So, it is transforming the user check-in sequence gathered through mobile network into a trajectory flow graph and learn global universal features on it. The insufficient features of users with few check-in records are well processed, thereby improving the model performance in sparse data situations. Furthermore, we propose a heterogeneous network with spatio-temporal interval aware with self-attention and gate recurrent unit to extract users' long-term and short-term spatio-temporal dependencies, respectively. In addition, paper leverage the

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scale between positive and negative samples by randomly sampling negative samples.

Paper conduct extensive experiments using two real-world datasets. Experimental evaluations demonstrate that the proposed model significantly outperforms state-of-the-art methods in most evaluation metrics and analyzed the impact of each of our components on experimental results. The experimental evaluations demonstrate that the proposed GESTIAN outperforms most challenging baselines by approximately 2%-10%, and achieves better performance over few-check-in history users.

This paper [3] discusses the implementation of efficient techniques for analyzing and detecting intelligent security attacks with the aim of predicting external threats using state-of-the-art security technologies in the rapidly evolving IT landscape. To enhance security intelligence, it involves the real-time integration and analysis of all logs, enabling the proactive identification of advanced security threats through correlation analysis of internal IT assets, including security events and network flows.

This paper connected a total of 12 log types by configuring various operating systems. The logical and physical configurations were established and managed using a Security Information and Event Management (SIEM) solution. The experiment was structured into four distinct stages:

Log Collection (Step 1): Gathering logs from various sources.

Log Analysis and Parsing (Step 2): Analyzing and parsing the collected logs.

User-Generated Rules (Step 3): Creating customized rules to define security threats.

Security Threat Detection (Step 4): Employing the established rules and parsed log data to detect security threats.

Throughout these stages, the experiments were executed, demonstrating the detection of sensitive information and correlation analysis as key outcomes.

One of the main issues to cloud systems is the utilization of actual applications in the various areas. The final paper on the actual application theme, ‘‘Design and Implementation for Research Paper Classification based on CNN and RNN Models’’ by Dipto Biswas et al. [4], considers the classification and recommendation of research papers. Deep learning techniques are used as a basic and essential technique in natural language processing; in detail, “Long Short-Term Memory” (LSTM) and “Gated Recurrent Units” (GRU) deep learning techniques are applied to the classification of research papers, respectively. This paper combines Bidirectional LSTM and GRU with “Convolutional Neural Networks” (CNNs) to boost classification performance for a specific distribution. Word embedding and deep learning techniques are used to classify and recommend research papers. The six types of models that CNN with combining LSTM, GRU and Bidirectional RNN models are applied to the classification of FGCS research paper abstracts, and the performance of those models is compared and analyzed with accuracy, model training time, and F-Score performance metrics. The CNN combining with RNN of various types of models relatively shows high accuracy compared to LSTM and GRU basic models. The performance of evaluation results also shows that the word embedding-based Sg technique has higher performance than the CBOW technique.

## References

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