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Editorial: Intelligent Collaboration Under Internet of Things and Mobile Edge Computing

Honghao Gao[1] · **Jing Liu**[2]

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Editorial comments:

With the development of Internet of Things, the exponential growth of data and communication delay demands a new computing paradigm. Mobile edge computing can handle data at the nearest available nodes, which enables that millions of connected mobile devices can execute real-time applications directly at the network edge. It is the way to intelligent collaboration to support the machine-to-machine communications and new user-centric applications. This special issue selected seven papers. A summary of these papers is outlined below.

In the paper entitled '*A Deep Learning Approach to Detection and Mitigation of Distributed Denial of Service Attacks in High Availability Intelligent Transport Systems*' by Mahajan et al., the authors propose a deep learning-based model for the identification and alleviation of DDoS attacks in SIP-based networks. The datasets used for conducting experiments are created by emulating SIP sessions, generating DDoS attacks, capturing the normal and attack flows and extracting time window-based features from the packets. A stacked autoencoder model is trained on the curated datasets to detect various types of DDoS attacks. Once an attack is detected, the Mitigation Policy Recommender module recommends various actions for threat mitigation.

In the paper entitled '*An Optimized Collaborative Scheduling Algorithm for Prioritized Tasks with Shared Resources in Mobile-Edge and Cloud Computing Systems*' by Amer et al., the authors develop a two-level cooperative scheduling algorithm with a centralized orchestrator layer. The first scheduling level is used to schedule tasks on MEC servers in local. In contrast, the second level resides at the orchestrator and assigns tasks to a neighboring base station or the cloud. The tasks serve following their priority, which is determined by the latency and required throughput. They also design a resource optimization algorithm for determining resource distribution to ensure service availability at the minimum cost, which contains two variations for the traffic is uniformly distributed and the traffic load is unbalanced among base stations.

In the paper entitled '*Deep Reinforcement Learning for Load Balancing of Edge Servers in IoV*' by Li et al., a load balancing algorithm based on Deep Q Network (DQN) is proposed, to minimize the mean square deviation of the load on the edge servers. The method transforms the decision-making process of multi-edge server load balancing into a single server decision-making process. Then, they design the guiding reward as DQN training algorithm setup reward mechanism. Finally, the goal optimization is to find the maximum value of the reward.

In the paper entitled '*Mobile Edge Server Deployment towards Task Offloading in Mobile Edge Computing: A Clustering Approach*' by Li et al., the authors use the improved K-Means clustering to determine the theoretical location and amount of edge servers. Besides, mobile computation tasks are strategically assigned to the distance-first edge server. To this purpose, they develop a reasonable deployment scheme which can effectively reduce the network delay, energy consumption, and cost of edge servers. The simulation results show that their strategy reduces the average completion time by 15.7%, the power consumption by 22%, and the overhead by 19% during edge server deployment.

In the paper entitled '*An Online Adjustment based Node Placement Mechanism for the NFV-enabled MEC Network*' by Liang et al., the authors propose an Online Adjustment based MEC node Placement mechanism (OAMP). First, the node placement problem is constructed as a class of set coverage problems based on the average historical load of nodes. The backtracking algorithm of depth-first search is used to obtain the optimal initial placement strategy. Then,

✉ Honghao Gao
gaohonghao@shu.edu.cn

Jing Liu
jliu@sei.ecnu.edu.cn

[1] Shanghai University, Shanghai, China

[2] East China Normal University, Shanghai, China

according to users' QoE (quality of experience), the fuzzy neural network is used to determine whether the deployment of MEC nodes needs to be adjusted. Finally, the number and location of MEC nodes are updated intelligently by Deep Q-Network (DQN) algorithm.

In the paper entitled '*Robust and Cost-effective Resource Allocation for Complex IoT Applications in Edge-Cloud Collaboration*' by Xiang et al., the authors study the cost-effective performance optimization problem in robust edge-cloud application systems and prove the convexity of the approximated problem. The experiment results show that their approach outperforms other baselines in performance, cost, and robustness.

In the paper entitled '*Adaptive Clustered Federated Learning for Heterogeneous Data in Edge Computing*' by Gong et al., the authors present an adaptive clustered federated learning approach, AdaCFL, which can classify clients into suitable clusters considering the local model weights and data distribution on clients. This method relies on the partial selected model weights to measure the data similarity between clients. It can group them into the optimal number of clusters in the adaptive way.

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Honghao Gao , Shanghai University, China. gaohonghao@shu.edu.cn. Honghao Gao is currently with the School of Computer Engineering and Science, Shanghai University, China. He is also a Professor at Gachon University, South Korea. Prior to that, he was a Research Fellow with the Software Engineering Information Technology Institute at Central Michigan University, USA, and was an Adjunct Professor at Hangzhou Dianzi University, China. His research interests include Software Formal Verification, Industrial IoT Networks, Vehicle Communication, and Intelligent Medical Image Processing. He has publications in IEEE TII, IEEE T-ITS, IEEE TNNLS, IEEE TSC, IEEE TNSE, IEEE TNSM, IEEE TCCN, IEEE TGCN, IEEE TCSS, IEEE TETCI, IEEE/ACM TCBB, IEEE IoT-J, IEEE JBHI, IEEE Network, ACM TOIT, ACM TOMM, ACM TOSN, ACM TMIS. He is a Fellow of the Institution of Engineering and Technology (IET), and a Fellow of the British Computer Society (BCS).

Jing Liu East China Normal University, China. jliu@sei.ecnu.edu.cn. Jing Liu is currently a Professor of computer science with East China Normal University (ECNU), China. In recent years, she is currently involved in the area of model driven architecture. Her current works focus on the design of real-time embedded systems and cyber-physical systems.