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Editorial: Emerging Networking Technology for Internet of Things

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1 Editorial

The Internet of Things (IoT) is considered to be one of the most critical network forms that the next generation wireless network must support, which will increasingly affect human life and work. Network technology is one of the core technologies of the Internet of Things since it is responsible for connecting multiple devices of the Internet of Things efficiently to achieve the purpose of information transmission, data processing and resource sharing. In recent years, academia has proposed many valuable protocols, algorithms and solutions for the networking technology of Internet of Things, while industry and standardization organizations (such as 3GPP and IEEE) are also accelerating the standardization process of the Internet of Things. At present, the Internet of Things is expanding to the fields of vehicle network, smart city, smart home, space network and so on. In order to cope with the rapid development of application scenarios and business service requirements, Internet of Things networking needs to explore and introduce a series of emerging research results. Therefore, the special issue focuses on the emerging networking technologies for the next generation IoT.

This special issue features 12 selected papers with high quality. The first article, "Survey on wireless networks coexistence: resource sharing in the 5G era", faced to the coexistence of various radio access technologies in the 5G era. The authors surveyed the existing and upcoming standards and investigated the access layer solutions for unlicensed bands. Furthermore, resource sharing mechanism was analyzed in this paper.

WLAN is an important network type for IoT. The second article titled "Survey and Perspective on Extremely High Throughput (EHT) WLAN — IEEE 802.11be" focused on the next generation WLAN standard: IEEE 802.11be, achieving extremely high throughput (EHT) as its core technical objective. The target scenario, technical objective, standardization process, key technologies including multi-band operation, multi-AP coordination, enhanced link reliability, and latency & jitter guarantee were surveyed and analyzed. The authors also provided some insights for the next generation WLAN.

In the next article with the title "Joint pyramid feature representation network for vehicle re-identification", the authors proposed a joint pyramid feature representation network named JPFRN for vehicle re-identification (Re-ID). JPFRN integrated the vehicle features with different resolutions and different degrees of semantic information. In this case, it achieved the purpose of multi-resolution representation, and ultimately achieved the richer representation of vehicle targets.

The fourth article titled "A high precision direction-finding method based on multi-baseline for target rescue" aimed at eliminating the angle ambiguity introduced by the direction-finding algorithm based on the phase comparison method. The authors proposed a high precision DF method based on the multi-baseline and multi-antenna for target rescue, and the error of the proposed DF method was within 2° which met the needs of high-precision target rescue.

Mobile fog computing is a hot topic for wireless networks and IoT industry. The fifth article, "Dynamic Weighted Fog Computing Device Placement Using a Bat-inspired Algorithm with Dynamic Local Search Selection" focused on the deployment problem of edge devices in fog computing system. The authors theoretically modeled the problem and utilized bat-inspired algorithm to efficiently solve the problem to improve the system performance.

The sixth article titled "QoE aware IoT Application Placement in Fog Computing using Modified-TOPSIS"

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provided a solution for application deployment for fog computing system. The authors proposed a lightweight Quality of Experience (QoE) aware application placement policy in fog computing. The algorithm can obtain the desired resource utilization as well as reduces the application placement time.

The seventh article titled "Deep Learning Based Resources Allocation for Internet-of-Things Deployment Underlaying Cellular networks" introduced deep learning methods into resource allocation (RA) task for IoT networks. The authors modeled the RA problem as a two-dimensional matching problem, and then recurrent neural network (RNN) based deep learning models were presented. High accuracy and efficiency were obtained by using the proposed scheme.

The eighth article titled "Smart Edge Caching-aided Partial Opportunistic Interference Alignment in HetNets" proposed smart edge caching-aided partial opportunistic interference alignment with deep reinforcement learning for IoT downlink system in HetNets. Towards this end, the proposed scheme can update the base station cache dynamically, and then select the optimal cache-enabled POIA user group considering the time-varying user's requests and time-varying wireless channels. Extensive evaluations demonstrate that the proposed method is effectiveness according to sum rate and energy efficiency of system.

In the next article with the title "Mobile Edge Computing against Smart Attacks with Deep Reinforcement Learning in Cognitive MIMO IoT Systems", the authors investigated a secure communication problem in a cognitive MIMO IoT system comprising of a primary user (PU), a secondary user (SU), a smart attacker and several MEC servers. To help the SU to maximize spectrum efficiency and system security, a Dyna architecture and prioritized sweeping (Dyna-PS) based Edge Server Selection (DPESS) scheme is firstly proposed. In order to improve the speed of learning in dynamic environments, a Deep Q-network (DQN) based Edge Server Selection (DESS) strategy is further developed.

The tenth article titled "A Sampling-based 3D Point Cloud Compression Algorithm for Immersive Communication" the author proposed a sampling-based compression algorithm for 3D point cloud to improve the coding efficiency. In this algorithm, a 3D point cloud is first down-sampled with the graph filter, then compressed, and finally reconstructed by a Convolutional Neural Network-based upsampling method.

The eleventh article, "Conflict Graph Based Concurrent Transmission Scheduling Algorithms for the Next Generation WLAN Networks" targeted at the spatial time division multiple access (STDMA) scheduling problem for the next generation WLAN. The authors modeled the problem as a multiple-step optimization problem and introduced a bi-weighted conflict graph to model the concurrent transmissions' interference relationships. After that, two algorithms with low complexity and better performance were proposed.

In the last article, titled "Distributed Scheduling in Wireless Multiple Decode-and-forward Relay Networks", the distributed opportunistic scheduling problem in wireless multiple relays networks was studied. The problem was formulated as an extended multistage stopping problem, and further an optimal strategy with a tri-level threshold structure was proposed to maximize the average network throughput.

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