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Editorial: special issue on "artificial intelligence for future wireless communications and networking"

Recent breakthroughs in Artificial Intelligence (AI) and Machine Learning (ML), including deep neural networks, the availability of huge amount of data, and powerful computing platforms are providing us with technologies to perform tasks that once seemed impossible. The recent win of AlphaGo over the world champion Mr. Lee Sedol has witnessed the power of AI beyond what many of us can imagine. In the near future, autonomous vehicles, intelligent mobile networks, and intelligent internet-of-things will become a norm and AI will be one of the key technologies to make all these possible. Therefore, we forsee that AI can provide many new and unprecedented opportunities in the way we design our wireless and wired data pipelines, the way we manage and optimize our wireless and wired networks, and the way we manage and deliver different user services and user content.

The purpose of this special issue is to explore and understand how advanced innovations in ML can enable the application of AI in future wireless communications and networking. We received a considerable number of submissions from different countries. After a rigorous review process, we assembled eight papers based on relevance and fit. It covers a wide range of topics including fog computing, mobile edge computing, caching, internet-of-things, aerial communications, MIMO systems, signal detection, and energy-aware and delay-aware optimization. These papers provide a diverse perspective on the potential application of AI in future wireless communications and networking.

The first paper entitled "Enabling intelligence in fog computing to achieve energy and latency reduction" shows how device and human-driven intelligence can be a key enabler to achieve better energy consumption and latency in fog computing in two scenarios. The first scenario employs ML to design content-aware medium access control mechanism in fog computing. The second scenario considers an intelligent task offloading algorithm design in fog computing.

The second paper entitled "Deep reinforcement learning-based joint task offloading and bandwidth allocation for multi-user mobile edge computing" proposes a deep-Q network based task offloading and bandwidth allocation for mobile edge computing. The objective of minimization problem is the overall offloading cost, which includes the energy cost, computation cost, and delay cost.

The third paper entitled "Caching resource management of mobile edge network based on Stackelberg game" considers a network composed of one operator, multiple users, and content providers. To solve the best caching resource allocation scheme, the original problem is transformed into a multi-leader multi-follower Stackelberg game model.

The paper by Wang et al. studies the joint content caching and updating strategy in Internet-of-Thing (IoT) networks by taking both the sensors' energy consumption and contents' freshness loss into account. This content caching and updating problem is formulated as a mixed integer non-convex optimization program and a harmony search based algorithm is proposed.

The fifth paper entitled "Antenna selection for MIMO system based on pattern recognition" proposes pattern recognition methods to carry out the transmit antenna selection algorithm in MIMO system. In particular, the K-nearest neighbour algorithm and the support vector machine algorithm have been modified to perform low-complexity but high-efficient transmit antenna selection.

The paper by Islam et al. develops a novel strategy for further improving the energy efficiency of an aerial base station by considering ternary state transceivers. Furthermore, a Markovian Decision process based algorithm, which intelligently switches between the states of the transceivers based on the traffic whilst maintaining a prescribed minimum channel rate per user, has been proposed.

The paper by Wu et al. considers the detection problem of weak harmonic signal under strong chaotic interference using an extended Kalman filter detection method. This method avoids matrix inversion by iterating from measurement equation and state equation, which makes it robust as well as computationally efficient.

In the final paper entitled "Traffic-driven epidemic spreading and its control strategies" provides an overview of traffic-driven epidemic spreading in complex networks. Furthermore, the control of traffic-driven epidemic spreading is discussed by focusing on network structure optimization and immunization strategies.

In summary, we received many papers in response to the call for papers of this special issue. We would like to express our appreciation to all the authors who submitted their research works to our issue. We would also like to thank all the reviewers who provided critical reviews of the diverse set of papers that we received. Finally, we would like to acknowledge Dr. Chonggang Wang, DCN's Editor-in-Chief who was very supportive of our issue and Prof. Yun Li, DCN Executive Associate Editor who provided countless advice and assistance, and of course Ms. Yi Guo for her professional assistance throughout the entire process. We hope that you will enjoy the papers in our special issue.

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