DATA SCIENCE AND ARTIFICIAL INTELLIGENCE FOR COMMUNICATIONS


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Advances in artificial intelligence (AI), particularly taking advantage of rapidly increasing network and user behavior data, indicates a new technological frontier of communications and networking, not only in new methodology in systems and network design, but also in new network architecture accommodating machine learning (ML) for broader and efficient services. This series is dedicated to introducing new trends, approaches, methods, systems, as well as network architecture, applying AI, ML, and data analytics.

Since the creation of this series, a great number of manuscripts have been submitted. With the remarkable assistance from reviewers, the series editors commit the best possible selection of articles to accommodate the readers' technical interest. In this issue, just two months away from an earlier issue, three articles are selected to present new technical advancement in applying AI and data science for communications.

An immediate application of machine learning to networks is to predictively comprehend the throughput in a cellular network and thus toward better network design and performance. It is difficult due to highly dynamic wireless communication environments and complex traffic services to users. Darijo Raca, Ahmed H. Zahran, Cormac J. Sreenan, Rakesh K. Sinha, Emir Halepovic, Rittwik Jana, and Vijay Gopalakrishnan, in the article "On Leveraging Machine and Deep Learning for Throughput Prediction in Cellular Networks: Design, Performance, and Challenges," target throughput prediction and cellular resource scheduling. By establishing the system model, random forest, support vector machine, and long short-term memory, are considered to implement machine learning, and HTTP adaptive video streaming is further selected as the use case of interest to verify the methodology, with further suggested open issues.

Among the broad services to users in the state-of-the-art communication networks, the technology to tailor the services for each person while keeping the privacy emerges as a great challenge for the operators. Rawan Alkurd, Ibrahim Abualhaol, and Halim Yanikomeroglu, in "Big Data-Driven and AI-based Framework to Enable Personalization in Wireless Networks," utilize the technologies of AI, big data analytics, and real-time non-intrusive user feedback to develop the framework for personalization. Based on each user's personal QoS requirements, a multi-objective optimization is formed together with a user satisfaction model. An experiment using a synthesized dataset successfully demonstrates the proposed framework.

In addition to applying ML technology to communication networks, the appropriate network architecture emerges as a critical technological stage. A Focus Group on Machine Learning for Future Network Architecture (ML5G) has been established under the Standardization Sector in the International Telecommunication Union – Telecommunication (ITU-T) during 2017-2020. In the article "A Flexible Machine Learning-Aware Architecture for Future WLANs," Francesc Wilhelmi, Sergio Barrachina-Muñoz, Boris Bellalta, Cristina Cano, Anders Jonsson, and Vishnu Ram, successfully demonstrate logic operation of applying ML to wireless LANs to illustrate the ML5G unified architecture.

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BIOGRAPHIES

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