An Overview of AI/ML in Wireless Communications

Y.-W. Peter Hong
National Tsing Hua University, Taiwan

Abstract

The success of artificial intelligence (AI) and machine learning (ML) in several modern consumer applications, such as speech and image recognition, recommender systems, autonomous driving, have motivated the study of AI/ML in wireless communications. This trend is strengthened by the growing need for automation in the increasingly complex wireless mobile system, especially as the industry moves rapidly from 4G to 5G (and even 6G). In this talk, I will give a tutorial on the use of AI/ML in wireless communications. First, I will talk about why AI/ML has received so much attention in wireless communications, and review the basics of deep learning, which is the predominant tool in this area. Then, by summarizing the works of several different researchers, we examine how AI/ML is commonly employed to solve challenging problems in wireless communications. We focus mostly on physical layer aspects, such as channel estimation, channel encoding/decoding, and beamforming, but will also touch upon networking aspects, such as network slicing. Finally, I will share my knowledge of recent standardization activities in this area.

Biography of Y.-W. Peter Hong

Y.-W. Peter Hong received his B.S. degree from National Taiwan University in 1999, and his Ph.D. degree from Cornell University in 2005, both in electrical engineering. He joined the Institute of Communications Engineering and the Department of Electrical Engineering at National Tsing Hua University, Hsinchu, Taiwan, in Fall 2005, where he is now a Full Professor. His research interests include AI/ML in wireless communications, signal processing for sensor networks, UAV communications, distributed learning and optimization, and physical layer secrecy.