

Spectrally - Efficient Multiple Access and Resource Allocation Design for B5G/6G Networks Exploiting Deep Reinforcement Learning

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Abstract

While the fifth generation (5G) cellular wireless communication technologies are currently being developed and deployed, research on the beyond 5G (B5G) technologies, also referred to as 6G technologies, has already begun. For design and optimization of multiple access and resource allocation techniques in 6G, machine learning (ML) tools, including deep supervised learning and deep reinforcement learning (DRL), will be particularly useful. In this talk, I will discuss the role of ML in general for design and optimization of multiple access and resource allocation in 6G systems. Also, I will give a specific example of how DRL techniques can be used for massive non-orthogonal multiple access in a cell-free MIMO system.

Bio



Ekram Hossain (IEEE Fellow) is a Professor in the Department of Electrical and Computer Engineering at University of Manitoba, Winnipeg, Canada. He is a Member (Class of 2016) of the College of the Royal Society of Canada, and also a Fellow of the Canadian Academy of Engineering. He received his Ph.D. in Electrical Engineering from University of Victoria, Canada, in 2001. Dr. Hossain's current research interests include design, analysis, and optimization of wireless communication networks (with emphasis on beyond 5G cellular), and applied machine learning, game theory, and network economics (<http://home.cc.umanitoba.ca/~hossaina>). He was elevated to an IEEE Fellow “for contributions to spectrum management and resource allocation in cognitive and cellular radio networks”. He was listed as a *Clarivate Analytics Highly Cited Researcher in Computer Science* in 2017, 2018, 2019, and 2020. Dr. Hossain has won several research awards including the “2017 IEEE Communications Society Best Survey Paper Award”, IEEE VTC 2016-Fall “Best Student Paper Award” as a co-author, IEEE Communications Society Transmission, Access, and Optical Systems (TAOS) Technical Committee's Best Paper Award in IEEE Globecom 2015, University of Manitoba Merit Award in 2010, 2013, 2014, and 2015 (for Research and Scholarly Activities), the 2011 IEEE Communications Society Fred Ellersick Prize Paper Award, and the IEEE Wireless Communications and Networking Conference 2012 (WCNC'12) Best Paper Award. He received the 2017 IEEE ComSoc TCGCC (Technical Committee on Green Communications & Computing) Distinguished Technical Achievement Recognition Award “for outstanding technical leadership and achievement in green wireless communications and networking”. Currently he serves as the Editor-in-Chief of the IEEE Press and an Editor for IEEE Transactions on Mobile Computing. Previously, he served as an Area Editor for the IEEE Transactions on Wireless Communications in the area.