



Title: Artificial intelligence-empowered 6G wireless channel extrapolation: basics, recent advances and future research

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Abstract:

The vision of the 6th generation of mobile networks (6G) is to support global coverage for critical scenarios, including metaverse, extended reality, digital twin, etc., exploiting all spectra with strong security, which can never be fully achieved without accurate 6G wireless channel information. Due to the unprecedented complexity of 6G, how to obtain accurate channel information cost-effectively is one of the biggest challenges of 6G research, and wireless channel extrapolation, which can predict the unknown channel from known channel information, is an emerging approach to resolve this challenge. Thanks to its exceptional feature learning, extraction, and data generation abilities, artificial intelligence is expected to achieve 6G wireless channel extrapolation. In this keynote speech, a comparison between 6G wireless channel extrapolation and other typical problems will be made, including computer vision, and natural language processing, to reveal the fundamental nature of the 6G wireless channel extrapolation. Then, recent advances in artificial intelligence technologies in time-, frequency-, and time-domain 6G wireless channels extrapolation will be elucidated along with several case studies based on simulation and measurement, including CNN, long short-term memory (LSTM) and gated recurrent units (GRU), transformer-based models. Finally, future research on artificial intelligence-empowered 6G wireless channel extrapolation will be discussed, such as the potential application of a large language model (LLM) for channel extrapolation.

Biography

Yuan Gao is an assistant Professor at the School of Communication and Information Engineering, Shanghai University. He received his B.S. degree from the Beijing University of Posts and Telecommunications, Beijing, China, in 2013, M.S. degree from Imperial College London, London, U.K., in 2014, and Ph.D. degree from the University of Sheffield, Sheffield, U.K., in 2019. From 2018 to 2021, he worked as a wireless engineer at Ranplan wireless network design, Cambridge, U.K. He has been awarded the excellent reviewer of IEEE Transactions on Network Science and Engineering (IEEE TNSE) in 2023, and the best organizer award of International Conference on Sensing, Measurement, Communication and

Internet of Things Technologies (SMC-IoT) 2023. He served as the workshop chair of SMC-IoT 2023. His research interests include Generative Artificial Intelligence, Integrated Sensing and Communication, Space-Terrestrial Integrated Networks.