



RESEARCH SEMINAR

Elastic Computing & Communication in Edge: Accommodate Mobility, Heterogeneity and Transmission Loss



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Abstract

Migrating the execution of intelligent tasks towards the network edge can provision prompt services to end users without consuming significant bandwidth to accumulate the widely distributed data, e.g., to a cloud center. However, users in edge are often with dynamic connectivity, limited computing capacity and heterogeneous configurations, which can hinder the local data exploitation and inter-user knowledge exploring, and thus degrade the performance of intelligent applications, such as smart traffic, intelligent healthcare, etc. To grapple with the edge promise and pitfalls, elastic computing and communication paradigms are called for to flexibly manage the edge resources and adaptively tune the machine learning process to deal with the edge variations. In this talk, I will present several novel research works to tackle the challenges from the user mobility, resource shortage and data heterogeneity. First, I will present to utilize the user mobility to boost the distributed computing over opportunistic Internet of vehicles; Then I will elaborate a new federated learning paradigm that can fuse the knowledge from non-IID data via calibrated compensation among the local and global gradients. Besides, I will introduce a cross-layer design to improving the wireless connectivity of edge users by accurately tracking the transmission loss via simulation-reality knowledge transfer, so that the multi-user access to the edge station can be robust in massive concurrent situation. Finally, I will share my future research vision regarding the interdisciplinary benefits and challenges from elastic communication and computing.

About the Speaker

Wenchao Xu is currently a research assistant professor at The Hong Kong Polytechnic University. He received his Ph.D. degree from University of Waterloo, Canada, in 2018. Before that he received the B.E. and M.E. degrees from Zhejiang University, Hangzhou, China, in 2008 and 2011, respectively. He has been an assistant professor at School of Computing and Information Sciences in Caritas Institute of Higher Education, Hong Kong, and a software engineer at Alcatel Lucent Shanghai Bell Co. Ltd., Shanghai. His research interests include distributed computing, Internet of vehicles and wireless communication.