
Electrical & Computer Engineering
S E M I N A R
Louisiana State University

Decentralized Intelligence

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Abstract—Today connected devices, which are continuously increasing in number due to the emergence of the Internet-of-Things paradigm, as well as various smart sectors generate a significant amount of data. Tailoring machine learning algorithms to exploit this massive amount of data can lead to many new applications and open-up new markets in medical care, finance, and enabling ambient intelligence. The question is how to use this decentralized data to enhance the system intelligence beneficial for everyone while protecting the sensitive information.

It is not desirable to offload such massive amounts of data available at the edge devices to a cloud server for centralized processing due to latency, bandwidth, and power constraints, as well as privacy concerns of the users. Furthermore, due to the growing storage and computational capabilities of the edge devices, it is increasingly attractive to store and process the data locally by shifting network computations to the edge. This enables decentralized intelligence where local computations on the data converts decentralized data to a global intelligence; hence, enhancing data privacy while learning from the collection of data available across the network.

In this talk, I highlight some of the challenges and advances in enabling decentralized intelligence by jointly designing communications, computations, and collaboration, the three essential components of enabling collective intelligence. Communications help connecting the clients in this distributed environment; computations help converting data into intelligence; and collaboration is a method of aggregating local intelligence into a global intelligence. I discuss about the advances in integrating these components and how this can help with efficient system development.

Bio—Dr. Mohammadi Amiri received the B.Sc. degree in Electrical Engineering from the Iran University of Science and Technology in 2011 and the M.Sc. degree in Electrical and Computer Engineering from the University of Tehran in 2014, both with the highest rank in classes. He also obtained the Ph.D. degree in Electrical and Electronic Engineering at Imperial College London in 2019. He then spent two years as a Postdoctoral Research Associate in the Department of Electrical and Computer Engineering at Princeton University. He is currently a Postdoctoral Associate at MIT where he joined in early 2022. He received the Best Ph.D. Thesis Award from the Department of Electrical and Electronic Engineering at Imperial College London, as well as the IEEE Information Theory Chapter of UK and Ireland in the year 2019. He is also the recipient of the IEEE Communications Society Young Author Best Paper Award (2022) for the paper titled “Federated learning over wireless fading channels.” His research interests include machine learning, wireless communications, information theory, edge computing, privacy, and data science.

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Where: Room 3285 Patrick F. Taylor Hall

Info: <https://www.lsu.edu/eng/ece/seminar>

