上海交通大学自动化系
Department of Automation
Shanghai Jiao Tong University

系统控制与信息处理教育部重点实验室
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学术报告会

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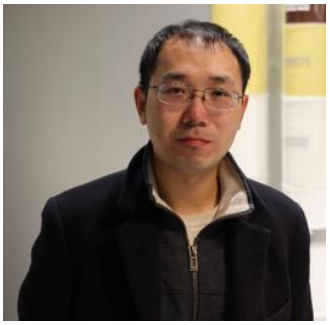

The role of over-parameterization in statistical machine learning-a function space perspective

Fanghui Liu

Postdoctoral researcher，EPFL

Abstract:

The conventional wisdom of simple models in signal processing and machine learning misses the bigger picture, especially over-parameterized neural networks (NNs), where the number of parameters are much larger than the number of training data. Our goal is to explore the mystery behind over-parameterized NNs from a theoretical side.

In this talk, I will discuss the role of over-parameterization in neural networks. First, I will talk about the motivation of function space for training dynamics of over-parameterized NNs: how initialization affects training dynamics of neural networks, which determines what kind of functions can be learned and why function space theory is needed. Then I talk about why over-parameterized models under stochastic gradient descent (SGD) can generalize well by exhibiting a double descent curve on the test risk. Based on this, I will discuss the separation between kernel methods and neural networks from the function space view. This can be used to address a fundamental question in trustworthy machine learning systems: over-parameterization in NNs helps or hurts robustness?

Biography:

Fanghui Liu is currently a postdoctoral researcher at EPFL, Switzerland and will be an assistant professor at University of Warwick, UK starting from Oct. 2023. His research interests focus on statistical learning theory, to build the mathematical foundations of machine learning. For his work on learning theory and cooperation, he was chosen for Rising Star in AI (KAUST 2023) and presented two tutorials at ICASSP 2023 and CVPR 2023. Prior to his current position, Fanghui received his PhD from Shanghai Jiao Tong University at 2019 and worked as a postdoc researcher at KU Leuven, Belgium. He is an ELLIS Member.