FUDAN UNIVERSITY

Applied Math Ph.D. Seminar

Dendritic Integration and Its Application in Artificial Intelligence

Speaker:
Jingyang Ma (Shanghai Jiao Tong University)

Time: 2024-11-21, 16:10 to 17:00

Location: Rm 1801, Guanghua East Tower

Advisor:
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Abstract: Neurons are the fundamental computational units of the brain. Specifically, the complex dendritic structures within neurons are crucial components for information integration and computation. Recently, quantitatively characterizing dendritic integration rules and understanding their implications for brain-inspired algorithms has become a key research topic. In this talk, we will first introduce the classical dendritic cable model and our recent theoretical and experimental results on a quantitative bilinear integration rule for dendrites. Next, we will discuss how the bilinear integration rule can be used to design artificial neural network models equivalent to biological neurons with complex dendritic structures. Finally, we will explore the implications of dendritic computation for designing artificial neural networks, examining how the information-processing mechanisms of neurons can be leveraged to enhance artificial neural network performance. Our work may help deepen the understanding of neuronal computation and provide valuable insights for the field of brain-inspired artificial intelligence.