

NUMERICAL ANALYSIS AND SCIENTIFIC COMPUTING
SEMINAR

*Deep Learning with Graph Structured Data: Methods, Theory,
and Applications*

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Abstract: Graphs are universal representations of pairwise relationship. With the rise of deep learning that demonstrates promising parameterizations of functions on Euclidean and regularly structured data (e.g., images and sequences), natural interests seek extensions of neural networks for irregularly structured data, including notably, graphs. This talk aims at painting a global picture of the emerging research on graph deep learning and inspiring novel directions. The speaker will share his recent research on modeling, computation, and applications of graph neural networks. Whereas modeling network architectures under different learning settings draws major interests in the field, understanding the capacity and limits of these networks attracts increasing attention. Moreover, efficient training and inference with large graphs or large collections of graphs need to address challenges beyond those of usual neural networks with regularly structured data. Of separate interest is the learning of a hidden graph structure if objects or variables interact, the subject of which interfaces with causality in machine learning. Last but not least, graphs admit numerous interesting applications, among which the speaker touches drug design, cryptocurrency forensics, cybersecurity, and power systems.

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