# Actor-Critic Graph Neural Networks: A Complete Recipe for Neural Decoding



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In recent years, graphs have become one of the most powerful abstractions for complex data, including brain networks, knowledge graphs, purchasing behavior, as well as disease pathways. Among many graph representation learning approaches, Graph Neural Networks (GNNs) have achieved promising performance in a variety of graph-focused tasks. Despite their success, existing GNNs suffer from two significant limitations that hinder their broader applications in scientific discovery: a lack of interpretability in results due to their black-box nature, and an inability to learn representations of varying order information with statistical guarantees. In this talk, Dr. Zhou will present a novel Actor-Critic Graph Neural Network (AC-GNN), which is able to integrate information of various orders and provide interpretable results by identifying compact subgraph structures. In particular, AC-GNN consists of two components: an estimation model for the latent representation of complex relationships under graph topology, and an interpretation model that recover influential nodes, edges, and node features. Statistically, it establishs the generalization error bound for AC-GNN via empirical Rademacher complexity, and showcase its power to represent layer-wise neighborhood mixing. Comprehensive numerical studies using benchmark and synthetic datasets are conducted to demonstrate the superior performance of AC-GNN in comparison to several state-of-the-art alternatives.

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### 2308 McGavran-Greenberg Hall

Zoom Link: https://unc.zoom.us/j/94304183888?pwd=SW5kQmJ1bkVVOFN5U2ZiQzR0MThnQT09

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