



Department of Data Science

香港城市大學  
City University of Hong Kong

# DS SEMINAR

## Foundation Models Meet Data: From Theoretical Insights to Efficient Adaptation

Date: 10 March 2025 (Monday)

Time: 9:30am - 10:30am

Seminar Link: <https://cityu.zoom.us/j/89672728614>



### ABSTRACT

Foundation models have demonstrated unprecedented capabilities through massive training data and sophisticated architectures. However, they face significant challenges in data efficiency and reliability, particularly when data access is limited or sensitive in critical domains such as healthcare and scientific discovery. These challenges create a need for both theoretical insights into model-data interactions and practical solutions for efficient domain adaptation.

In this talk, I will first present my theoretical work on how neural architectures interact with data, where I established conditions under which networks can learn effectively from noisy data through benign overfitting and how mixture-of-experts architectures can efficiently process naturally clustered data. Next, I will discuss approaches to data-efficient alignment for domain adaptation, including a self-play framework that utilizes synthetic data generated by the foundation model itself, thereby reducing the need for real data. Finally, I will outline future directions for advancing foundation models, with an emphasis on scalable synthetic data generation and alignment across diverse data modalities.



### Mr. Zixiang CHEN

#### GUEST SPEAKER'S PROFILE

Zixiang Chen is a Ph.D. student in Computer Science at UCLA, advised by Prof. Quanquan Gu. His research interests lie in the theoretical foundations and algorithm design of deep learning and reinforcement learning, with a recent focus on generative models and their domain adaptation. He was a visiting graduate student at the Simons Institute for the Theory of Computing and was awarded the UCLA dissertation fellowship. Before joining UCLA, he received his bachelor's degree in mathematics from Tsinghua University.

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All are welcome