香港城市大學
City University of Hong Kong

Frontier of Artificial Network

Causal Representation Learning for Visual Understanding

Invited Speaker

Guangyi Chen

CMU & MBZUAI

Date: June 30, 2025 (Monday)

Time: 10:00 am-11:00 am (Hong Kong Time)

Zoom Meeting: 979 2527 2892

Biography

Guangyi Chen is a postdoctoral research fellow at Carnegie Mellon University (CMU) and a research scientist at the Mohamed bin Zayed University of Artificial Intelligence (MBZUAI). He currently co-leads the Causal Learning and Reasoning (CLeaR) Group with Prof. Kun Zhang. Prior to that, he received both his Ph.D. and B.S. degrees from Tsinghua University. His research interests include causality, representation learning, and visual understanding. A central focus of his work is to develop principled and practical methods for learning meaningful representations from visual data that support understanding, generation, generalization, and reasoning. He has published over 20 papers in top-tier machine learning and computer vision conferences, including NeurIPS, CVPR, ICLR, and so on, with several recognized as highlights or oral presentations. He also co-organized the Causal Representation Learning workshops at NeurIPS 2024 and ICDM 2024.

Abstract

In this talk, we introduce the foundational principles of causal representation learning and its growing role in advancing visual understanding. Traditional deep learning methods rely heavily on statistical correlations, often at the expense of generalization, robustness, and interpretability. Conversely, classical causal discovery techniques are effective at identifying causal relationships in observed tabular data but struggle with unstructured, high-dimensional inputs such as images. Causal representation learning bridges this gap by uncovering the latent causal structure underlying visual observations. We will discuss the theoretical conditions, such as sufficient invariance and sparsity, that make it possible to identify causal variables from visual data. Finally, we will show how leveraging causal representations enhances the transferability, transparency, controllability, and attribution of visual understanding systems in real-world scenarios.