

## Department of Computer Science

# SEMINAR 2023 SERIES





## Prof. Kun Zhang

Machine Learning Department  
Carnegie Mellon University

Register Now



 **Date: 25 May 2023 (Thursday)**

 **Time: 10:30am – 11:30am**

 **Venue: Cheung Ching Lan Diana Memorial Lecture Theatre,  
WLB204, Shaw Campus**

 **Registration: <https://bit.ly/cs-ereg>**

## Causal Representation Learning: Discovery of the Hidden World

### ABSTRACT

Causality is a fundamental notion in science, engineering, and even in machine learning. Causal representation learning aims to reveal the underlying high-level hidden causal variables and their relations. It can be seen as a special case of causal discovery, whose goal is to recover the underlying causal structure or causal model from observational data. The modularity property of a causal system implies properties of minimal changes and independent changes of causal representations, and in this talk, we show how such properties make it possible to recover the underlying causal representations from observational data with identifiability guarantees: under appropriate assumptions, the learned representations are consistent with the underlying causal process. Various problem settings are considered, involving independent and identically distributed (i.i.d.) data, temporal data, or data with distribution shift as input. We demonstrate when identifiable causal representation learning can benefit from flexible deep learning and when suitable parametric assumptions have to be imposed on the causal process, with various examples and applications.

### BIOGRAPHY

Kun Zhang is currently on leave from Carnegie Mellon University (CMU), where he is an associate professor of philosophy and an affiliate faculty in the machine learning department; he is working as an associate professor of machine learning, director of the Center for Integrative AI, and deputy chair of the machine learning department at Mohamed bin Zayed University of Artificial Intelligence (MBZUAI). He has been actively developing methods for automated causal discovery from various kinds of data and investigating machine learning problems including transfer learning, representation learning, and reinforcement learning from a causal perspective. He has been frequently serving as a senior area chair, area chair, or senior program committee member for major conferences in machine learning or artificial intelligence, including UAI, NeurIPS, ICML, IJCAI, AISTATS, and ICLR. He was a general & program co-chair of the first Conference on Causal Learning and Reasoning (CLear 2022), a program co-chair of the 38th Conference on Uncertainty in Artificial Intelligence (UAI 2022), and is a general co-chair of UAI 2023.

## ENQUIRY

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