BRIGHAM AND WOMEN'S HOSPITAL
HARVARD MEDICAL SCHOOL

181 Longwood Avenue
Boston, Massachusetts 02115-5804

Department of Medicine
Channing Division of Network Medicine

Channing Methods Seminar

February 28 (Tuesday), 2023, 11AM (ET)

MCP 5th-floor large conference room
https://us02web.zoom.us/j/579497999?pwd=cHNlWHMzWUlFUUVJTG1EeVJmY05aQT09
Meeting ID: 579 497 999
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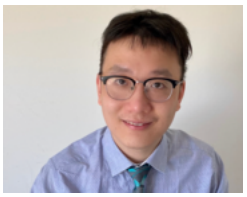

Can Chen, PhD

Channing Division of Network Medicine, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School
https://scholar.harvard.edu/canc

Deciphering Biological Networks through Hypergraph Learning

Abstract: Biological networks such as ecological, genomic, and metabolic networks are complex systems with intricate relationships among various components. However, traditional graph representations fail to capture the full extent of multiway interactions present in these networks. Hypergraph learning provides a powerful framework for modeling and analyzing biological networks by representing multiway interactions as hyperlinks. In this talk, I explore hypergraph learning from two perspectives: dynamical systems and machine learning. Using the lens of dynamical systems, I discuss the controllability of hypergraphs, extending the classical Kalman's rank condition to identify the minimum number of driver nodes required for full hypergraph control. From a machine learning perspective, I present a novel deep learning-based method for hyperlink prediction to identify missing reactions in genome-scale metabolic networks. Finally, I discuss future research plans in data-driven control, hypergraph learning, and reinforcement learning.

***Bio**:* Can Chen received the B.S. degree in Mathematics from the University of California, Irvine in 2016, and the M.S. degree in Electrical & Computer Engineering and the Ph.D. degree in Applied & Interdisciplinary Mathematics from the University of Michigan in 2020 and 2021, respectively. He is currently a Postdoctoral Research Fellow at the Channing Division of Network Medicine, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School. His research interests include control theory, network science, dynamical systems, machine learning, and computational biology.

Hosted by Yang-Yu Liu