BRIGHAM AND WOMEN'S HOSPITAL
HARVARD MEDICAL SCHOOL

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Department of Medicine
Channing Division of Network Medicine

Channing Methods Seminar

September 24 (Tuesday), 2024, 11AM (ET)

MCP 5th-floor conference room & Zoom:
https://us02web.zoom.us/j/579497999?pwd=cHNlWHMzWUlFUUVJTG1EeVJmY05aQT09
Meeting ID: 579 497 999
Passcode: 844168

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A Positive Statistical Benchmark to Assess Network Agreement

Current computational methods for validating experimental network datasets compare overlap, i.e., shared links, with a reference network using a negative benchmark. However, this type of comparison fails to quantify the level of agreement between the two networks. To address this challenge, we propose a positive statistical benchmark to determine the maximum possible overlap between two or more networks [1]. Our approach can efficiently generate such a positive benchmark using a maximum entropy framework and quantifies whether the observed overlap is significantly different from the best-case scenario. We also introduce a normalized overlap score, "Normlap", to enhance comparisons between experimental networks. As an application, we compare various molecular and functional networks, resulting in an "agreement network" of human as well as yeast network datasets. The Normlap score can improve the comparison between experimental networks by providing a computational alternative to network thresholding and validation. Future applications involve directed and dynamical networks, as well as improved pipelines for experimental assay evaluation and optimization.

[1] B. Hao and I. A. Kovács (2023) A positive statistical benchmark to assess network agreement, Nat. Commun., 14, 2988

***Bio**: István Kovács is an Assistant Professor in the Department of Physics and Astronomy at Northwestern University, a core faculty of the Northwestern Institute on Complex Systems (NICO), with a courtesy appointment in the Department of Engineering Sciences and Applied Mathematics. Previously he was a postdoctoral fellow in the Network Science Institute at Northeastern University, a visiting researcher in the Center for Cancer Systems Biology at the Dana-Farber Cancer Institute and at University of Toronto, as well as at the Department of Network and Data Science of the Central European University. He received a PhD in Physics from the Eötvös Loránd University in Hungary, working at the Wigner Research Centre for Physics, during which he spent time at Semmelweis University and University of Saarbrücken, Germany. His group develops novel methodologies to predict the emerging structural and functional patterns in problems ranging from systems biology to quantum physics, in close collaboration with experimental groups: https://sites.northwestern.edu/kovacslab/*

Hosted by Enrico Maiorino