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12:00-1:00 pm

HSLC 1345 *or* via Zoom Link

<https://uwmadison.zoom.us/j/93883767372>

Topological Inference and Learning for Cycles in Graphs

Abstract: Cycles or loops in a network embeds higher-order interactions beyond dyadic relations. The cycles are essential for the parallel processing of information and enable feedback loops. Despite the fundamental importance of cycles in networks, identifying and extracting them are computationally prohibitive. In this talk, we propose an efficient algorithm for the systematic identification of cycle basis using the Hodge Laplacian and persistent homology. In the vector space of cycles, we can perform regression and clustering. The method is applied to modeling human brain networks obtained from resting-state functional magnetic resonance imaging (MRI). We demonstrate the dynamic pattern of the state space in brain activity itself is a heritable trait for the first time. The talk is based on Songdechakraiwut and Chung 2022 (arXiv:2012.00675) and Anand et al. 2022 (arXiv:2110.14599).



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