Division of Biostatistics Seminar Series

Analyzing Structural Brain Connectivity using Deep Neural Networks for Non-Euclidean Measurements

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Professor

Department of Biostatistics and Medical Informatics

University of Wisconsin

When:

Friday, October 16, 2020
12:30pm - 1:30 pm

Registration Link via Zoom:

https://wustl.zoom.us/meeting/register/tJYucytrDsuH9Po6NbmeBxVp48hxFj5W7cd

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Title: Analyzing Structural Brain Connectivity using Deep Neural Networks for Non-Euclidean Measurements

Speaker: Vikas Singh, University of Wisconsin Madison
(http://www.biostat.wisc.edu/~vsingh)

Abstract: The analysis of structural brain connectivity obtained via diffusion Magnetic Resonance imaging is an important step in understanding the complex processes that underlie neurodegenerative diseases such as Alzheimer's disease (AD). But in many AD focused studies, especially in early or preclinical AD, the sample sizes are small and detecting the weak disease signal is challenging. This talk will describe our ongoing work on generalizing deep neural networks for sequences to non-Euclidean spaces provides a promising line of attack. The approach is suitable for modeling diffusion MR data where one considers the measurement at each voxel (diffusion tensor, EAP or another representation), as a manifold-valued object. It turns out that our generalizations of RNNs and CNNs can reliably model brain fiber tracts with such measurements: the formulation provides methods that yield statistically sensitive frameworks for case-versus-controls analysis in a preclinical AD cohort.

Bio: Vikas is a Vilas Distinguished Achievement Professor at the University of Wisconsin Madison. His research group is focused on design and analysis of algorithms for problems in computer vision, machine learning and statistical image analysis with a focus on brain imaging, and is supported by various federal agencies and industry. He is a recipient of the NSF CAREER award. Vikas' teaching and collaborative activities include teaching classes in Computer Vision, Image analysis and Artificial Intelligence as well as collaborating with a number of industrial partners to enable real-world deployments of AI/machine learning technologies.