Finding Low-Dimensional Structure in Large-Scale Neural Datasets

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Explosions in both high-throughput imaging and machine learning have provided immense potential for data-driven discovery in neuroscience. While deep machine learning architectures can provide significant improvements in performance on prediction tasks, interpretability is still a major challenge. In this talk, I will discuss my lab's efforts towards developing new machine learning approaches to model and interpret large-scale neural datasets. In particular, I will show how we are using deep learning methods to navigate through large-scale 3D brain volumes, automatically identify brain areas, and rapidly learn signatures of disease and variability. Throughout, I will describe ways in which we are trying to open the "black box" and interpret the representations learned by the network.

Eva Dyer is currently an Assistant Professor in the Wallace H. Coulter Department of Biomedical Engineering at the Georgia Institute of Technology and Emory University. Eva completed all of her degrees in Electrical & Computer Engineering, including a Ph.D. and M.S. at Rice University, and a B.S. at the University of Miami. While at Rice, she worked in the Digital Signal Processing Group with Richard Baraniuk and had the opportunity to co-develop the edX course on Discrete-Time Signals and Systems. After completing her Ph.D., she worked with Konrad Kording as a Research Scientist in the Bayesian Behavior Lab at Northwestern University. Eva and her team, the NerDS lab, develop new machine learning and data science approaches for modeling brain organization and function, discovering patterns of variability in large collections of data, and tracking progressive changes in the microstructure of the brain over the course of aging and development.

ABOUT the SPEAKER

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