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Rewiring dynamics on directed graphs

Brain function can be modeled as a network, or graph, of interacting neurons. Most graph theoretic approaches use undirected graphs by assuming such interactions are symmetric. We consider asymmetric interactions to construct directed graphs derived from functional Magnetic Resonance Imaging (fMRI) data. The aim is to better understand the relationship between structural properties of these directed graphs and the dynamics of neural networks. Since functional connectivity (the interaction between brain regions sharing functional properties) is a dynamic process, this gives rise to evolving networks. For this reason, we apply spectral graph theory techniques to study the effect that rewiring arcs in directed graphs has on the dynamics of the network. This is joint work with Kris Vasudevan (University of Calgary).