#304 Subhashini Sivagnanam Advisor(s): William Lytton

Network inference algorithm and measures of simulated brain network

Understanding how the brain generates functional behavior requires an understanding of the interaction between the structure and function. Network and graph theory has gained recognition as a useful framework to consider the brain in terms of its structure and function. The present research focuses on extracting high-level connectivity rules from data obtained from the simulation of brain networks to observe whether the algorithm can reproduce the original rules that constructed the network. The inference method employs graph theory techniques such as nested stochastic block modeling designed to extract large-scale modular structures from the network data. The graph-tool package was used to group 15 cell types of the Motor cortex mode without prior knowledge of the cell population or its location. The algorithm inferred neuronal groupings and strengths that matched those used in the original rule. In future, we will further evaluate the connectivity rule on other published network models available on ModelDB (modeldb.yale.edu).

In addition, we are using network theory to study the network topology and identify nodes that play a crucial role in mediating a vast number of network connections in the simulated network. We are measuring various centrality metrics and betweenness to identify nodes in the simulated network that are likely to be highly influential over the behavior of the network.