B490 Project Proposal

Rachel Lowden

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**I Group**

I will be working by myself in this endeavor.

**II Problem**

I plan to ground my project in the study of brain connectivity, specifically structural and functional connectivity. The emerging field of connectomics (a branch-off of computational neuroscience) is rapidly expanding, resulting in the cumulation of massive amounts of connectivity data. I plan to use a form of link analysis to explore the emergence of functionally connected brain areas. My main goal will be to find these connections in an efficient way. If time permits, I’d also like to somehow correlate individual behavioral data into the connectomic analysis, but at present I’m not sure how I’d accomplish this.

**III Reasons for Interest**

My sophomore year, I was briefly involved in a computational neuroscience lab that pioneered the breakthrough in brain connectomics. While my time spent there was short, it peaked my interest in the field of graph theory analysis and algorithmic computation applied to brain data. The time spent running some of those algorithms was sometimes prohibitively high—close to two days might be spend computing some metrics. I am interested in exploring possible improvements in the handling of such large amounts of data in this context.

**IV Data Acquisition**

I plan to use data from db.humanconnectome.org. It has an amalgamation of many labs’ connectivity data that I plan to utilize. Data comes in a binary matrix format representing a graph. Nodes are brain areas, and edges represent a connection between them.