Honors Thesis Proposal

Adviser: Dr. Arden Ruttan

Student: Mitchell Fulton

Date: 5/4/2017

Evolving Topology Structures For Neural Networks

1. Problem Statement

   Neural networks operate on the principle of emulating biological neurons in an attempt to give computational programs some degree of higher level decision making. These networks in the most basic sense have two structural parts, nodes and links. With nodes representing neurons, and the links representing the connections between neurons. By examining the relationship between the interconnectivity (topology) of nodes in a network and the effectiveness of said network, a new method for creating a system of network topology generation may become apparent. The discovery of new methods of topology structuring would be hugely important for the field of artificial intelligence, as would any increase in the effectiveness of neural networks.

2. Projected Implementation

   Neural networks require large amounts of information to “learn” how to accomplish task. Subsequently this project will be implemented with the help of a big data analysis framework to filter the data and funnel it into the tests. The project will involve some aspects of cluster computing in order to maximize

efficiency of tests run. Exact details as to the cluster (gpu, cpu, etc) will come later once the availability of resources for the project has been established.

3. Results

Expected results are firstly a deeper understanding of the effects of topology on neural networks. Secondly the creation of a new topology framework for neural networks that takes is capable of formulating the most efficient topological design for a given problem domain. This new framework will be self evolving in nature and will aim to bring a new dimension of variability and efficiency to artificial intelligence.