**MASTER'S PROJECT (SPRING 2018)**

**TOPIC:** ***Visualization and Prediction of Energy Usage for Smart Cities***

**PRESENTOR:** Hardik Sankhla

**ADVISOR:** Dr. Haiping Xu

**DATE & TIME:** Friday, April 6, 2018, 4:00 PM

**LOCATION:** Dion 302E (Demo)

**COMMITTEE MEMBERS:** Dr. Shelley Zhang and Dr. Paul Bergstein

**ABSTRACT**

Smart grids are one of the most crucial parts of a smart city, which is also the center of focus for industries around the world. The smart grids consist of various sources of power such as coal plant, hydro-electric plant, solar plant and oil plant. Currently coal, natural gas and oil are still the major sources of energy; however, the green and sustainable energy sources such as wind, water and sunlight, have become more and more important. One major function of a smart city is to deliver power in an environment-friendly way, while reducing costs and increasing its reliability and transparency. There has been a great interest in developing accurate prediction models for energy demand in recent years. However, it has been a challenging task because there are many different sources of energy, and energy usage also depends on many different factors such as month, day of the week, hour, temperature, weather, and many others. In this project, we attempt to improve the current energy demand predicting techniques using deep neural-network models. We develop our deep neural network models in Python supported by the TensorFlow deep learning library. The performance of our models is evaluated against the industry standard used by ISO New England (ISO NE) for prediction of the energy demand in the Boston Area. The experimental results show that our deep neural-network approach performs better than the industry standard with lower error rates. To further support visualization of energy usage for smart cities, we display the computation graph, namely the data flow graph, which can be derived from the deep neural network models. Note that in a computation graph, nodes represent unit operations, while the edges represent the data that flow through the graph and get modified as they pass thought each node.