1. What is the most interesting topic covered in your domain this quarter?

   The application of Graph Convolutions is the biggest concept we talked about during DSC180A. The convolution operation is an extension of the random-walk on graph structure which is a fundamental concept for all types of learning tasks on the graph. The application of this convolution operation is in Graph Convolution Network, which is a neural network consisting of one or multiple Graph Convolutional Layers connected to a fully connected layer specifically designed for specific tasks. So far we have explored using Graph Convolutional Network in node classification and link prediction tasks on a graph. Node classification is when we want to fill in unknown labels of nodes based on their connections. Link prediction is when we are looking for potential missing edges in the graph. Both are tasks investigating properties that are within graphs. During the last couple of weeks, we will be exploring expanding these two small tasks to do more complicated recommendation tasks. In addition, we will also examine some learning tasks that compare different graph structures (ex: molecules).

2. Describe a potential investigation you would like to pursue for the Quarter 2 Project.

   One potential area of investigation is proposed by a classmate, which is to investigate the effectiveness of different types of loss function on link prediction tasks. In short, link prediction is completed with some type of reconstruction of the partial graph we have. The model we explored during week 7 is the graph convolutional autoencoder. We assumed that because link prediction is a binary classification task, binary cross entropy should make intuitive sense as a loss function for optimization. However, it has also been proposed in the original paper to use mean square error or any type of loss function that measures the difference between labels. This is quite a general statement, and since loss function is crucial to a machine learning problem, we want to make this more strictly defined for the link prediction problem. So, a plan we have for quarter 2 is to test different types of loss function and compile our result and propose a better description on choosing the loss function.

3. What is a potential change you would like to make to the approach taken in your current Quarter 1 Project?

In general, me and my classmates learned a lot, thanks to the continuous support of our mentor, Prof. Gal Mishne and her students. We received valuable feedback on our work. For each week we start by reviewing some literature, which are assigned to us as readings. After which, we put what we have read into practice through coding tasks that usually ask us to implement what is mentioned in the readings. This makes our discussion more productive. I do wish we had taken notes on our discussion, because I realize a lot of conversions can be extremely useful for the final presentation, especially to help our audience understand some of the points we had issues with.

4. What other techniques/methods would you be interested in using in your project?

   I am very happy with the materials I have been working on. For the final week, we are offered to pick our own topic, and that is still in the work. Some areas related to graph neural networks that we are interested in are manifold learning, recommendation systems, molecular/biological applications of GCNs, and etc.