For our final project we implemented three algorithms: BFS, PageRank, and Strongly Connected Component. The dataset we chose was Amazon0302 from the Stanford Collection. This unweighted directed graph shows co-purchased products. The first algorithm we completed was the BFS algorithm. This was a simple algorithm since pseudo code was already given to us in lecture slides. The second algorithm we implemented was PageRank. This algorithm required some matrix multiplication in which we manipulated the adjacency matrix of the graph in order to get the output. Finally we implemented an algorithm to find Strongly Connected Components. This algorithm required us to use DFS so we implemented that in the function itself.

Originally, we were gonna do a different algorithm, Dijkstra's Algorithm. As we continued we realized that with the dataset that we chose, the output of Dijksra's Algorithm had little to no significance since our graph is an unweighted directed graph. So we decided to choose a different algorithm and chose Strongly Connected Component since the output had a significant meaning.

Both PageRank and Strongly Connected Component give us an insight into the dataset we chose. PageRank allows us to see which products are the most popular. It produces a steady state of products where, after a certain amount of vector multiplications between a transition matrix based on the outgoing edges of the vertices and a random vector, the algorithm allows us to see the significance of certain products based on the steady state value of a certain product. The higher the value, the more popular the product is. Strongly Connected Component is an algorithm that allows you to find a sub component of a graph where every vertex is accessible by every other vertex. For the amazon dataset this could let us analyze the similarities between certain products, since if they are in the same strongly connected component, they are more similar and closely related to each other. Both these algorithms could be used for real world

projects for marketing purposes. The products can be analyzed for significance and relationships

to other products and this data could help advertise certain products to people that purchased

closely related products.