CS225 Final Project Report

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Outcome:

For this project, we were able to meet all of our goals. Our original goals were to make a shortest path and landmark path algorithm on the OpenFlights dataset using Dijkstra's algorithm. We also originally decided to use the counting the number of routes on an edge and then use (1/number of routes) for the weights of the edges, however, we decided to implement it with the weights corresponding to the number of stops a particular flight had. In practice, this meant that the majority of the edges (aka flights) were with weight zero, which is not very useful in practice. Despite this, we still have a functioning program that accurately calculates the shortest path between two (or three) airports.

Although our final project was stressful at times, and at one point we were even concerned if we would be able to get it work, we were finally able to successfully implement all of our goals. During the process, we ran into several errors, such as segfault 11, linking errors, and malloc errors. Debugging each of these errors did set us back a couple hours, however, we persisted and were able to fix each and every one. We now have a working Dijkstra's algorithm and landmark path using the BFS traversal. We worked collaboratively on zoom for nearly everything, which definealty helped our work flow because if we ran into an error, we were able to talk to the other teammates and find a solution relatively quickly.

<u>Discoveries</u>:

With our algorithms, we are able to make routes traveling the world. Some of the more interesting results of our landmark algorithm is when the route takes several stops at many airports. For example, when we use our landmark path to find the route between the AER airport (Sochi international airport) and the DME airport (Domodedovo Moscow Airport), with a stop at the LIM airport (Jorge Chavez International Airport in Peru), you would need to take six different flights to make the trip. You would have to travel to Vnukovo International Airport in Moscow, to JFK airport in New York City, to Jorge Chavez International Airport in Lima, Peru, back to EWR Airport in Newark, to the Leonardo da Vinci International Airport in Italy, all the way back to Russia at the DME airport in Moscow. No one would really ever take a flight all the way from Sochi to Lima just to go back to Moscow, but we do see the amount of different stops you would need to take to get from Russia to Peru. Our program can find all shorts of interesting paths like this to go from one corner of the world to another.

<u>Our programs output</u>:

Shortest path from AER -> LIM -> DME: AER -> VKO -> JFK -> LIM -> EWR -> FCO -> DME