

GOAL

After the consideration, the team gave up on the Animation search engine since it is hard to implement a graph algorithm. Now we decide to do the open flight data sets since the data is much more complex and interesting. We wish to find the shortest path between the two airports.

Description: In our project, we will use IATA as an identifier for each airport in case there is more than one airport in the same city, longitude and latitude to calculate the distance between each airport, and airports as vertexes and flight between airports as edges to build the graph. In order to use our program. The user needs to input a start airport's IATA code and a destination airport's IATA code, and the system will calculate the shortest route between two airports. If entered IATA code does not exist in the database, the system will let you enter a valid IATA code.

The Dataset we will use is Openflight <https://openflights.org/data.html>. In this project, we will use airports as vertexes and flight routes as edges and use the shortest route algorithm to find the preferred routes.

BFS: based on the airport the user entered, we will use BFS traversal to traverse all airports and connect with flight routes. Also, given the start airport and destination airport, we will use BFS to find the shortest routes from the starting airport to the destination airport.

Floyd Warshall Algorithm: Though the time complexity of the Floyd Warshall Algorithm is much longer than the Dijkstra algorithm, Floyd Warshall Algorithm can find the shortest distances between every pair of vertices in a given edge-weighted directed Graph. In our project, this algorithm can find multiple shortest paths(if there are any) which may give our users more options to choose from. (Time Complexity: $O(V^3)$)

A-start Search Algorithm: This algorithm combines the advantages of best-first search and Dijkstra's algorithm: while performing a heuristic search to improve the efficiency of the algorithm, it can ensure that an optimal path is found. In our project, this algorithm can insure to find the shortest route and an ideal running time.(Time Complexity: $O(|V|+|E|)$)