

# Goals

## Basic Function:

Our goal is to use the OpenFlights dataset to create a program that can display the shortest flight route representative of an enclosed polygon that the user can draw on a blank canvas. The program defines the shortest flight route as the smallest ratio between the distance and the number of stops. The program will also be able to return an ordered list of flights that the user could take in order to recreate the path they drew on the map in real life. We will be using both the airport dataset and the flight route dataset in order to generate a weighted directed graph, where the nodes represent individual airports by 3-letter (IATA) codes, and the edges contain the pythagorean distance between the two airports that edge connects. When a user draws a path, the program will use the angles between the sides of the polygon in order to limit its search of airports to a constrained region. Additionally, the search for the shortest path can start from virtually any airport in the world.

## Algorithms:

- Breadth-First Search  
Used to locate nodes in the graph based on coordinate approximation
- Floyd-Marshall  
Used to search for an optimal path determined by the drawing.
- Landmark Path  
Used to validate the Floyd-Marshall algorithm and ensure that the conditions of the drawing are kept (order in which points were drawn)
- Each algorithm will be thoroughly tested with test cases that begin as drawings and expected values in the format of a list of directions.