# Final Project Goals

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We will be using OpenFlights data and use Breadth First Search (BFS) as our traversal.
We will use Dijkstra's Algorithm to determine the shortest path from one point to another.
We would like to simulate the spread of COVID-19, and the following are the assumptions to reduce the complexity.

**A list of assumptions we made:**

- airports and flights are open and available at all times.
- We assume that by default, one person in Beijing is infected (at time = 0day)
- Each day, there is only one flight to the airports that are connected directly.
    - For example, if there are 4 countries that are connected to Beijing, then there will be only one flight to each country per day
    - We will also assume that no one is being infected during the flight, and the disease is spread only after arrival.
    - Since this is only one flight to each country, we will not change the populations of each country after flights.
- We are planning to represent each airport as a node and edges are connected according to the following rule:
    - the nodes (airports) will be loaded into the graph in the order of the dataset given. When the new edge (to be connected) creates an overlap over the existing one, the new edge will not be created.
- A plane must fly and land at the nearest node (airport) of its original airport before moving onto the next destination
    - This is where we will implement the shortest path algorithm.
    - During this process, there is always a spread of disease, with the probability that is determined by the description below.

**Probability of the spread of disease**

- We have to take the time zone into account.
    - We are going to take the average infection rate (from the internet) as our normal probability of the spread.
    - We are going to set different probabilities of the infection rate depending on the time period. If the infected person arrives between 11am~7pm , we will set the probability higher than the average, and at other times, we will take that lower than the average. This takes into account the crowdedness of the airports.
    - The process will include random sampling of the population in order to render causality in our experiment.
    - We will take into account the normal behavior of COVID-19, including the patient having no symptoms but still spreads the disease.

Input / Output

Input: Destination

- Default: Incheon, South Korea

Output: A total number of people infected by COVID - 19 in the world after the travel from origin to the destination.