**Final Assignment: Flow networks and airlines**

The file “routes.dat.txt” found in the “Uploaded media” folder on the canvas page was downloaded from the openflights.org page. Each row of the file contains information concerning flights from a destination to another destination. A description of the data download from openflights.org is given by the following table (describing column values):

|  |  |
| --- | --- |
| **Airline** | 2-letter (IATA) or 3-letter (ICAO) code of the airline. |
| **Airline ID** | Unique OpenFlights identifier for airline (see [Airline](https://openflights.org/data.html#airline)). |
| **Source airport** | 3-letter (IATA) or 4-letter (ICAO) code of the source airport. |
| **Source airport ID** | Unique OpenFlights identifier for source airport (see [Airport](https://openflights.org/data.html#airport)) |
| **Destination airport** | 3-letter (IATA) or 4-letter (ICAO) code of the destination airport. |
| **Destination airport ID** | Unique OpenFlights identifier for destination airport (see [Airport](https://openflights.org/data.html#airport)) |
| **Codeshare** | "Y" if this flight is a codeshare (that is, not operated by *Airline*, but another carrier), empty otherwise. |
| **Stops** | Number of stops on this flight ("0" for direct) |
| **Equipment** | 3-letter codes for plane type(s) generally used on this flight, separated by spaces |

There is a second file, “planes.dat.txt”, which provides a codebook for the equipment entry in the file routes.dat.txt. From the planes data it is possible to assign a passenger load to each flight with an equipment entry.

Consider trips between destinations that involve no more than 1 layover (i.e. trips involving a beginning and at most one intermediate stop before the destination). Consider a source city, say New York, and a target city, say San Francisco. Answer the following questions:

1. Given your inferred load on each flight, what is the maximal number of people that can be moved from New York to San Francisco?
2. Which carrier can transport the greatest number of individuals from New York to San Francisco?

You will have to make some decisions about how you count people and flights. Carefully stating what decisions you are making is an important part of answering the questions.

A complete solution should include

* a pdf describing how data was transformed, a description of what algorithms were used in the solution, how algorithms were implemented, how the solution was validated, and a discussion concerning how the work might be extended.
* Documented code for the problem.
* A 15-minute slide show presentation in which each team member presents part of the solution.

Evaluation Rubric:

There are four main components of the evaluation:

1. Correctness: Does the implemented algorithm correctly solve the given problem?
2. Report: Does the written description of the algorithm clearly describe what design choices were made, why such choices were made, how choices were implemented, how the algorithm was tested and how the algorithm might be varied in future work?
3. Code: Is the code well-documented? Is it extensible?
4. Presentation: Does the presentation clearly describe the work that was done? Can team members answer questions about the project?

I will be very interested in gauging relative improvement over the course of the semester.

Suggestions:

1. Meet to determine team roles as soon as possible. Have a leader/coordinator who sets regular meeting times.
2. Partition tasks according to strengths. Have benchmarked timelines for each team member.
3. Feel free to communicate across team boundaries.
4. Keep in mind that the project is intended to be primarily a chance to learn new things, including how to work effectively as part of a team.

Team assignments

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Red | Black | Blue | Yellow | Green |
| Danielle | Miles | Amanda | Adam | Adam G |
| Kalani | Rick | Ben | Conor | Austin |
| Kevin | Steven | Julian | Sara | Noah |
| Tim | Vivien | Sumitra |  |  |
|  |  |  |  |  |