

APCS Lab 21: Real World Problems :: Air Traffic Analysis

Problem Description:

Good News: you've moved on to a job at the FAA as an air traffic analyst.

Bad News: the FAA is still run with technology and systems invented in the 1950s.

The director of your department has given you the task of finding some bottlenecks in the air traffic system.

There are certain flight paths between airports that are very clogged, which is first of all dangerous, and second, it's preventing important flights from traveling along those paths. Ultimately, the goal would be to give certain flights alternate routes to prevent the congestion, but you don't have to do that now. For now all you need to do is identify the congested paths.

The director has given you the daily flight lists for about 100 US airports. A flight list for a particular airport "ABC" contains a list of 3-letter airport codes that planes from "ABC" flew to on a given day. The list is in no particular order. For example, the beginning of the file for O'Hare airport (ORD) reads:

```
ORD numFlights:199
ATW
DVT
ANC
GFL
ANC
GFL
GFL
...
```

The first line of the file tells you the airport code this file pertains to (ORD) and the total number of flights listed.

A pair of airports may have many different flight paths between it and a flight path is considered "in use" when a plane is flying in either direction between two airports. So, if there is a flight going from ORD to JFK, that implies that a flight from JFK to ORD cannot use that path. In other words, paths between cities are bi-directional even though only one direction of the path might be listed in the file.

The director wants to know the top 10 congested paths in the system of 100 airports that was given to you. You have a week.

Errata:

1. A folder containing plain text files of the daily flight lists is given on the blog.
2. For this problem you'll need to know how to read a whole directory of files – you don't want to write out all the file names by hand. A HOWTWO is listed on the blog.
3. The flight list data were randomly generated by me (Franke). Lists of flights between airports will bear little resemblance to reality other than the airport codes are real.