Project 3: Optimizing a fuel network

# Introduction

For this project my objective was to supply multiple fuel stations from multiple depots. The primary objective was to optimize the routes the tankers should take so that none of the tanks had to drive a far distance.

# Approach

The program reads in a file which contains a list of connections between vertex and the weight of each connection. Also, another file was read that contained a list of some vertex which were either a depot or fuel station.

**Dijkstra's algorithm**

I used Dijkstra's algorithm to find the shortest path between the depots and stations. I reused my methods from lab 10 and lab 8 to read the file in, construct the graph and find the quickest paths.

# Methods

I read the file, line by line using the same method I used in lab 8. Each line contained 2 vertex and a weight so I tried to create two new vertex with the keys equal to the vertex number. This meant that if the vertex already existed it would not be created again but if the vertex did not exist it would be created. Once the graph was created the next file would be read and the graph searched for the vertex that matched the specified key. After this match was made the element stored at the vertex would be changed from "Nothing" to either depot or station depending on which it was. Also I had two more Arraylists storing the stations and depots. Initially I planned to used the element value to optimize my search but to save time I used these ArrayLists. For each station I found which depot was the closest by calculating the quickest distance to each depot. This doesn't seem to be very efficient but it completes the task. To ensure that each station was serviced by one and only one depot I calculated the path from each station to a depot. The path was then printed out to the console separated by a space.

# Data and Analysis

Data to be gathered.

# Conclusion

Awaiting data

# References

Project description: https://moodle.lafayette.edu/pluginfile.php/141173/mod\_resource/content/1/p3.pdf

Excel tutorials:

http://stackoverflow.com/questions/15124103/excel-how-can-i-make-a-scatter-plot-which-colors-by-a-third-column

http://www.excelbanter.com/showthread.php?t=117549

VBA tutorials:

http://stackoverflow.com/questions/12933279/how-to-comment-and-uncomment-blocks-of-code-in-the-office-vba-editor

http://www.cpearson.com/excel/declaringvariables.aspx

http://stackoverflow.com/questions/17194105/how-can-i-color-dots-in-a-xy-scatterplot-according-to-column-value

http://stackoverflow.com/questions/15981802/changing-the-colors-of-the-specific-dots-in-scatterplot-vba-excel/15982217#15982217

Bash tutorials:

http://www.tldp.org/LDP/Bash-Beginners-Guide/html/sect\_07\_01.html

Java api:

https://docs.oracle.com/javase/7/docs/api/

http://docs.oracle.com/javase/6/docs/api/

Book:

Data Structures & Problem Solving Using Java

Timing tutorial:

http://cs.lafayette.edu/~liew/courses/cs150/lab/labs/lab02f

Graph construction:

http://cs.lafayette.edu/~liew/courses/cs150/lab/labs/lab10b/

File reading:

http://cs.lafayette.edu/~liew/courses/cs150/lab/labs/lab08e/

Quickest path between 2 vertex:

http://stackoverflow.com/questions/17480022/java-find-shortest-path-between-2-points-in-a-distance-weighted-map

Implementation of Dijkstra's algorithm:

http://en.literateprograms.org/Dijkstra%27s\_algorithm\_(Java)

http://en.literateprograms.org/index.php?title=Special%3aDownloadCode/Dijkstra%27s\_algorithm\_%28Java%29&oldid=15444