ETEC3401 – Algorithms
Lab 4 – Minimum Spanning Tree (MST)
Assigned on 9/26/2016
Due on 10/10/2016 by 11:59pm

Overview

In the Kingdom of Hyrule, people living in the towns do not have access to a high-speed Internet connection, while those in the palaces enjoy a fast fiber-optic network. The King has declared that all towns will be connected to this fast network, and has decided to update the Internet infrastructure and run new cables to all of the towns. To save money, however, the King has declared that only one palace may be used to distribute service to all of the towns, and has tasked you with designing a network that uses the least amount of cabling possible.

Tasks

1. Read in and parse the palace/town names and pixel coordinates from the **hyrule.json** file
2. Build a graph for each palace
   a) The vertices of each graph will be the palace and all of the towns
   b) The graph will have edges from the palace to each town
   c) The graph will have edges from each town to all other towns
   d) The edges of this graph will be weighted using Euclidean (straight-line) distance for the weights. You will use the palace/town pixel coordinates to calculate this distance.
3. Using Prim's or Kruskal's Algorithm, build a minimum spanning tree (MST) for each graph
4. Find the MST with the smallest sum of edge weights and pass the edges of this tree to the **MapViewer.jar** Java program. This will display a map of Hyrule with the tree drawn (as lines) on top of it.

Using MapViewer.jar

The MapViewer program takes line coordinates as its input. For example, running the following will draw two lines:

```
java -jar MapViewer.jar 10 10 100 100 150 92 500 600
```

The first line is from 10,10 to 100,100; the second is from 150,92 to 500,600.

See the **mapviewer_example.py** example for executing MapViewer from Python.