

Algorithms and Complexity

This practical is the preparation for the next week's practical. Please remember to write your student number and name on the java file. This work is due on the **27th of September, 2020** (Sunday) at 11:59 PM. Please submit your source code uncompiled.

Graphs.

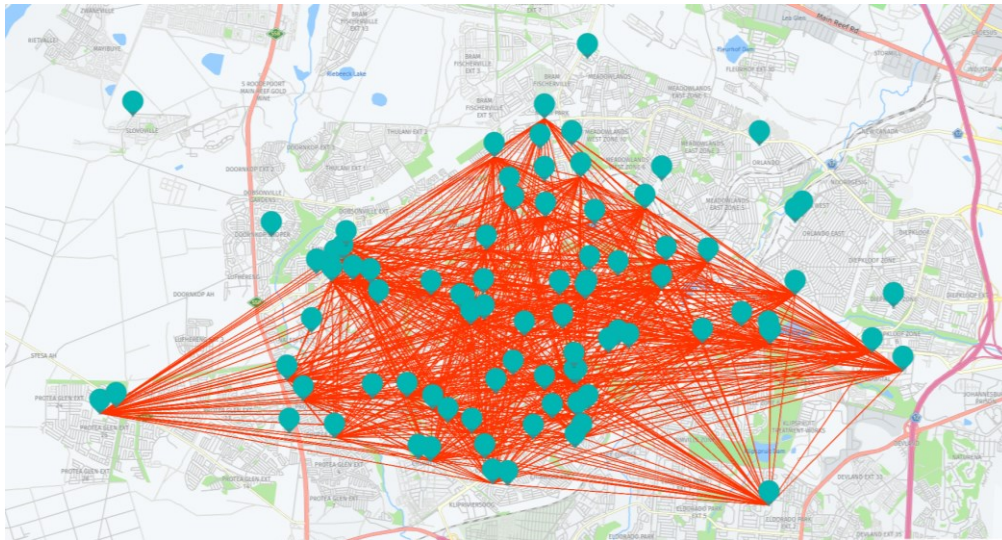


Figure 1 - Soweto educational centres with 4 and above ratings.

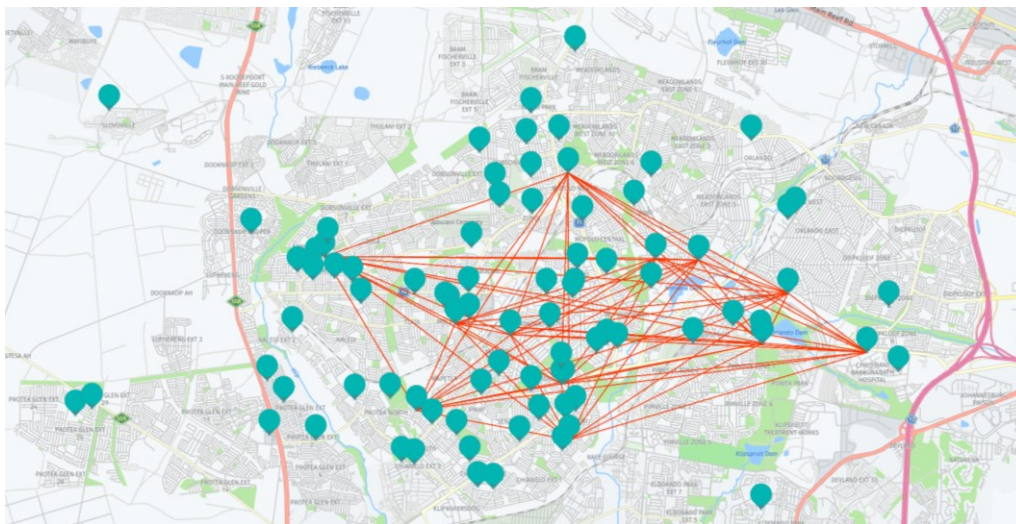


Figure 2 - Soweto educational centres with 5 ratings.

Three figures above depict Soweto educational centres with links based on their ratings. Your task is to write a Java program that performs Breadth-First and Depth-First search:

- Write a Java program that opens the CSV and reads the values into an array. The CSV file (*Soweto.csv*) contains the names, geographical coordinates, and ratings for schools separated by semicolons.

don't worry about weightings and use an arraylist

ii. Implement Breadth-First and Depth-First search algorithms.

- a. **Breadth First search** is an algorithm for traversing or searching tree or graph data structures. It starts at the tree root (or some arbitrary node of a graph, sometimes referred to as a 'search key'), and explores all of the neighbour nodes at the present depth before moving on to the nodes at the next depth level.
- b. **Depth-first search** is an algorithm for traversing or searching tree or graph data structures. The algorithm starts at the root node (selecting some arbitrary node as the root node in the case of a graph) and explores as far as possible along each branch before backtracking. The basic idea is to start from the root or any arbitrary node and mark the node and move to the adjacent unmarked node and continue this loop until there is no unmarked adjacent node. Then backtrack and check for other unmarked nodes and traverse them. Finally print the nodes in the path.
- iii. Use the array with CSV data to create a graph that has links among nodes (educational centres) with a 5-star rating. Please do not create any loops on your graph.
- iv. Assume we always choose the letter closest to the beginning of the alphabet first. Call both searching algorithms to show how the nodes will be visited and write the results into a text file (Output.txt).

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create
a flag

For example, if your input file contains:

```
Name;lat;lng;rating
Moletsane Secondary School;-26.2545499;27.85119;5
BHUKULANI HIGH SCHOOL;-26.233524;27.867531;4.7
St Matthews School;-26.259996;27.881219;3.8
Adelaide Thambo School;-26.2488437;27.8764192;3
Naledi High School;-26.2506089;27.831194;3.6
```

Then your output file will look like this:

```
Values [High School, Kliptown Primary School, ..., Zerowa Christian Academy]
Sorted [Primary School, Glenridge Primary School, Greenwich College, ..., WO BIBLE COLLEGE]

Following is Depth First Traversal
0 ... N

Following is Breadth First Traversal (starting from vertex 0)
0 ... N
```

A starting point:
<https://www.geeksforgeeks.org/breadth-first-search-or-bfs-for-a-graph/>

The table below discusses the grading rubric for this practical implementation.

Criteria	Points
Code Comments	5
Breadth First search Algorithm	10
Depth-first search Algorithm	10
Results	10