

1. Pseudocode

```
Main Method{
    File = get File input

    Initialize variable VertexArray as Array

    FOR EACH Vertex
        Insert vertex information into VertexArray
    ENDFOR

    Initialize variable EdgeMatrix as 2D Array

    FOR EACH Edge
        Insert edge information into EdgeMatrix
    ENDFOR

    Set variables for Start and End vertices

    Print Start Vertex
    Print End Vertex
    Call findEuclideanDistance and Print data

    Initialize PathTree as 2D Array

    Call calcShortestPath and Print data

    Modify EdgeMatrix to store data for the longest path

    Call calcShortestPath with new data
}

calcShortestPath Method{
    Initialize arrays for pathsToAdd and shortestDistance for vertices

    FOREACH Vertex
        Check for next shortest path

        FOREACH Vertex
            Add distance to shortestDistance array for current vertex
        ENDFOR
    ENDFOR

    Print data
}
```

```

printPath Method{
    IF Vertex = -1 THEN
        Break
    ENDIF

    Call printPath
    Print Vertex
}

findEuclideanDistance Method{
    Initialize Start and End variables for X and Y coordinates

    Find Start and End vertices' X and Y positions

    Print data
}

Class Vertex{
    Coordinate data
    VertexCount

    Constructor{}
}

```

2. big-O analysis

3. Data Structures

- Array
- 2D Array
- Classes
 - Vertex class

4. Compilation and Execution / 5. Output

```
Microsoft Windows [Version 10.0.19044.2130]
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C:\Users\idrie\Desktop\UNI\CSCI203\Assignment3>javac ShortestPathAlgorithm.java

C:\Users\idrie\Desktop\UNI\CSCI203\Assignment3>java ShortestPathAlgorithm.java
Enter file name: a3-sample.txt
Total number of Vertices: 20
Total number of Edges: 100

Start Vertex: 2
Goal Vertex: 13

Euclidean Distance between Start Vertex and Goal Vertex:
Formula:  $\sqrt{(83.0 - 12.0)^2 + (98.0 - 66.0)^2}$ 
Result: 77.87810988975015

Shortest Path:
Path from 2 to 13: Start --> 2 --> 13 --> End
Distance = 85.0

Longest Path:
Path from 2 to 13: Start --> 2 --> 17 --> 20 --> 13 --> End
Distance = 134.0
```