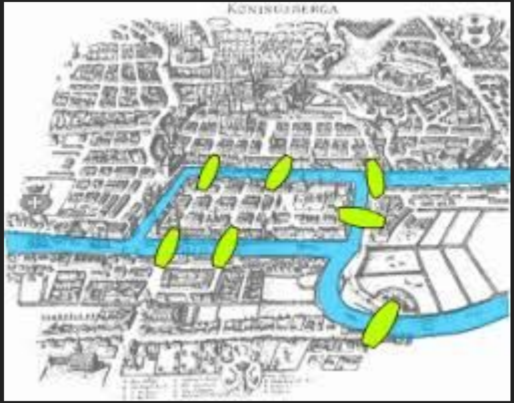
Algorithm Archives

Gilbert Neuner, Daryan Sugandhi, Esam Izzat, Andrew Lybianto

Content

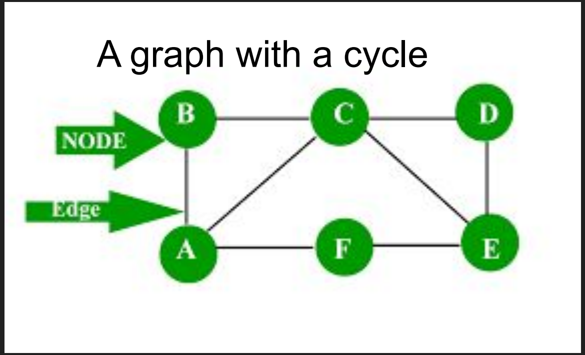
Project Overview

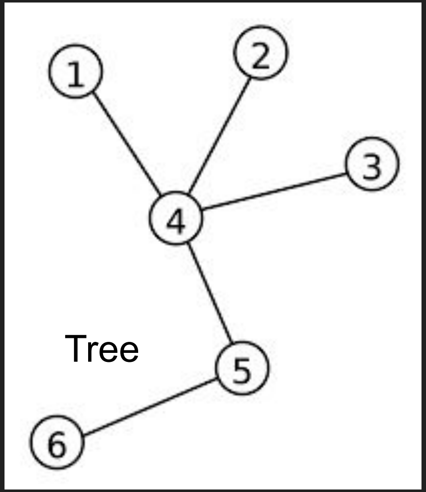
This project executes Depth First Search and Breadth First Search on a graph inputted by the user



Definitions

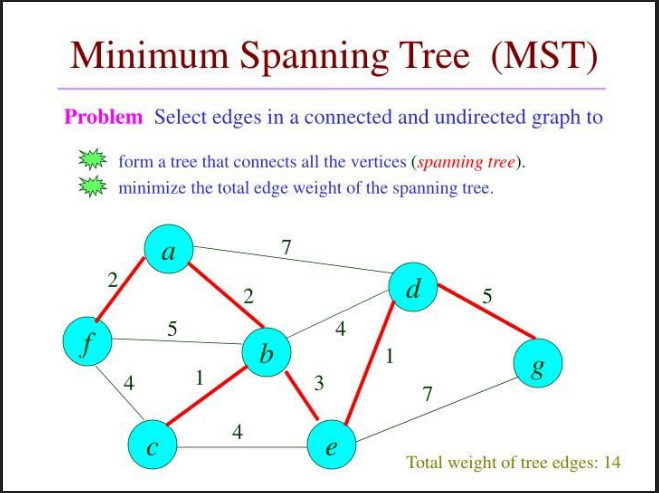
- A graph is a collection of nodes connected by edges
- A cycle is a set of vertices connected in a closed chain
- A tree is a connected graph with no cycles





Minimum Spanning Tree

- A minimum spanning tree is a subset of the edges of a graph which connects all the nodes together with no cycles
- MSTs are not always unique and different algorithms will yield different MSTs given the same inputs


Minimum Spanning Tree (MST)

Problem Select edges in a connected and undirected graph to

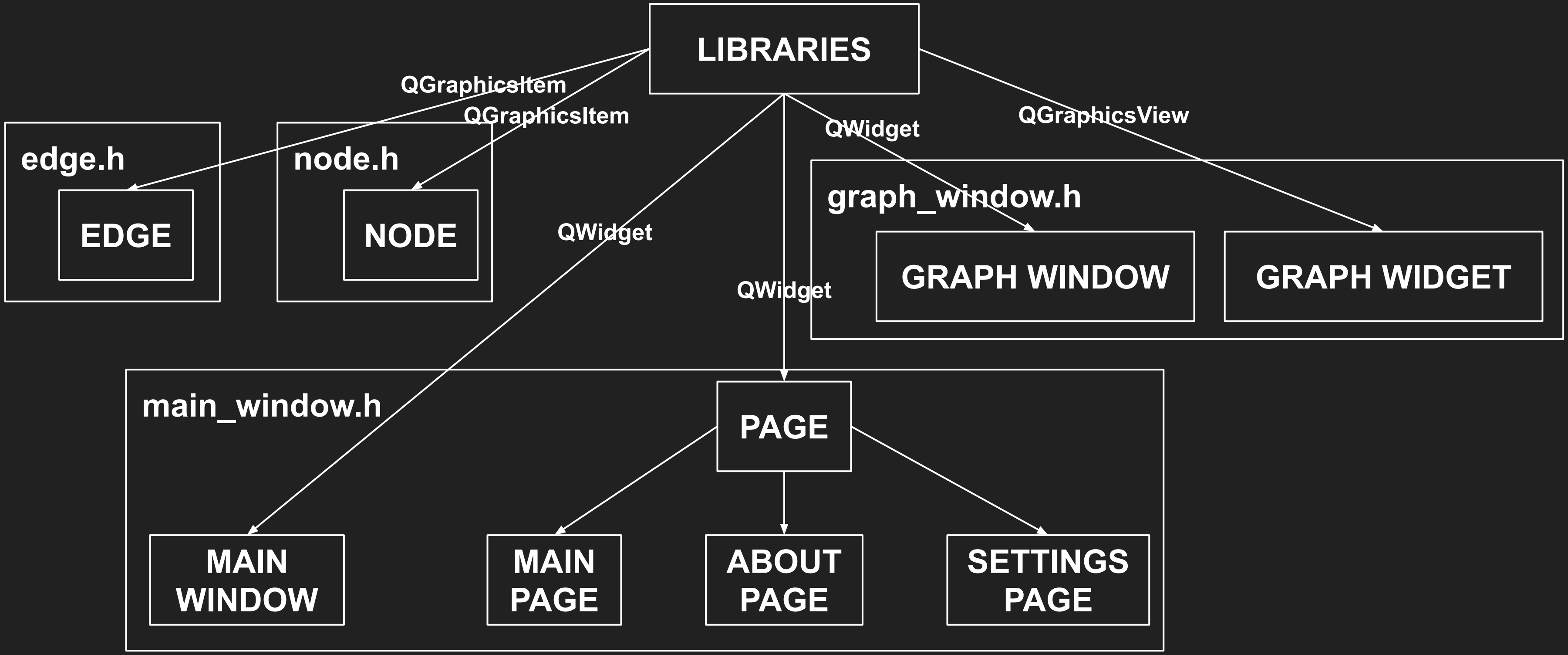
- form a tree that connects all the vertices (*spanning tree*).
- minimize the total edge weight of the spanning tree.

DFS vs BFS

- Depth First Search
- Finds MSTs by starting at root node, and exploring as far as possible before backtracking

- Breadth First Search
- Starts at root node, and explores all neighbors at current depth before moving onto nodes at the next depth

Class Hierarchies

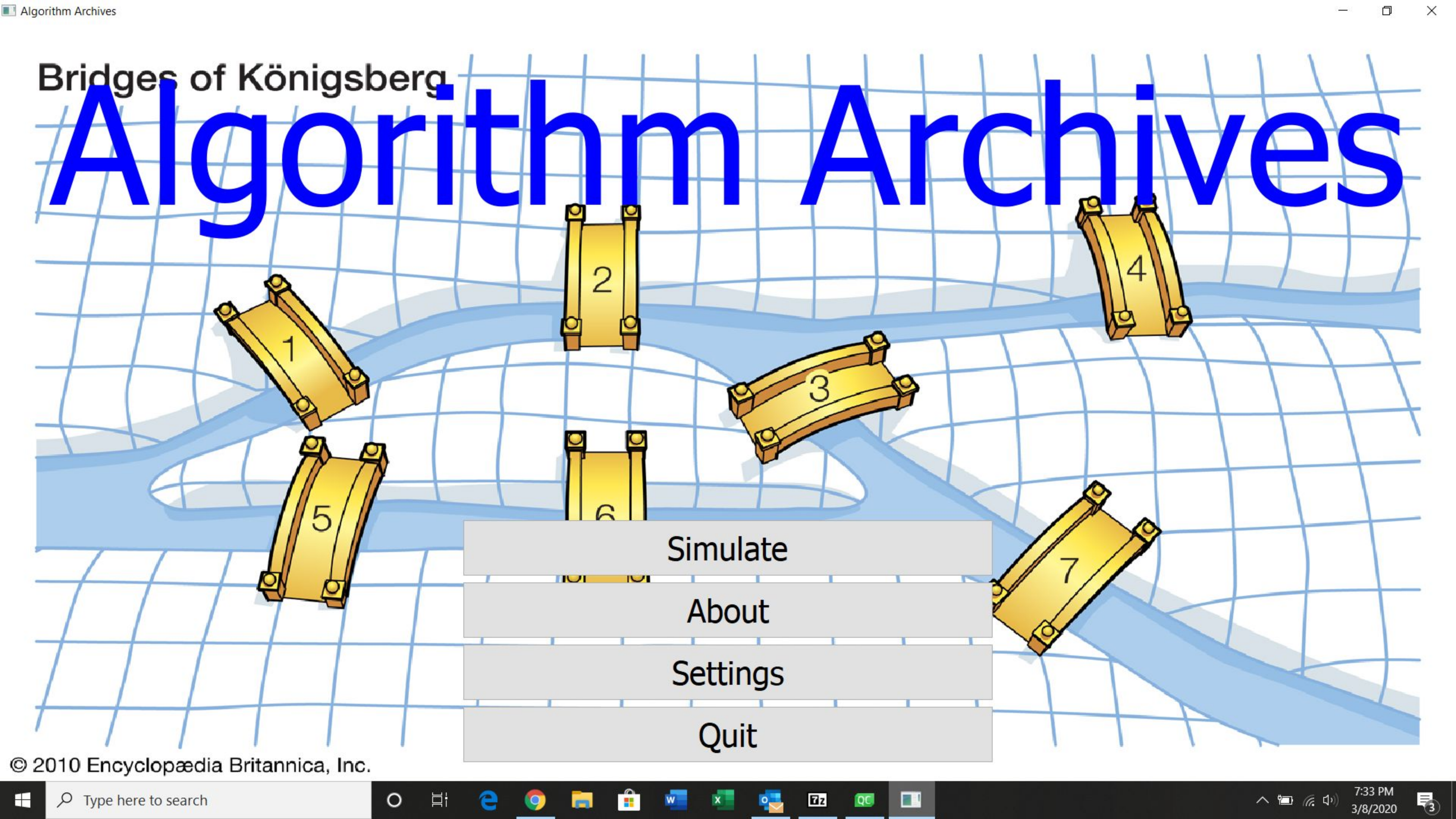


Edge, Node, and Graph

- Edge
    - Stores pointers to graph, and two nodes
    - Mostly cosmetic - nodes do the heavy lifting
- Node
    - Stores a pointer to graph, a vector of neighbors, a bool indicating whether it has been explored, and an identification number
    - Use this to look at other nodes
    - Use this to add and delete edges
- Graph
    - Stores vector of nodes, and a vector of edges
    - Also knows which identification numbers are available
    - Use this to add and delete nodes

Main Window/Misc. Class Overview

- MainWindow: window that links the simulation, about and settings page
- Page: parent class of the pages; return the contents and buttons of the page
- Main Page: title page
- About Page: descriptions of the algorithm and what they do
- Settings Page: allows the music to be muted/unmuted
- StackedWidget


Algorithm Archives
Bridges of Königsberg
Algorithm Archives
1
2
3
4
5
6
7
Simulate
About
Settings
Quit
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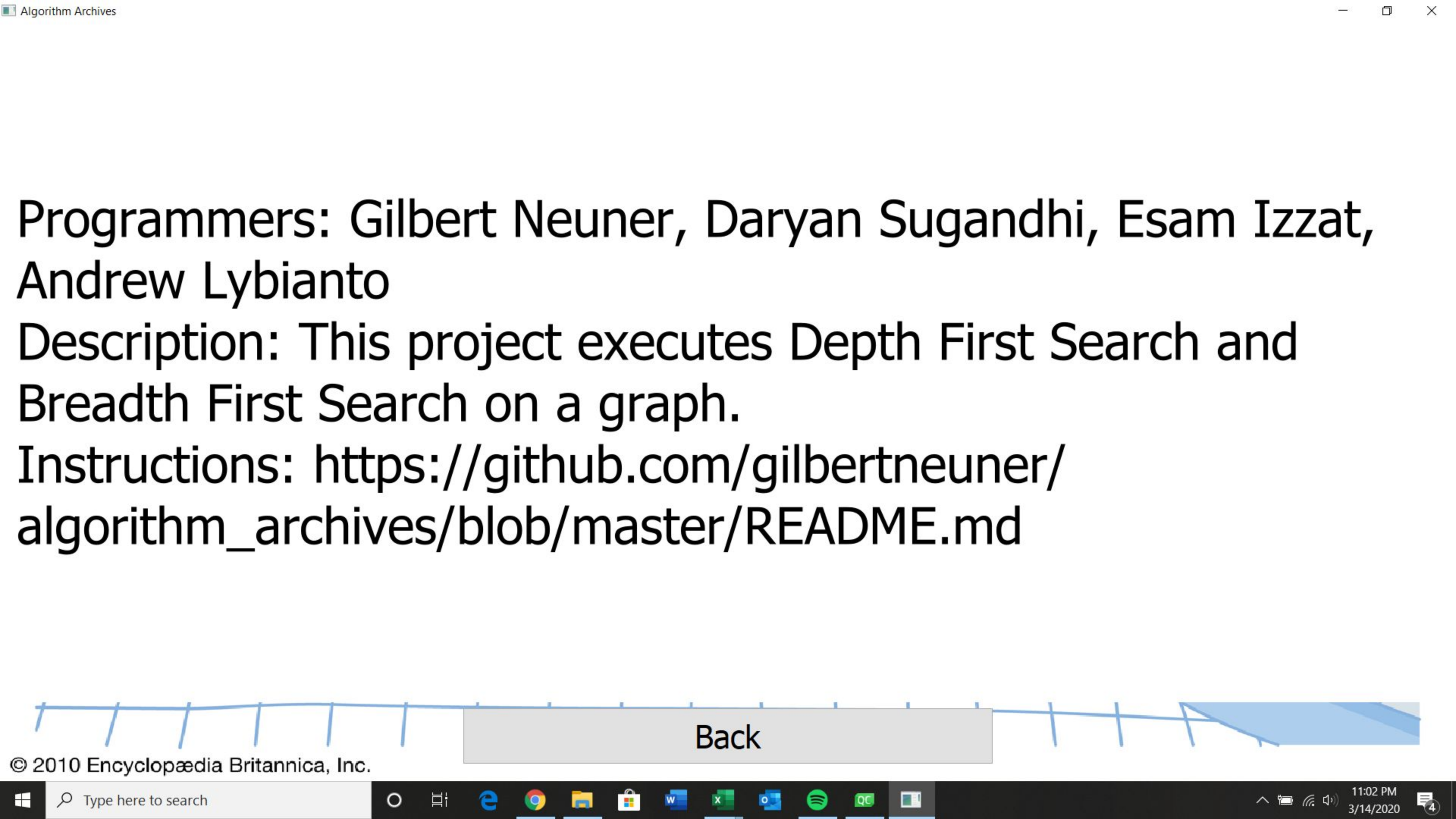
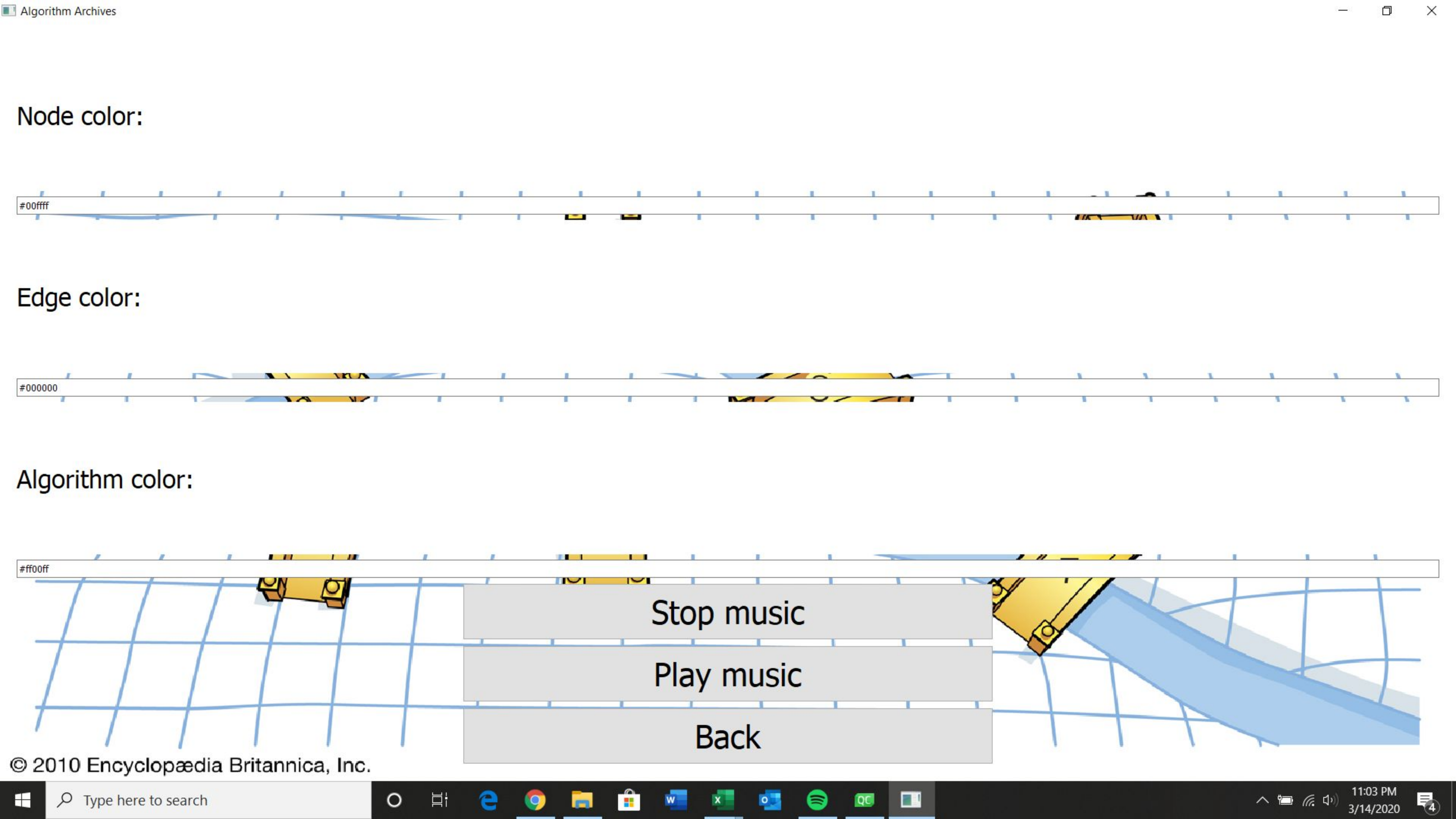
Type here to search
7:33 PM
3/8/2020



Programmers: Gilbert Neuner, Daryan Sugandhi, Esam Izzat, Andrew Lybianto

Description: This project executes Depth First Search and Breadth First Search on a graph.

Instructions: https://github.com/gilbertneuner/algorithm_archives/blob/master/README.md



Node color:

#00ffff

Edge color:

#000000

Algorithm color:

#ff00ff

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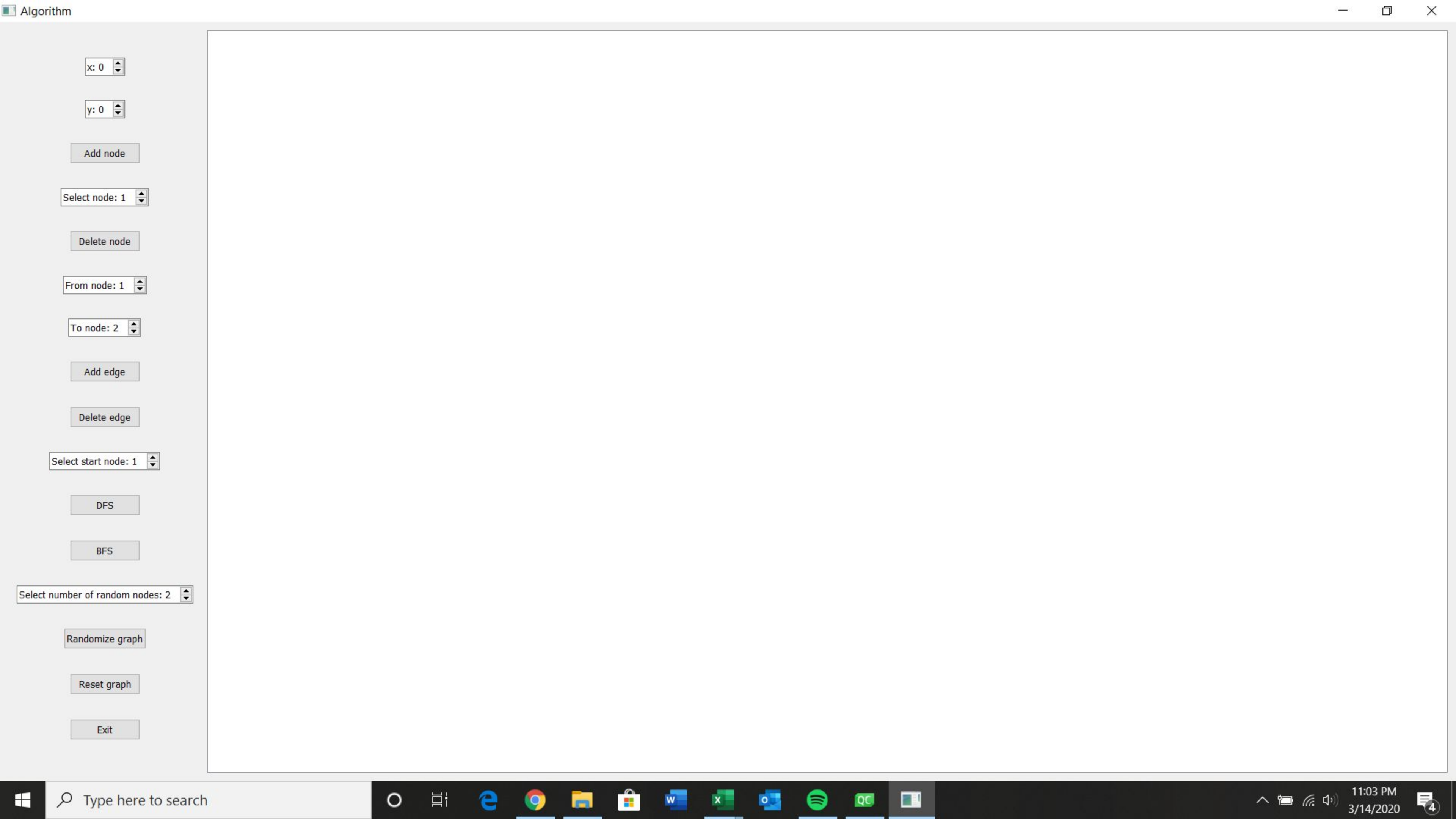
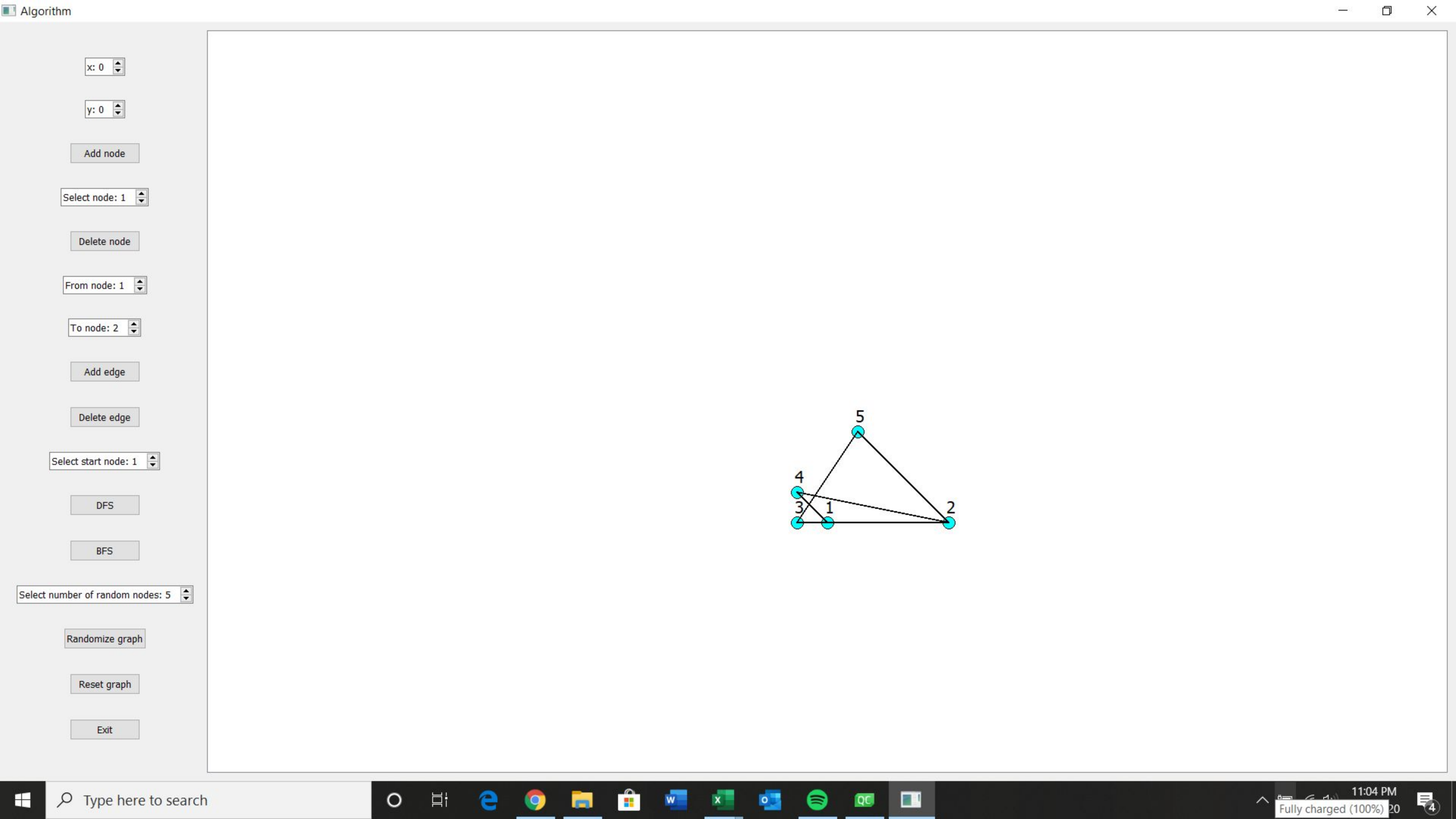
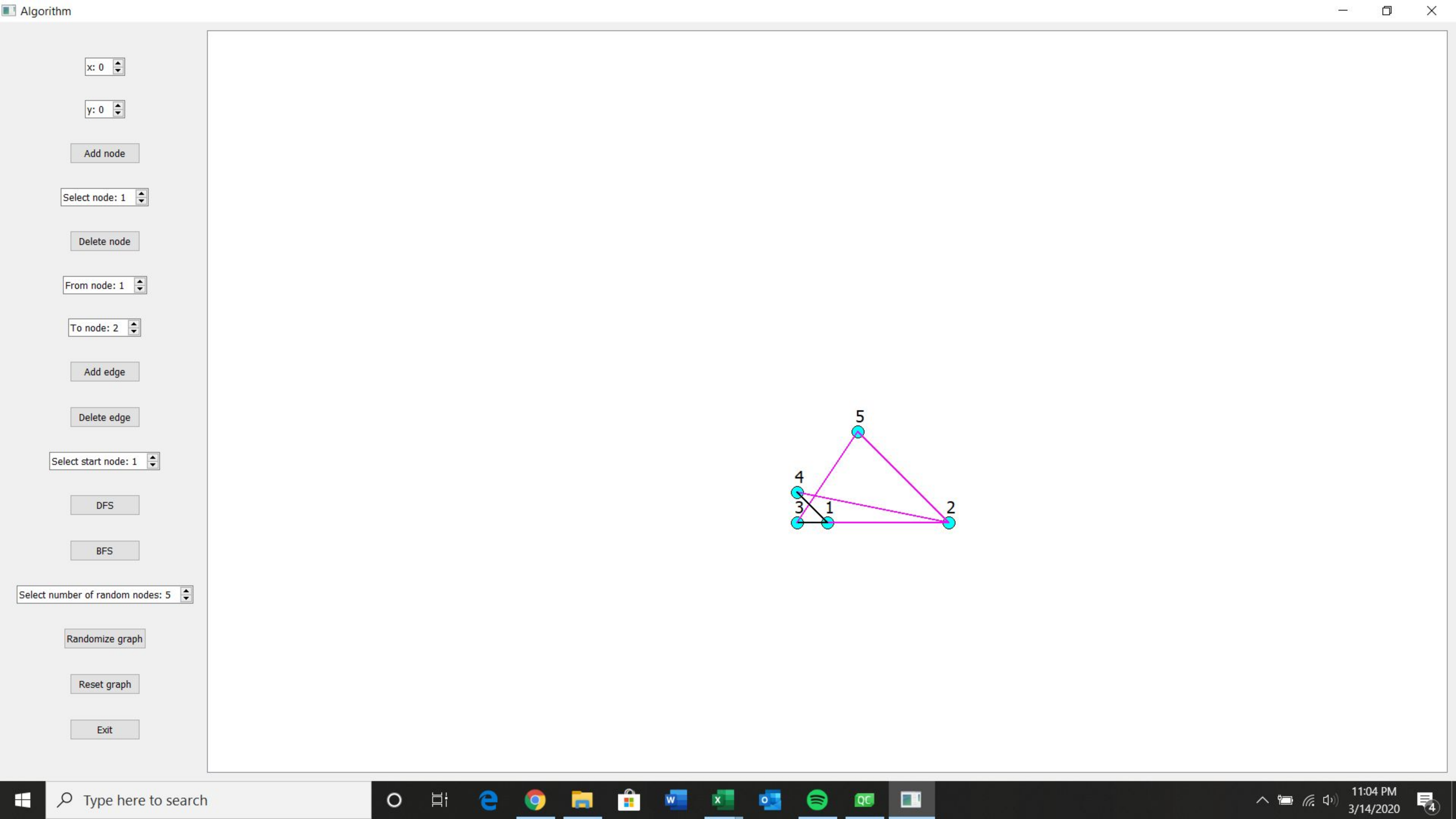
Graphs Class Overview

- Edge class: parameters of edge, e.g. source node & destination node.
- Node class: parameters of the node, e.g. neighbors, coordinate and node number

- GraphWindow class: contains all the buttons that allows addition/removal of nodes/edges, and signals algorithms when pressed.
- GraphWidget class: the graph that exists in GraphWindow; contains vectors of nodes and edges and paints them according to the user’s input


Algorithm
x: 0
y: 0
Add node
Select node: 1
Delete node
From node: 1
To node: 2
Add edge
Delete edge
Select start node: 1
DFS
BFS
Select number of random nodes: 2
Randomize graph
Reset graph
Exit
Type here to search
11:03 PM
3/14/2020


Algorithm
x: 0
y: 0
Add node
Select node: 1
Delete node
From node: 1
To node: 2
Add edge
Delete edge
Select start node: 1
DFS
BFS
Select number of random nodes: 5
Randomize graph
Reset graph
Exit
5
4
3
1
2
Type here to search
11:04 PM
Fully charged (100%)



x: 0

y: 0

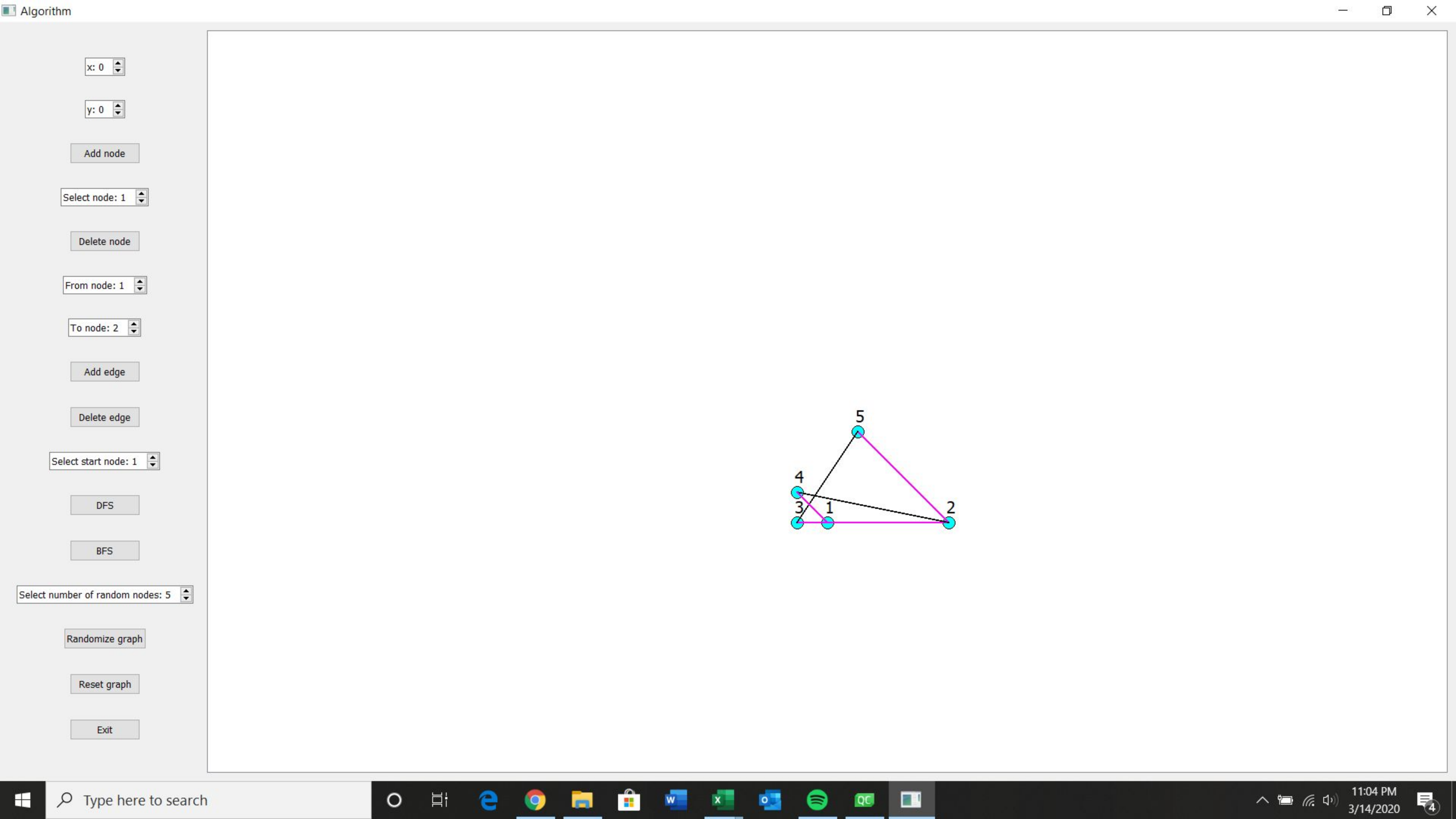
Select node: 1

From node: 1

To node: 2

Select start node: 1

Select number of random nodes: 5



x: 0

y: 0

Select node: 1

From node: 1

To node: 2

Select start node: 1

Select number of random nodes: 5

11:04 PM
3/14/2020