

Graph GUI Help

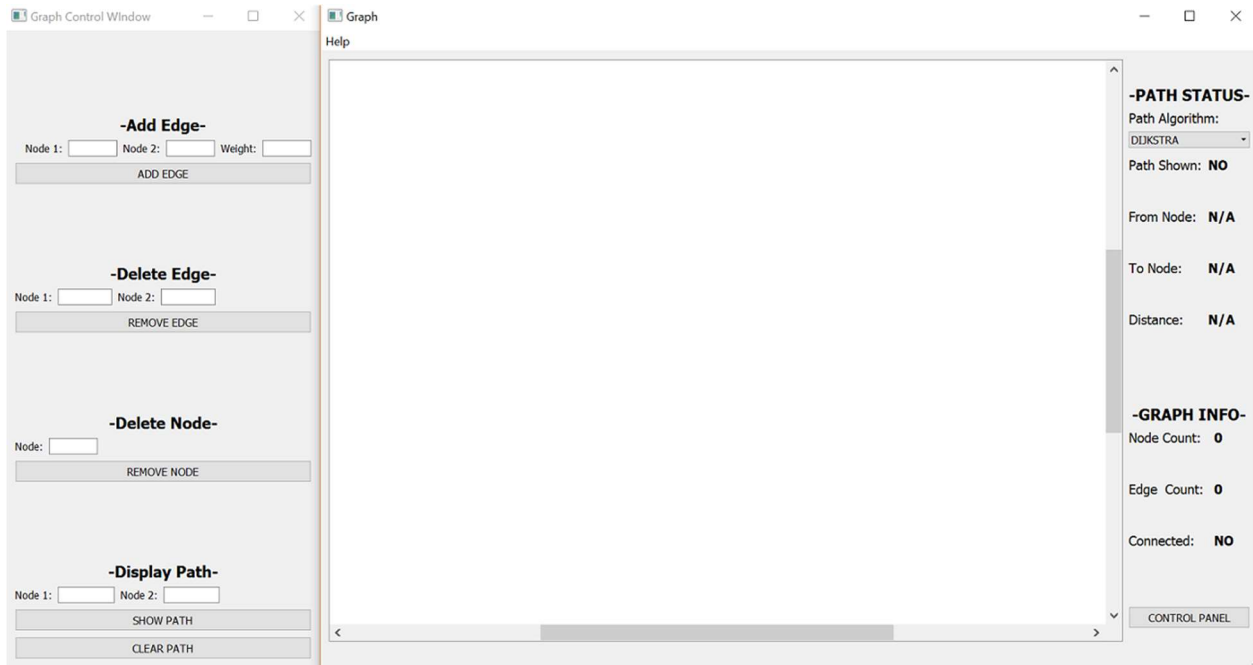


Figure 1: *Graph GUI Layout*

LAYOUT:

When first opening the project two windows appear. The left window is a control panel and the right is split into two sections, one empty white section for the graph itself and another section for displaying data about the graph.

Control Panel

The control panel on the left allows the user to edit numerous elements of the graph, however it is not necessary for controlling the graph as all the actions on the panel can be implemented using key commands in the graph area.

Graph Area

The white graph area is where the graphical representation of the graph appears. Nodes and edges are added to and deleted from this area. The user interacts directly with this window in order to add nodes and all other operations can be performed using special key commands within the graph area.

Graph Data Panel

The panel to the far right is the data panel. It contains data about the graph currently being displayed including the number of nodes and edges in the graph as well as whether the graph is

connected. The panel also contains information about the current graph algorithm being utilized. The combo box in the panel indicates the current algorithm being used and the user can switch algorithms using the box. The section titled **-PATH STATUS-** shows some path information such as whether or not a path is currently displayed, what nodes the path connects if applicable and the length of the shown path. Finally, at the bottom of the panel is a button labeled **CONTROL PANEL** that can be used to open the control panel to the left if it was previously closed.

GRAPH COMMANDS:

Add Node

To add a node simply left click somewhere within the white graph area. After left clicking a dialog box will appear requesting the name of the node. Input a node name between 1 and 4 characters in the dialog's text area and either press OK in the box or simply hit ENTER on the keyboard. An orange node will now appear at the location that was originally clicked with the input name.



Figure 2: *Node*

Select/Deselect Node

Many commands require that node are selected. To select a node simply move the cursor over an existing node and right click on the mouse. When the node is selected it will turn red. To deselect a node simply right click over a selected node and it will turn back to orange.



Figure 3: *Selected node*

Add Edge

Control Panel: To add an edge from the control panel go to the text boxes directly under the label **-Add Edge-**. In the first two text boxes input the names of the existing nodes that the added edge will connect. In the third box input the numerical weight value of the desired edge. To add the described edge click the **ADD EDGE** button.

Key Command: To add an edge without the control panel simply select two nodes in the graph by right clicking over them and then hit ENTER. A dialog will appear requesting a numerical

weight value. Input a number and either click OK or hit ENTER again. An edge of the given weight will then appear between the selected nodes.

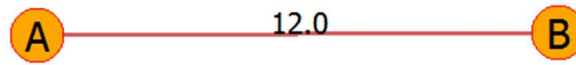


Figure 4: Edge between A and B

Remove Node

Control Panel: To remove a node from the control panel go to the text box directly under the label **-Delete Node-**. Input the name of the node to be deleted and then click the **REMOVE NODE** button.

Key Command: To remove a node without the control panel simply right click select all the nodes to be deleted and hit the BACKSPACE key. The nodes and any connected edges will then be deleted.

Remove Edge

Control Panel: To remove an edge from the control panel go to the text boxes directly under the label **-Delete Edge-**. In the two text boxes input the names of the existing nodes between which the edge exists. To remove the described edge click the **REMOVE EDGE** button.

Key Command: To remove an edge without the control panel simply select two nodes in the graph by right clicking over them and then hit the DELETE button on the keyboard. As long as an edge existed between the two selected nodes it will be removed from the graph.

Display Path

To display a path using a path algorithm, first make sure that the algorithm shown in the combo box in the rightmost panel is the desired algorithm. The default algorithm selected is DIJKSTRA's shortest path algorithm. Click the combo box to view and select another algorithm.

Control Panel: When the desired algorithm is selected from the right panel go to the control panel underneath the **-Display Path-** label. If the selected algorithm requires node references input the node values into the text boxes. To display a path using the algorithm, click the **SHOW PATH** button. If graph conditions are valid a path will then be displayed by coloring the edges and nodes of the discovered path green.

Key Command: To display a path without the control panel simply right click select the nodes in the graph that are required for the algorithm if selected nodes are needed. Hit the UP ARROW button on the keyboard and a highlighted green path will be displayed if the graph conditions are valid.

Clear Path

Control Panel: To clear a highlighted path simply click the **CLEAR PATH** button on the control panel.

Key Command: To clear a path without the control panel simply hit the DOWN ARROW key on the keyboard.

GRAPH ALGORITHMS:

Dijkstra

Dijkstra's algorithm can be used to find the single source shortest path from a single node to all other nodes in the graph that can be reached from the selected node. Dijkstra is implemented in this program to only find the shortest path between two selected nodes. To find the shortest path between two nodes using Dijkstra, first ensure DIJKSTRA is selected in the combo box. Select two nodes by right clicking nodes or typing node values into the text boxes below the - **Display Path-** label. When the UP ARROW is hit on the keyboard or the **SHOW PATH** button is pressed on the control panel a path with the lowest possible weight value will appear connecting the two selected nodes.

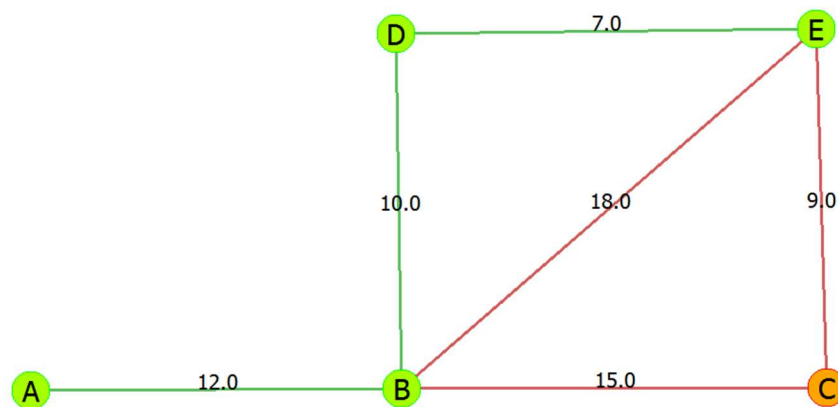


Figure 5: Dijkstra between nodes A and E

REQUIREMENTS: Two selected nodes must be connected by edges and weights of the connecting edges must be nonnegative.

Prim's

Prim's algorithm finds the Minimum Spanning Tree of a graph or the path through the graph that touches all the nodes by traversing the edges with the lowest possible weights. To find the MST of the graph using Prim's, first ensure PRIM'S is selected in the algorithm combo box and then either hit the UP ARROW on the keyboard or the **SHOW PATH** button on the control panel.

All the nodes in the graph will then be highlighted and the least costly edges connecting those nodes will also be highlighted.

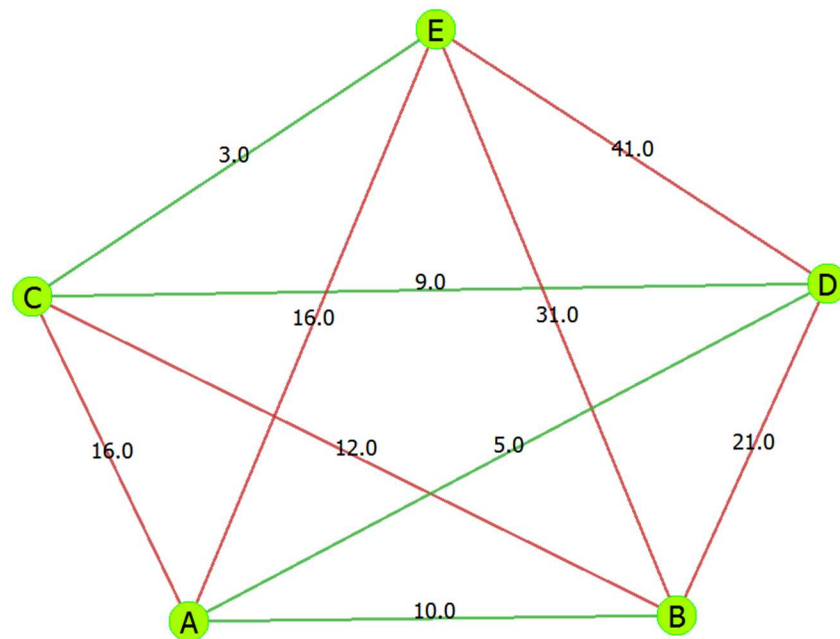


Figure 6: *Prims*

REQUIREMENTS: Prim's will only work if the graph in the graph window is connected.