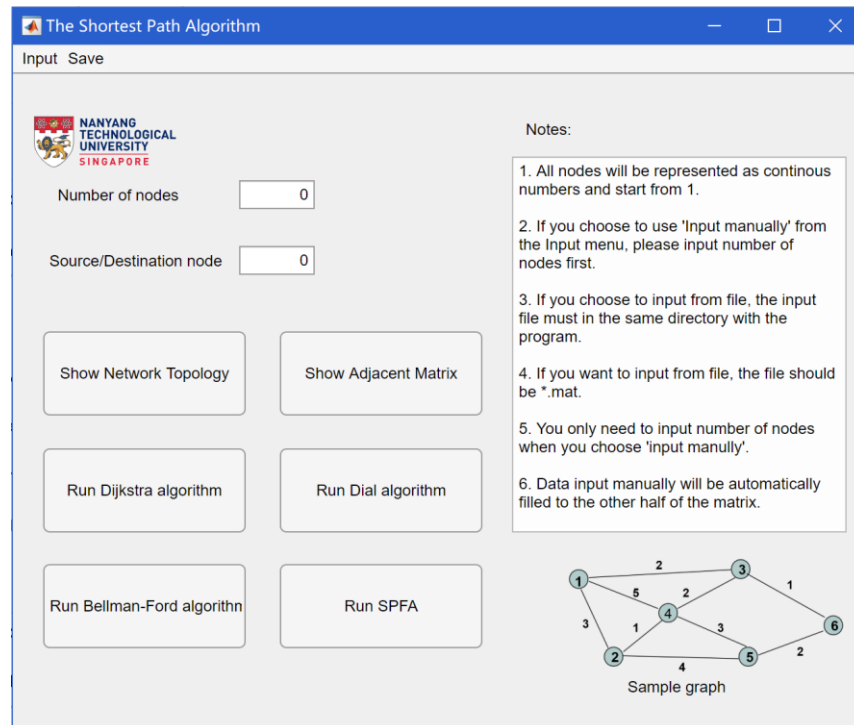# User Guide

The shortest path algorithm program

Version 2.0


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Input

Input data should be represented as adjacent matrix. If node A is not connected to node B, the cost should be set as inf. The diagonal elements, which is the cost to itself, should be set to 0. Also in the routing all routes are bi-directional, which means the graph should be undirected. So the matrix should be symmetric.

Input from file

The file to be loaded should be a *.mat file. The matrix should meet the criteria above. The input should be in the same directory with the program, or an error will occur.
A callback function will be responsible to check the validity of the matrix. If the matrix is not a square matrix, has nonzero diagonal elements, has minus elements, or is asymmetric, a message box will appear. Also user needs to select a new input. An example of error input shows like this:
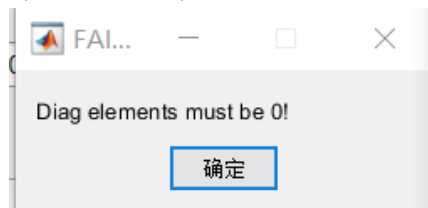
If input graph is loaded successfully, a message box will appear. If the below message box does not appear, it means the loaded process failed. The most likely reason may be the program and the mat file are in different directories.
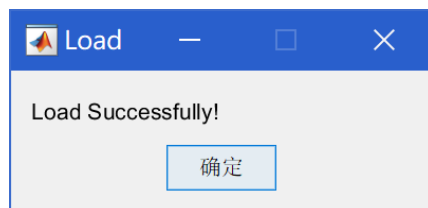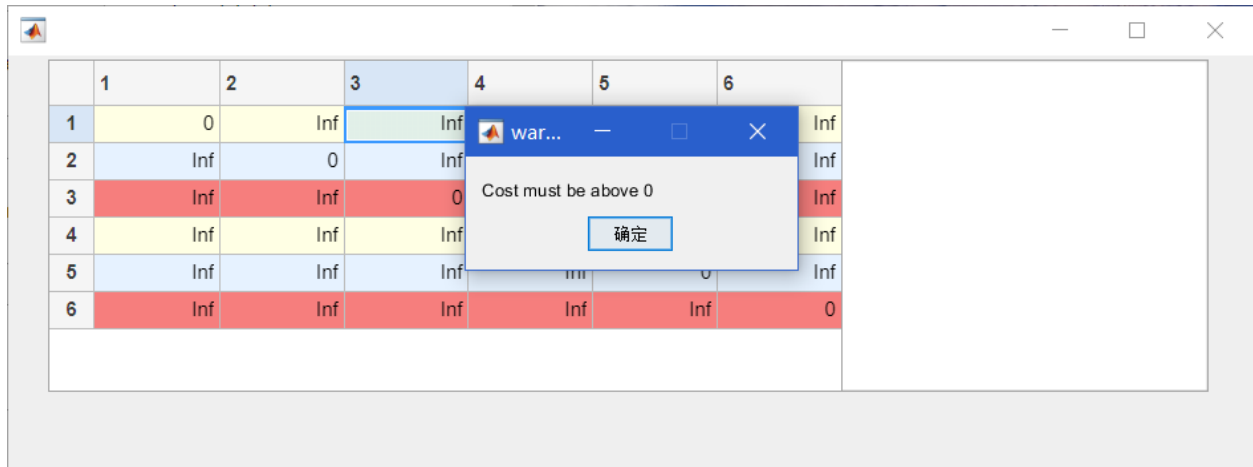

The number of nodes will be determined automatically. User does not need to input in the GUI interface.

Input manually

An interface will show to accept the input. It is initialized to infinity matrix with diagonal elements to 0s.
A callback function will be responsible to check the validity of the matrix after every input. The value will remain unchanged if a minus value is input. Also the input will be denied if user tries to change diagonal elements to non-zero values. An example of error input shows like this:

The auto-complete function is enabled by a callback function triggered by any fill event. This means user does not need to input duplicated data twice. For example, if the value located in (5,3) is set to 4, the value in (3,5) will be set to 4 automatically.

User should first input the number of nodes in the GUI interface for program to initialize an appropriate dimensional matrix.

Generate random input

A random matrix, with dimension from 5 to 8, will be generate by program. The elements in the matrix will be chosen randomly from 1 to 9. Some elements will be changed to inf randomly.
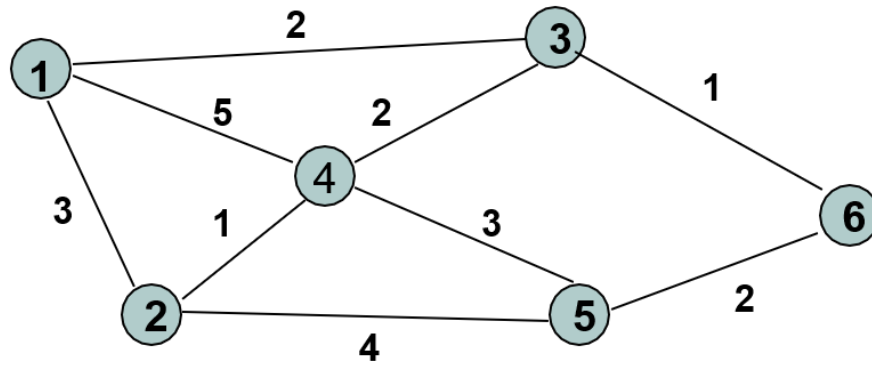
The number of nodes will be determined automatically. User does not need to input in the GUI interface.

If successfully generate, a message box will appear:
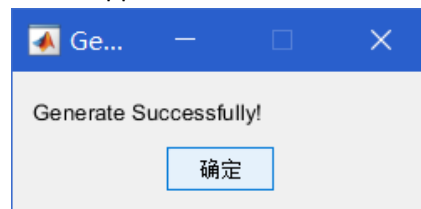
Load sample input

This menu will generate the adjacent matrix of the below graph:

The number of nodes will be determined automatically. User does not need to input in the GUI interface.

Save

This menu will save the computed matrix to file in *.mat format. All files will be saved to the same direction where the program is running.
The correspond button(function) must be click before saving the mat file.
User can first input matrix manually, then use the 'save adjacent matrix' menu to generate the .mat file for later use.

Blanks

There are two blanks in the GUI interface. The Source/Direction node field should always be filled if user wish to run one of the shortest path algorithms. The number of nodes field should only be filled if user input data manually.

Buttons

There are six buttons represents six different functions.
In the Dijkstra and Bellman-Ford algorithms, the output is presented step-by-step.