
SIGNAL FLOW GRAPH PROJECT

Team members:

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1) Problem statement

Signal flow graph representation of the system. Assume that the total number of nodes and numeric branches gains are given.

Required:

- 1- Graphical interface.
- 2- Draw the signal flow graph showing nodes, branches, gains, ...
- 3- Listing all forward paths, individual loops, all combination of n non-touching loops.
- 4- The values of Δ , Δ_1 , ..., Δ_m where m is number of forward paths.
- 5- Overall system transfer function

2) Main Features of the program and additional options if exists.

The program allows you to draw a directed graph with the following features:

_ add a node to the graph.

_add an edge to the graph with specific weight.

_choose an input and output node for the graph.

_edit the weight of an edge. (extra option)

_remove a node or an edge from the graph. (extra option)

_ the final solution shows:

1. the Gain or the overall transfer function.
2. list of all forward paths
3. big delta or the delta of the whole graph.

4. list of all loops.
5. list of all non-touching loops.
6. list of the deltas of each path.

3) Data Structure.

_ Array List.

_2D array.

_Hash map.

_set.

4) Main modules.

_forwardPaths.

_Delta.

_Loops.

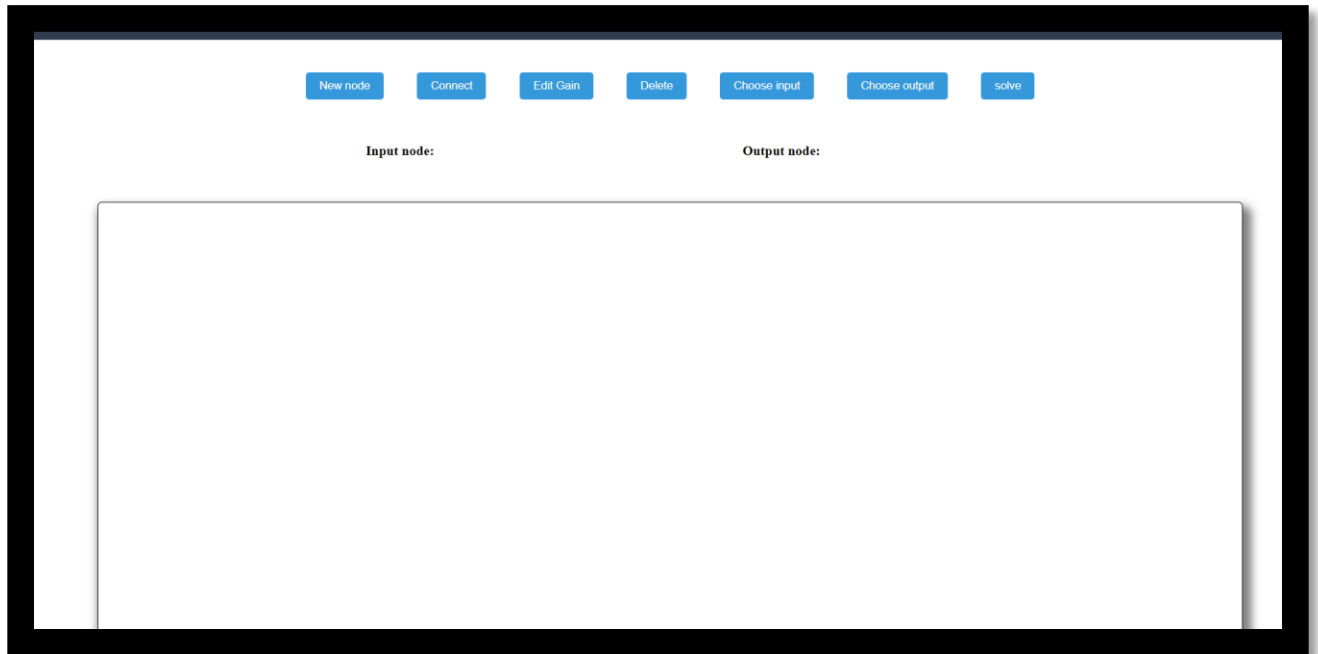
_NonTouchingLoops.

5) Algorithms used.

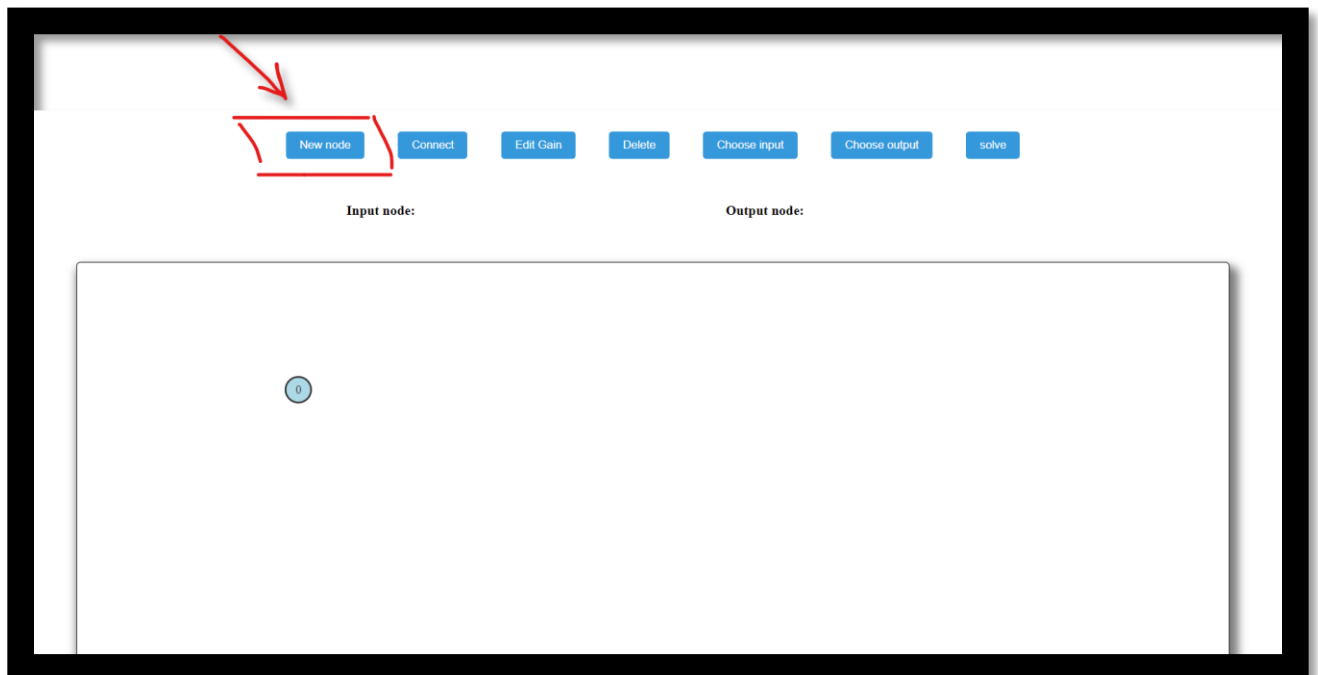
_ DFS is used to get forward paths and all loops.

6) Simple user guide.

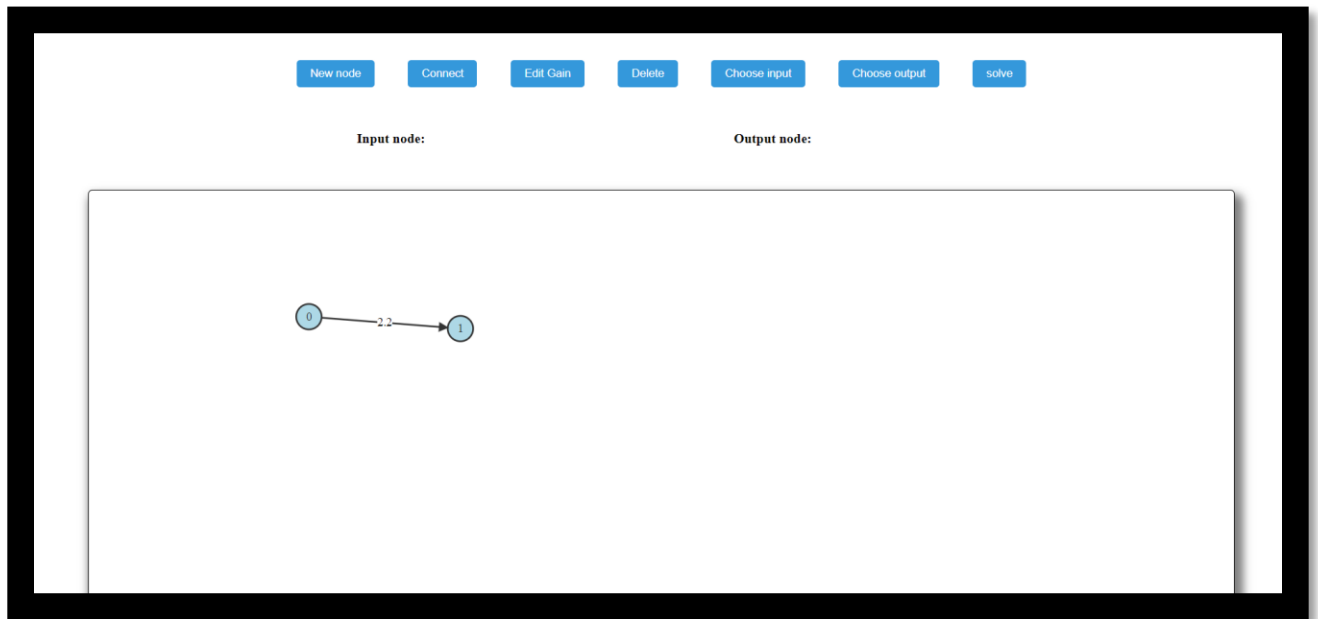
_the main GUI.



A) Adding new node: simply click the new node button the a node is created at the top left and you can move it along.



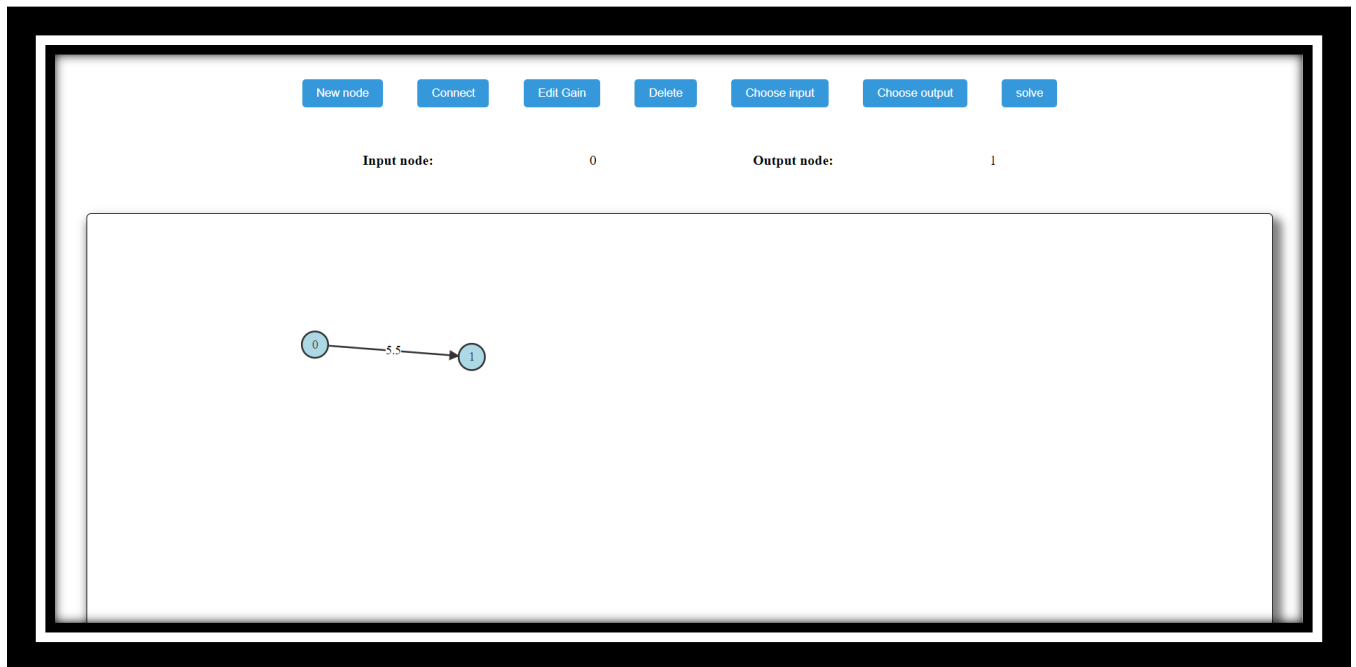
(B) add an edge: click connect button then click of the first node which is the source of the edge then double click on the second node which is the destination of the edge.



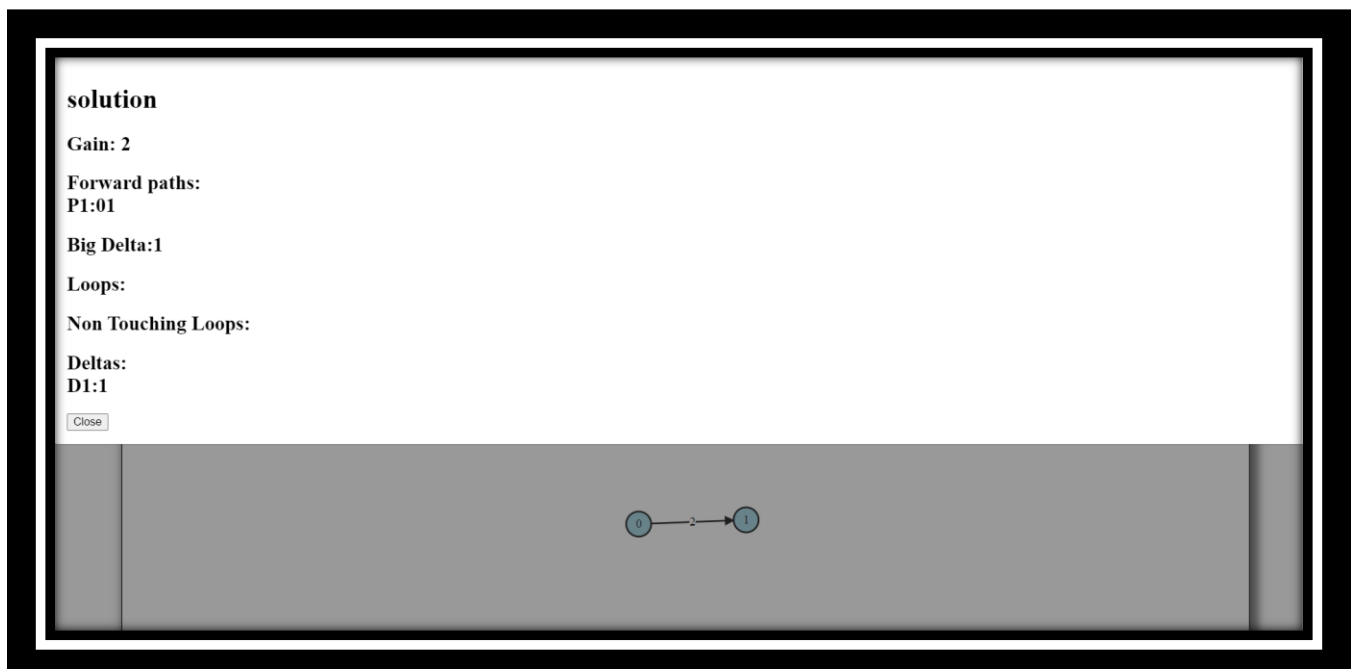
(C) Editing and setting Gain to edges: write an number into the box shown then hit enter.



(D) Choosing input and output: click of the choose input or output then click on the node you choosed.

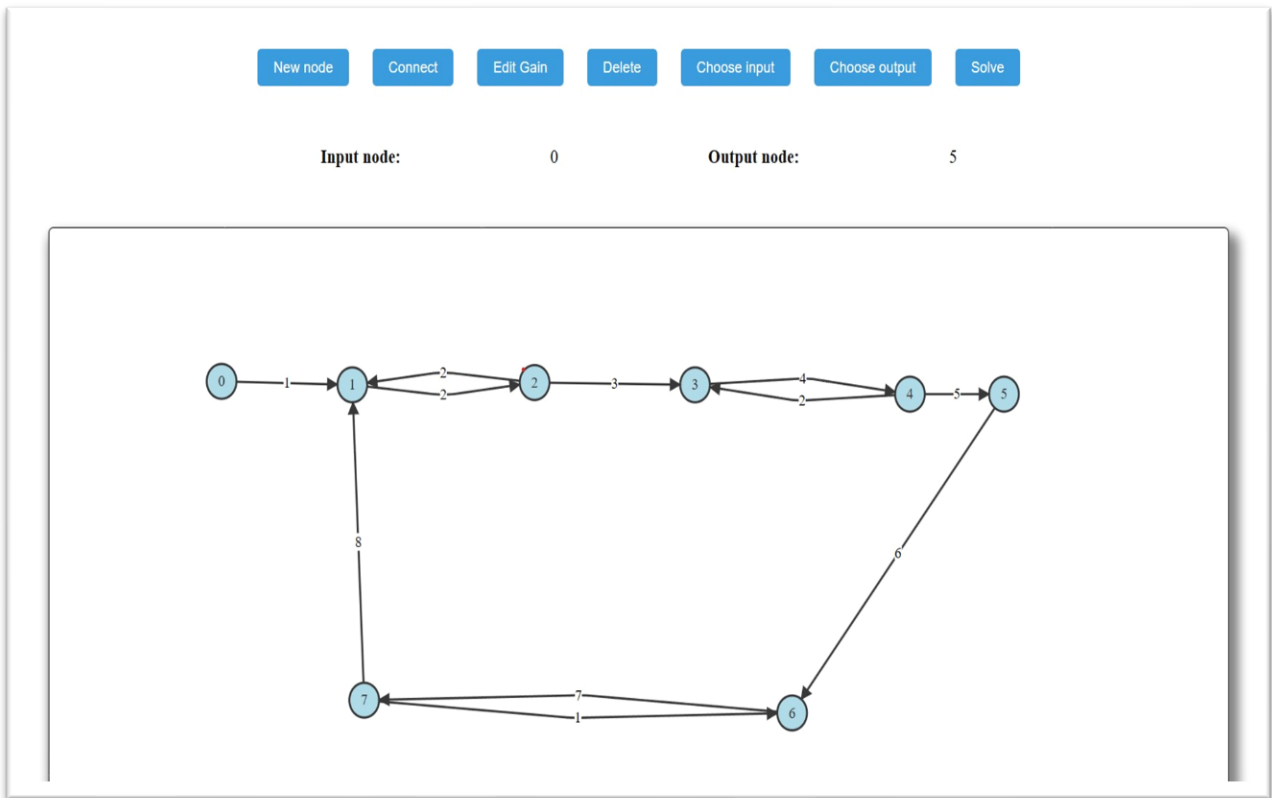


(E) Showing Solution: simply click solve button and it will display the solution as shown.



7) Sample runs.

Sample run_1



solution

Gain: 0.017801513128615932

Forward paths:

P1:012345

Big Delta:-40446

Loops:

L1:121

L2:12345671

L3:343

L4:767

Non Touching Loops:

L[1, 2, 1],L[3, 4, 3],

L[1, 2, 1],L[5, 6, 5],

L[3, 4, 3],L[5, 6, 5],

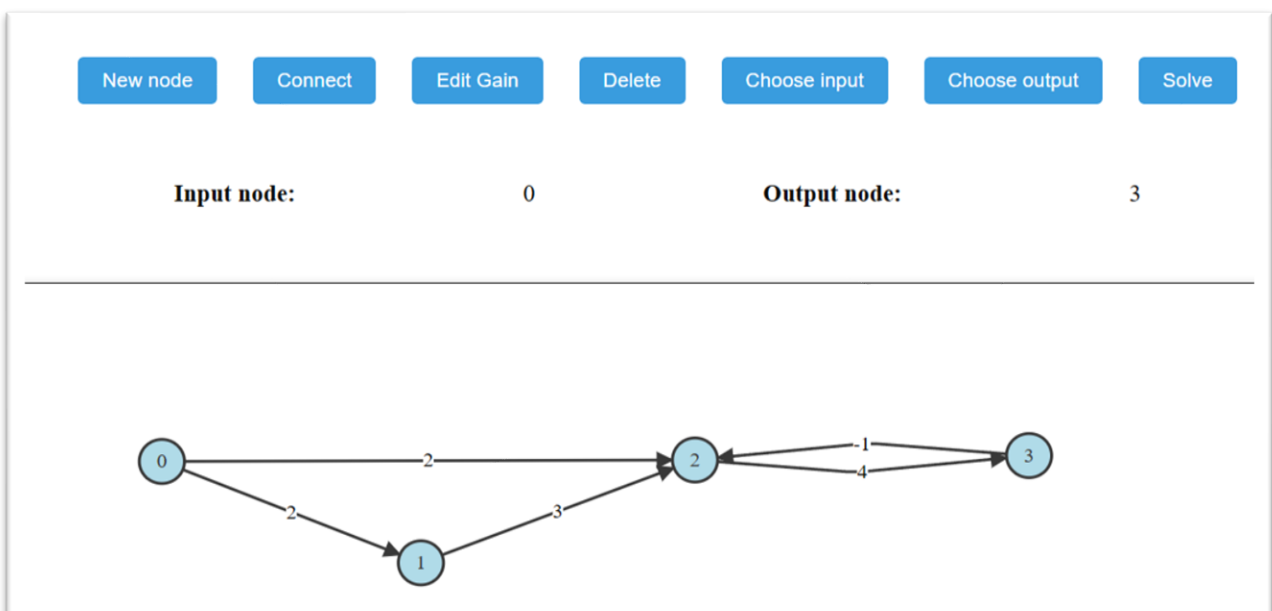
L[1, 2, 1],L[3, 4, 3],L[5, 6, 5],

Deltas:

D1:-6

Close

Sample run_2



Solution

Gain: 6.4

Forward paths:

P1:0123

P2:023

Big Delta: 5

Loops:

L1:232

Non Touching Loops:

Deltas:

D1:1

D2:1

Close
