National University Of Computer and Emerging Sciences

GRAPH VISUALIZATION AND ITS ANALYSIS

ALGO Project Report
Section: BCS-5B

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Abstract:

The implementation of our project is totally based on the analysis of graph by using matplotlib library. For this, we have to implement the following algorithms like:

- Prim's.
- Kruskal.
- Dijkstra.
- Bellman Ford.
- Floyd Warshall Algorithm.
- Clustering Coefficient.
- Borůvka's algorithm.

Hence, these algorithms are implemented to examine and analyze the fluctuation of graph from one node to another and show their graph representation by using given benchmarks of increasing number of nodes from10 to 100 nodes provided in the project description.

Introduction:

A graph is an abstract notation used to represent the connection between pairs of objects. So, according to graph theory algorithm we can easily find connection between many nodes of the graph either it contains a bunch of nodes in it. These algorithms are also used to solve the problems of representing graphs as networks like airline flights, etc. But, here in this project we are in struggle to find the graph properties like its MST and best path of 10 different networks based on the input nodes entered by the user which ranges from 10 nodes to 100 nodes. We implement this project in this way, that we are also able to view the different networks as graph representation. The edge_count value of the graph acts as a middleware in our project which associate link with the different networks having some nodes with their x and y coordinates present in the given input file. The purpose of generating all these networks is to analyze that how we link all the network nodes with the minimum average cost of another network. Hence, the

linking of these two networks is totally dependent on the graph MST. So, we have to find the MST of the graph associated with those networks. The algorithms which we used in order to calculate the MST are "Prims" and "Kruskal" algorithms which determine the minimum average cost of some network. Also, we have an option to calculate the lower cost of the graph which ranges from one node to all other nodes. For this, we have to implement such algorithms which are suitable in finding out the shortest path between all node pair elements. So, the algorithms we used here are "Floyd Warshall" and "Dijkstra" algorithm but the algorithm which gives full meaning of the shortest path is Floyd Warshall algorithm because it fits best in our above statement. Also, we use some greedy algorithm like "Borůvka's algorithm" for finding a minimum spanning tree in a graph with a restriction that our graph is not connected. At last, we have the clustering coefficient algorithm which determines that how the nodes are clustered in the graph.

Proposed System:

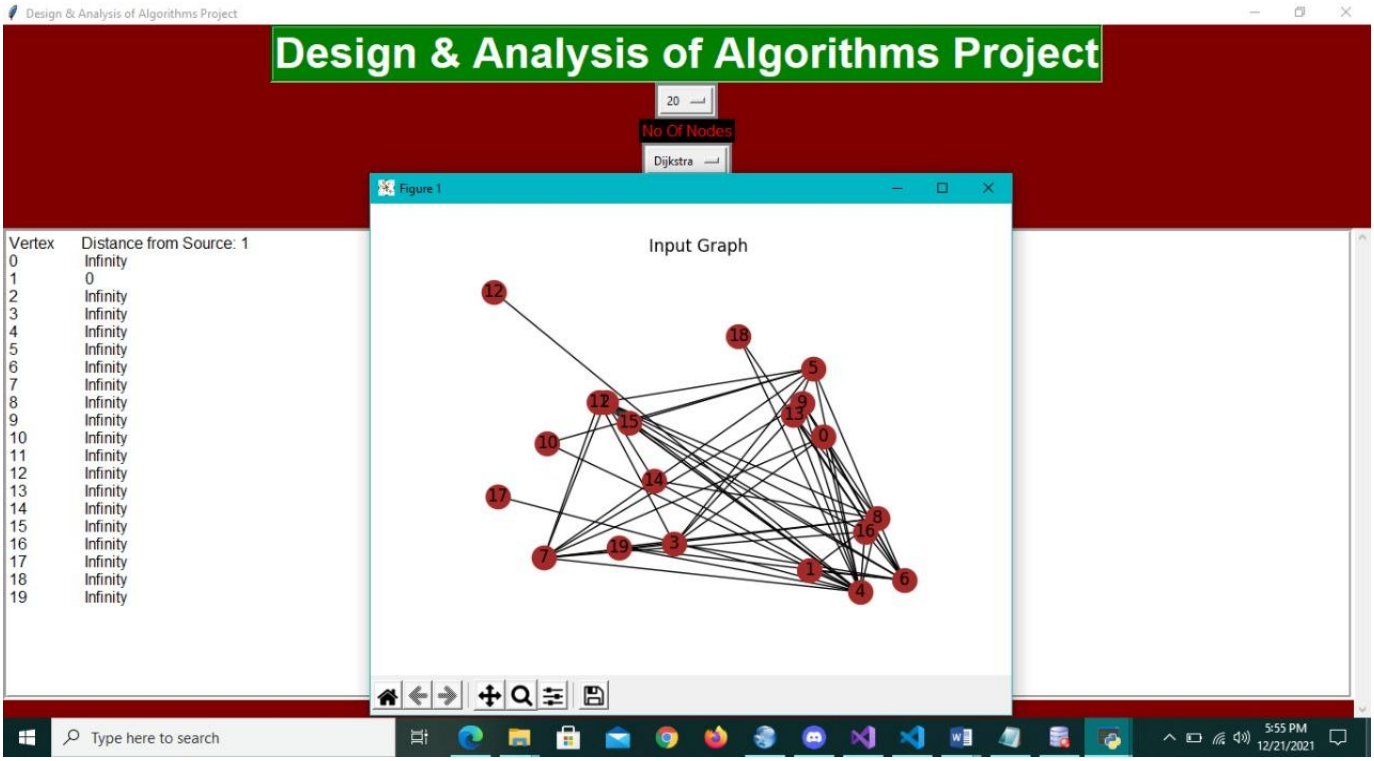
The main reason of our proposed system is to find out the minimum average cost and low average cost for different types of graph from the above mentioned algorithms having some input files with them which vary from node 10 to 100.

Experimental Setup:

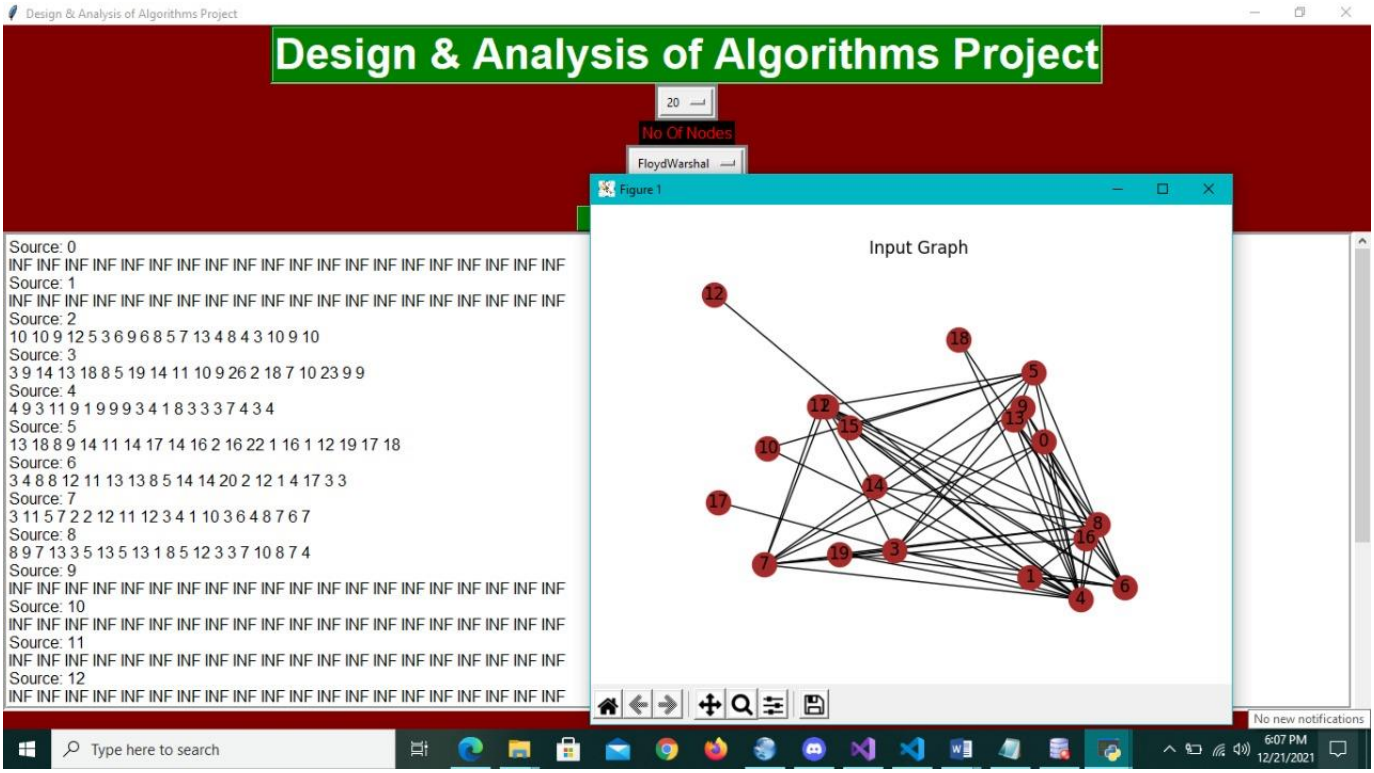
The experimental setup of our project is based upon the two things only which are input and output because without these two things our UI becomes useless. So, in order to display a graph we take an input of x and y coordinates which is provided for each node in each input file. After, input all the data in their required field then our system displays some output of graph visualization having some networks associated with it.

Result:-

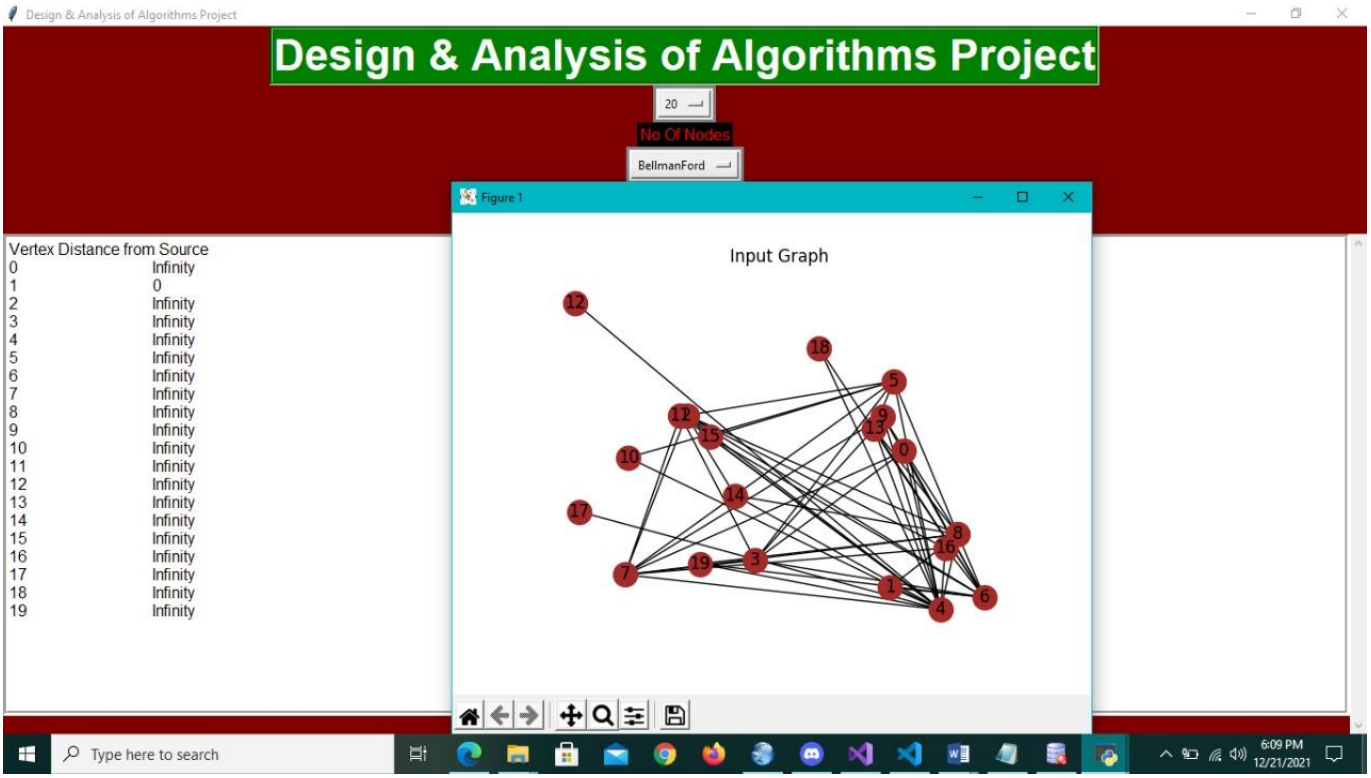
1. Dijkstra's Algorithm:



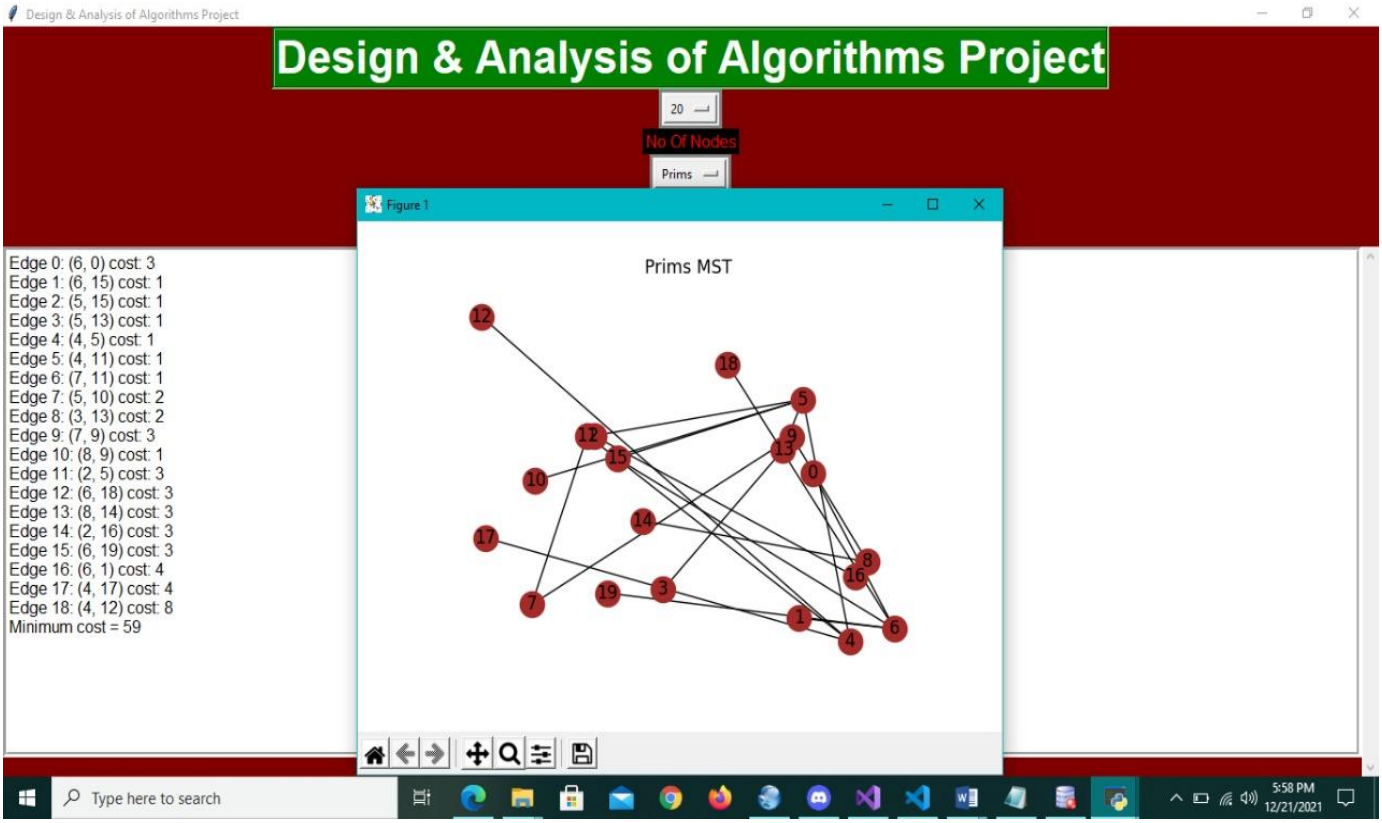
2. Floyd Warshall:



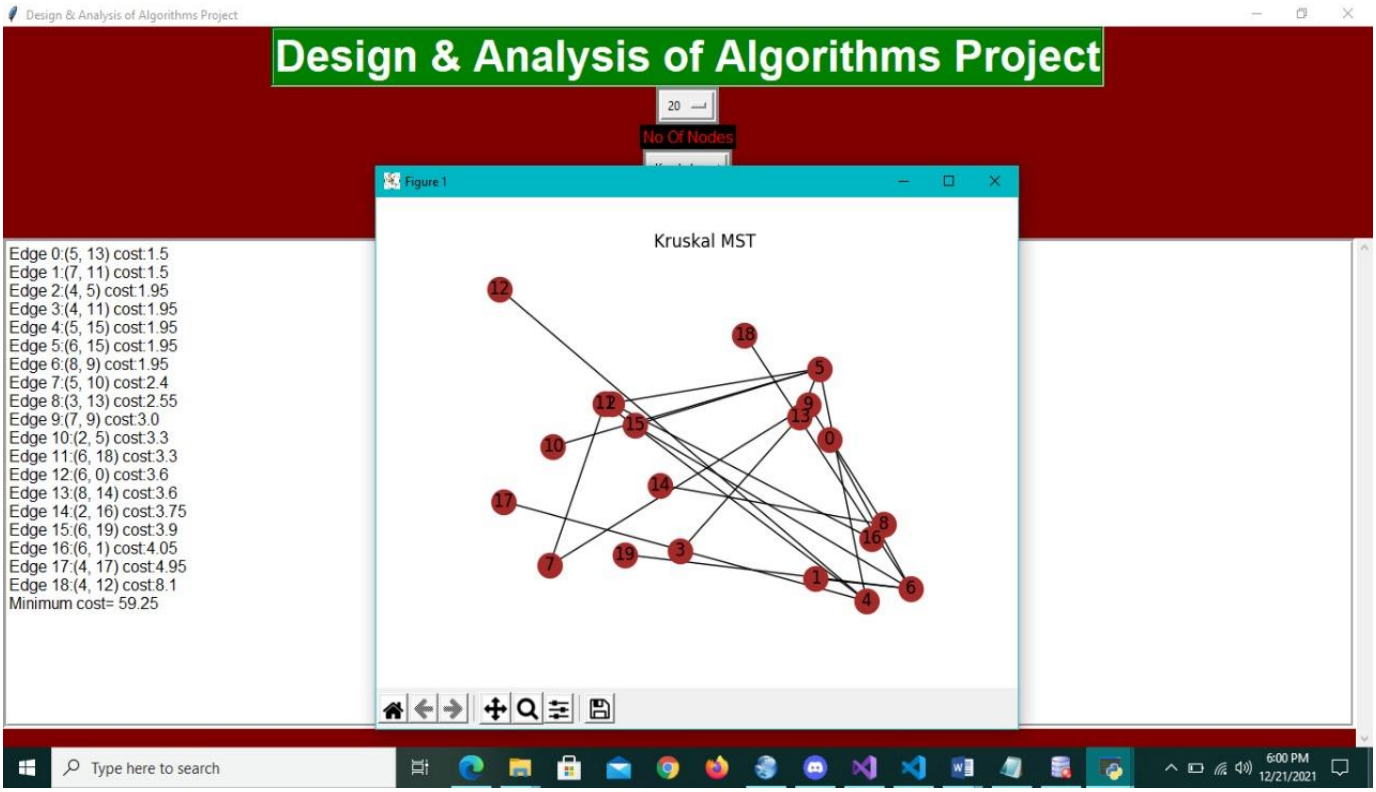
3. Bellman Ford:



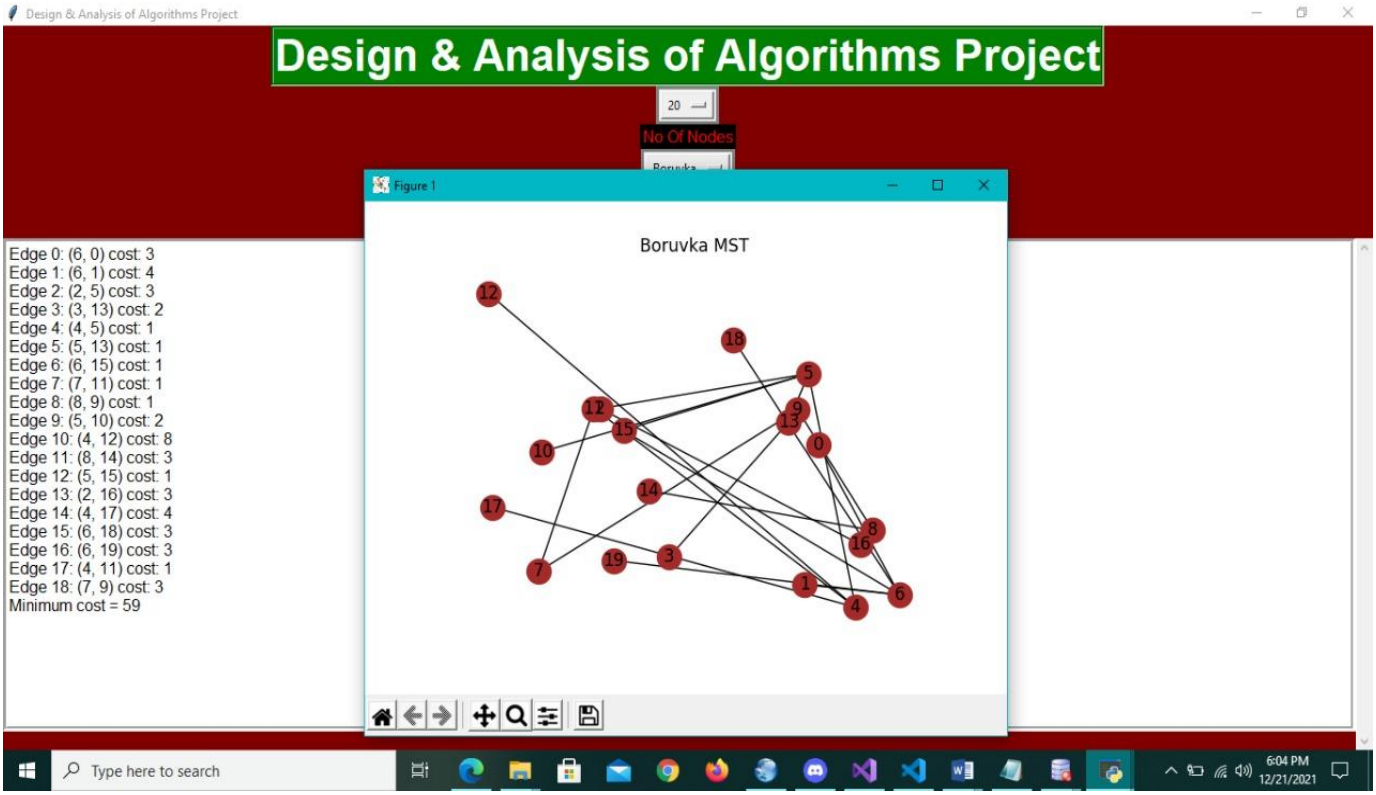
4. Prims:



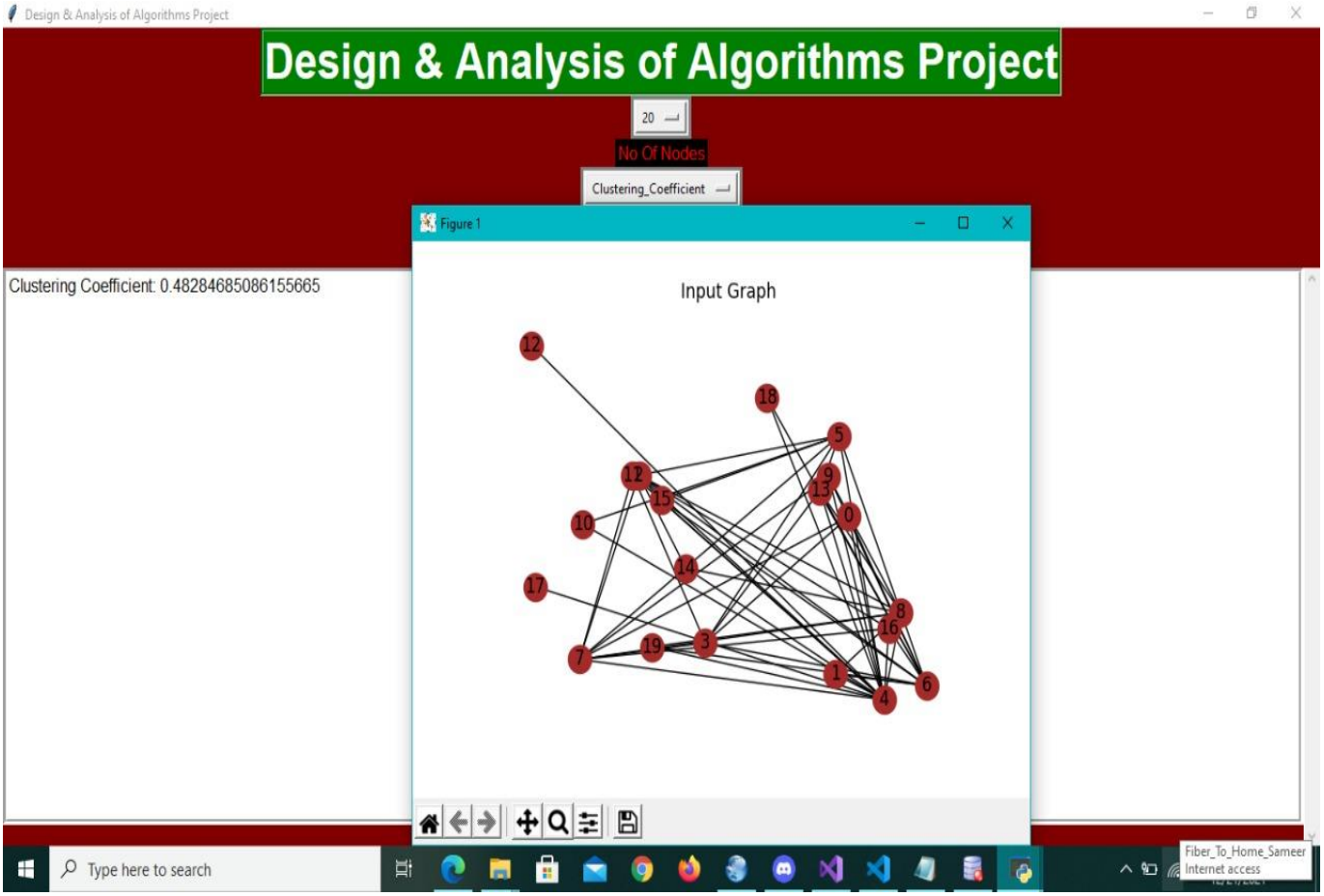
5. Kruskal's:



6. Borůvka's:



7. **Clustering_Coefficient:**



Conclusion:

Hence, graph theory algorithm allows us to model and analyze the different structures and properties of a network. Also, the graph indices such as network topology serve as basic measurements to describe its structure and behavior in order to distinguish with other graph indices. The above indices present in our result section facilitate comparison between different graph networks and revealing commonalities and variations among them on the basis of their input nodes.

Reference:

www.matplotlib.org

You Tube link:

https://www.youtube.com/watch?v=FtN3BYH2Zes

https://youtube.com/playlist?list=PLCC34OHNcOtoC6GglhF3ncJ5rLwQrLGnV

www.geeksforgeeks.com