IR Assignment 3 Report
Group 2

Raghav Sharma	2020397
Maksimjeet Chowdhary	2020566
Shashank Singh	2020120

The dataset chosen for the assignment is data of Bitcoin OTC trust weighted signed network which contains data about who-trusts-whom on a bitcoin trading platform : Bitcoin OTC. This is done to maintain a reputation of users since they are anonymous.
Nodes in data : 5881
Edges: 35592
(given)
Data downloaded from: link
Stripped the data since we don't need information about weights of edges and times provided.

Question 1:
Part 1, 2
Got the number of nodes by maintaining a set of nodes and number of edges through the length of edge list representation.

```
Number of nodes:  5881
Number of edges:  35592
```

Part 3, 4
Calculated average In-degree and out-degree by taking average number of edges towards and outwards a node. Since, for every edge there is a source and target node, average in-degree and out-degree are equal.

```
{1: [226, 215], 2: [41, 45], 3: [21, 0], 4: [5
5881
Average In-Degree:  6.0520319673521605
Average Out-Degree:  6.052031967352259
```

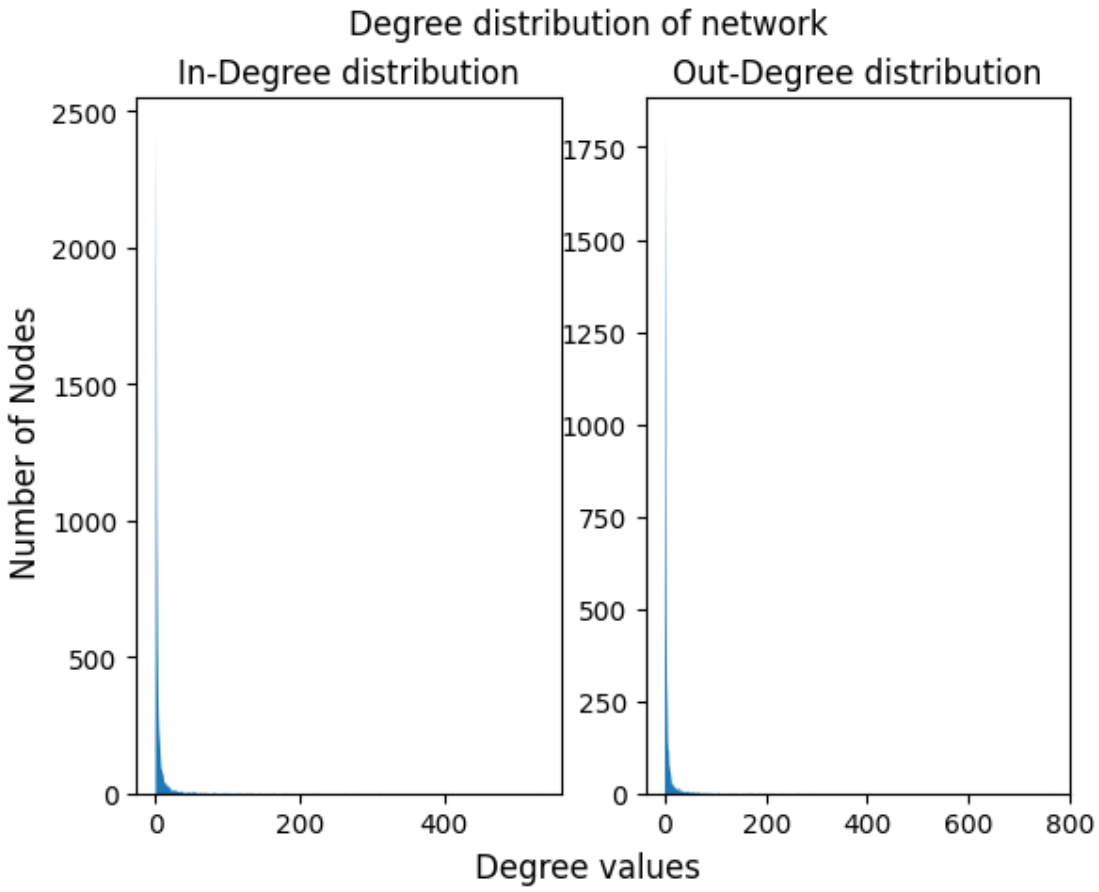
Part 5, 6
By maintaining a dictionary of the number of incoming and outgoing edges, got the max value of in-degrees and out-degrees simultaneously. Coincidentally, the same node has the max in-degree and out-degree values.

```
Node 35 has max In-Degree value of: 535
Node 35 has max Out-Degree value of: 763
```

Part 7
Calculated the network density using the following formula:
Density = Number of edges present in the network / (Number of nodes in graph) * (Number of nodes in graph -1)

```
The density of network is (between 0 and 1) 0.0010292571373043777 or 0.10292571373043777 %
```

Degree distribution of the network:



Local Clustering coefficient (LCC):

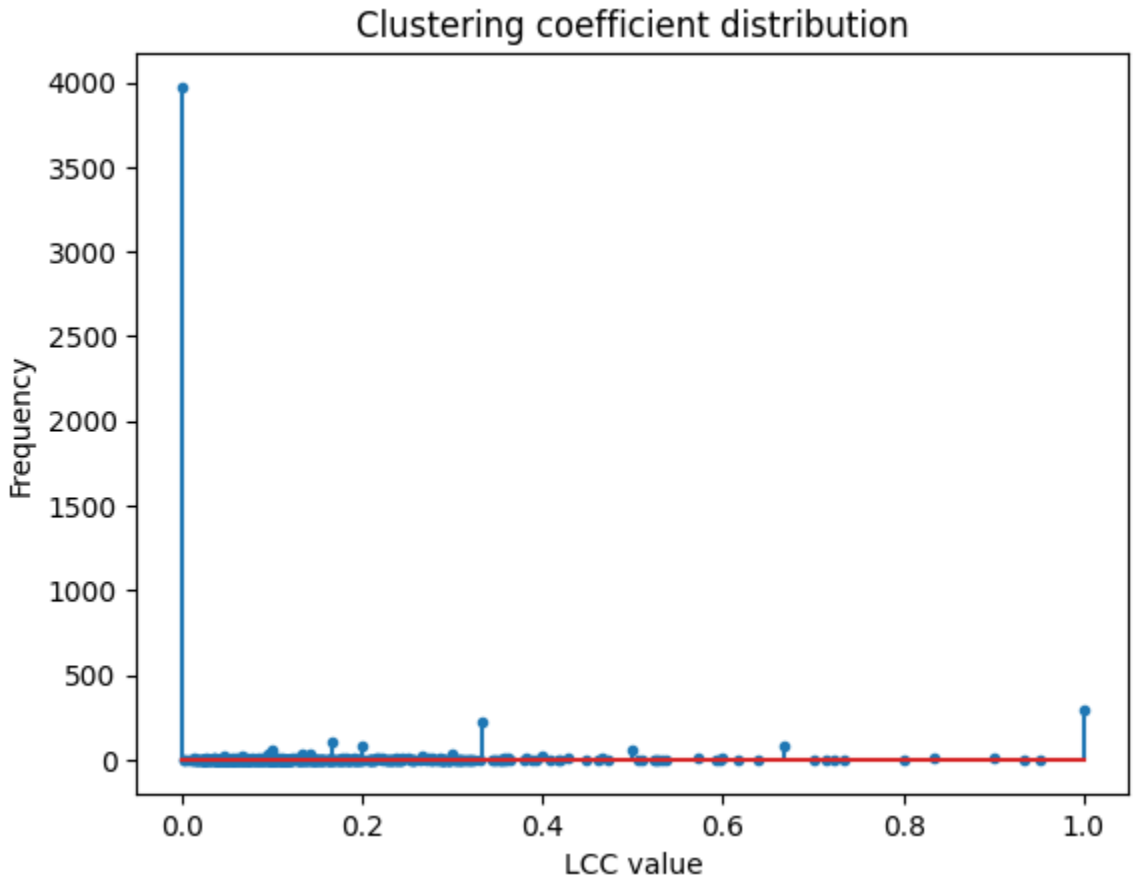
Calculated LCC value for each node by computing the number of ‘triangles’ formed in each node’s local neighbors (or if there exists an edge in node’s neighboring nodes) dividing by the total number of edges possible in the node’s neighborhood

LCC = Number of triangles formed in neighborhood of node / Max number of edges possible

Or

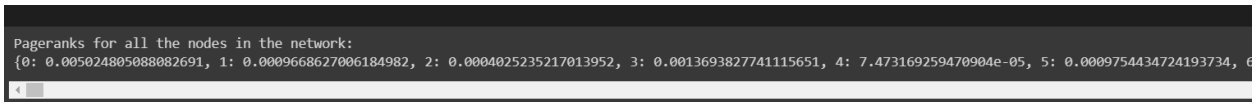
$$\text{LCC} = \frac{\text{Number of triangles formed in neighborhood of node}}{(\text{Number of neighbors}) * (\text{Number of neighbors-1})}$$

Clustering Coefficient Distribution:

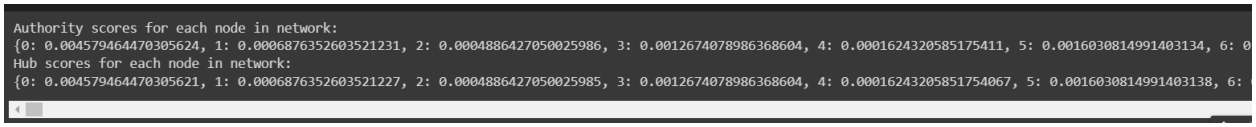


Question 2:
Computed PageRank, Authority, Hub Scores using pagerank() and hits() function of networkx library respectively.

PageRank scores:



Authority Scores and Hub Scores:



Comparison between authority and pagerank scores: