



## SMA Lab Assignment 2: Calculating network centrality measures using networkx

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In [7]:  pip install networkx

Requirement already satisfied: networkx in c:\users\arulk\anaconda3\lib\site-packages (2.8.4)  
Note: you may need to restart the kernel to use updated packages.

In [11]: 

```
import networkx as nx
graph = nx.Graph()
# Load the graph from the input file
with open('sma_labass22.txt', 'r') as file:
    for line in file:
        source, target = line.strip().split()
        graph.add_edge(source, target)
```

In [12]: 

```
# Degree Centrality
degree centrality = nx.degree_centrality(graph)

# Betweenness Centrality
betweenness centrality = nx.betweenness_centrality(graph)

# Closeness Centrality
closeness centrality = nx.closeness_centrality(graph)

# Eigenvector Centrality
eigenvector centrality = nx.eigenvector_centrality(graph)
```

```
In [13]: ▶ print("Degree Centrality:")
for node, centrality in degree Centrality.items():
    print(f"{node}: {centrality}")

print("\nBetweenness Centrality:")
for node, centrality in betweenness Centrality.items():
    print(f"{node}: {centrality}")

print("\nCloseness Centrality:")
for node, centrality in closeness Centrality.items():
    print(f"{node}: {centrality}")

print("\nEigenvector Centrality:")
for node, centrality in eigenvector Centrality.items():
    print(f"{node}: {centrality}")
```

```
Degree Centrality:
Ammu: 0.3333333333333333
jones: 0.3333333333333333
sheela: 0.3333333333333333
Jesy: 0.16666666666666666
jon: 0.3333333333333333
laksh: 0.3333333333333333
sri: 0.16666666666666666
```

```
Betweenness Centrality:
Ammu: 0.0
jones: 0.0
sheela: 0.0
Jesy: 0.0
jon: 0.13333333333333333
laksh: 0.13333333333333333
sri: 0.0
```

```
Closeness Centrality:
Ammu: 0.3333333333333333
jones: 0.3333333333333333
sheela: 0.3333333333333333
Jesy: 0.25
jon: 0.375
laksh: 0.375
sri: 0.25
```

```
Eigenvector Centrality:
Ammu: 0.5773502690249112
jones: 0.5773502690249112
sheela: 0.5773502690249112
Jesy: 8.879940325002797e-06
jon: 1.4368045263925312e-05
laksh: 1.4368045263925312e-05
sri: 8.879940325002797e-06
```

1. Degree Centrality: This measures the number of direct connections (edges) in each node.

2. Betweenness Centrality: This measures the number of times a node acts as a bridge along the shortest path between other nodes.

3. Closeness Centrality: This measures how close a node is to all other nodes in the network.

4. Eigenvector Centrality: This assigns a score to each node based on the centrality of its

In [ ]: ▶