Homework 05

MO412 - Network Science

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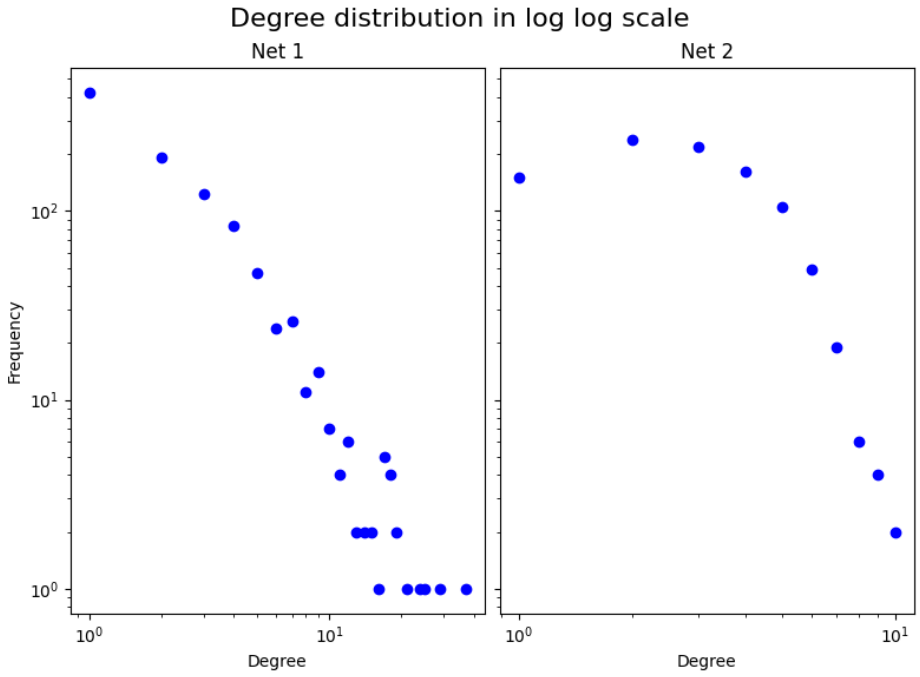
Two undirected networks are given in files net1.tsv and net2.tsv. Plot their degree distributions in log-log scale. Which of the two is more likely to be a scale-free network?

Net 1 is more likely to be a scale-free network. The data points form an approximate straight line suggesting that the degree distribution is well approximate with a power law distribution. A scale-free network is a network whose degree distribution follows a power law.



Code

```
import networkx as nx
import matplotlib.pyplot as plt

# ---------- Reading net1 and net2 ---------- #

net1 = pd.read_csv("net1.tsv",header=None,sep='\t')
graph1 = nx.from_pandas_edgelist(net1, 0, 1)

net2 = pd.read_csv("net2.tsv",header=None,sep=' ')
graph2 = nx.from_pandas_edgelist(net2, 0, 1)


# ---- get degree distribution of net1 and net2 ---- #

degree_freq = nx.degree_histogram(graph1)
degrees = range(len(degree_freq))

degree_freq2 = nx.degree_histogram(graph2)
degrees2 = range(len(degree_freq2))

# ---------- plot in log log scale ---------- #

fig, (ax1, ax2) = plt.subplots(1, 2, constrained_layout=
    True, sharey=True)
ax1.loglog(degrees, degree_freq,'bo')
ax1.set_title('Net 1')
ax1.set_xlabel('Degree')
ax1.set_ylabel('Frequency')

ax2.loglog(degrees2, degree_freq2,'bo')
ax2.set_xlabel('Degree')
ax2.set_title('Net 2')

fig.suptitle('Degree distribution in log log scale',
    fontsize=16)

plt.show()
```