International Institute of Information Technology, Bangalore (IIIT-B)

Network Science For Web Development
AI-608

Mandate:
Generating random Graphs of Social Networks

(Barabasi Albert Model)

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Aim:

Our Aim is to generate random graphs of social Networks.
There are different generative models for random graphs.
Our Aim is to try and learn about **Barabasi Albert Model.**

GITHUB LINK:
https://github.com/Roopam10/NSW.git

INTRODUCTION

This era is all about data, data creation, data manipulation. We all are surrounded by lot of data. This data needs analysis which can be used for future.

The best examples of social networks that employ social networking methods are Facebook, Twitter, Instagram, and all other social networking sites.They build a network using graphs.For instance, the nodes of a graph represent the individuals, and the edges connecting the nodes show the connection between those two nodes. Using this example, we can create the Facebook friends network.

Random graphs can be helpful for visualization of huge data. In this mandate I am going to talk about about

-: Barabasi Albert Model

I have implemented this model and have shared the code of the same which will be used to generate random graphs of social networking sites.

Barabasi-Albert model

The creation of various real-world networks is depicted in a 1999 study by Barabasi and Albert titled "Emergence of Scaling in Random Networks," which includes graphs showing the relationships between movie characters, online sites, and components of the power system in the western United States.

One of the few models that has been developed that generates scale-free networks is the Barabasi-Albert model. It combines the two key ideas of growth and preferred attachment. In actual networks, both growth and preferred attachment are quite prevalent.

Growth is the process through which a network's node count rises over time.Preferential attachment describes the tendency of nodes having more linkages to other nodes to find new links more frequently.Stronger linkages established to the network can be held by higher degree nodes.Preferential attachments can be intuitively comprehended if we take into account the social networks that link individuals. In other words, preferential attachment implies that those who are already wealthy receive more, while those who are less fortunate receive less.

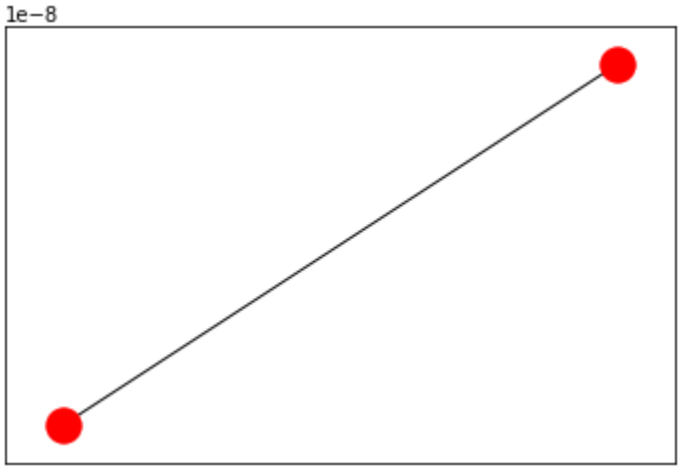
Algorithm:

The network starts with an initial m0 node linked network.

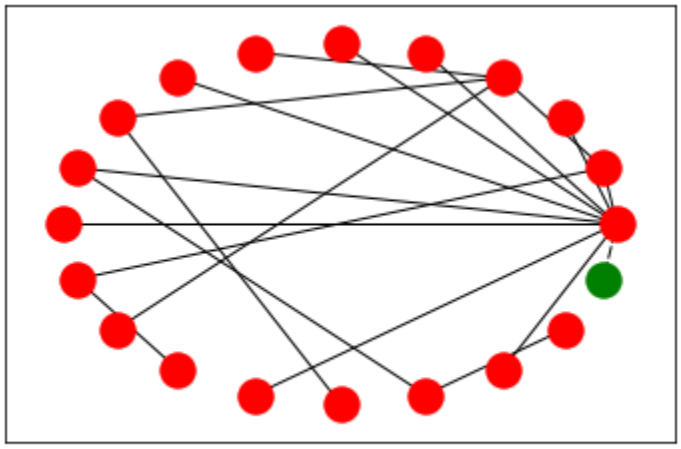
$$p(k_i) = \frac{k_i}{\sum_j k_j}$$

The network grows one new node at a time.
With a probability proportional to the amount of linkages the current nodes already have, each new node gets linked to the m m0 existing nodes.
Formally, the chance pi that a new node will link to a node i is where ki is the node's degree and the total is calculated over all of the nodes j that have already been established.
While nodes with few links are unlikely to be picked as the destination for a new link, heavily connected nodes frequently pick up even more links over time.
The newly added nodes "prefer" to connect to the nodes that are already closely connected.

Images of random graph generated from my python code:



1. Initial Graph



```
[1, 2, 3, 4, 10]
[13, 4, 1, 1, 1]
```

2.Graph with 20 nodes, can still increase with respect to network

Source Code link:

https://github.com/Roopam10/NSW.git

References:

1.Barabasi Albert Model

https://en.wikipedia.org/wiki/Barab%C3%A1si%E2%80%93Albert_model