## Scale Free Network

The scale free network is a with a power-law degree distribution.

Scale-free networks are a type of network characterized by the presence of large hubs, that are a little numbers of nodes   that are highly connected to other nodes in the network. The presence of hubs will give the degree distribution a long tail, indicating the presence of nodes with a much higher degree than most other nodes. To understand if our network is scale free we have initially created an artificial Barabasi-Albert (scale-free) graphs undirected network with the number of nodes as equal to our network , and   number of links equal to eight ,that is each node establishes once joining the network. This number is according to the average degree of the nodes of the real undirected network, that is 8.

In the following figures we can see the BA model on the right   the distribution in degrees on a logarithmic scale the degree distributions, in the center the cumulative distribution function (CDF) and on the left the Derived functions the complementary cumulative distribution function (ccdf) or simply the tail distribution.
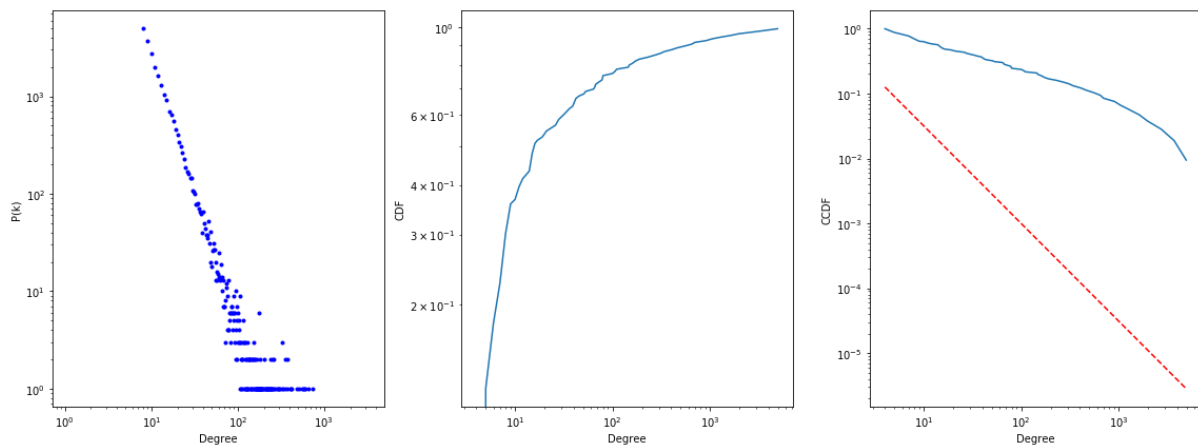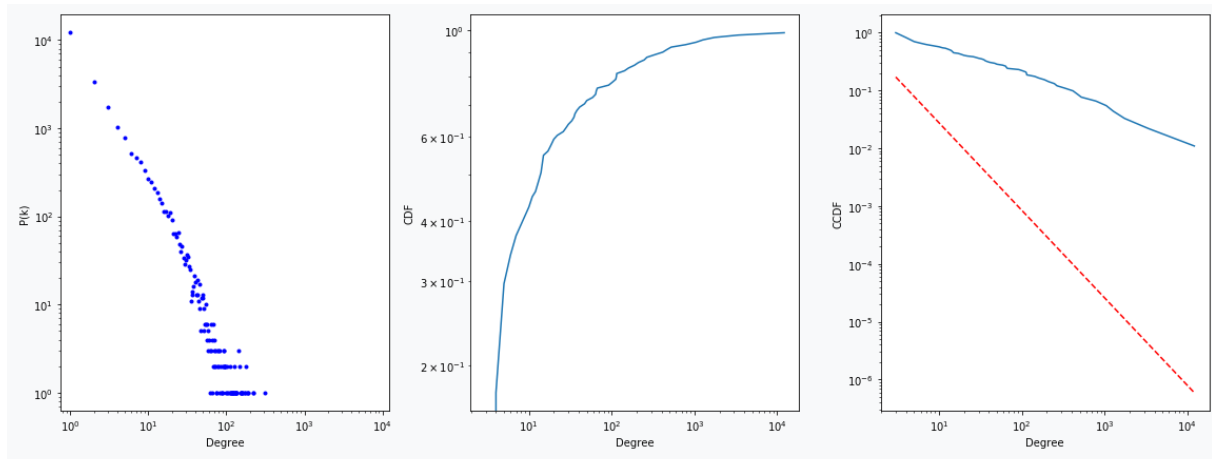

The syntetich Network has alpha=2.505 and sigma=0.049.

We then analyzed our network, considering it Indirect using the same methods and graphs. In the following figure the graphs o f it .
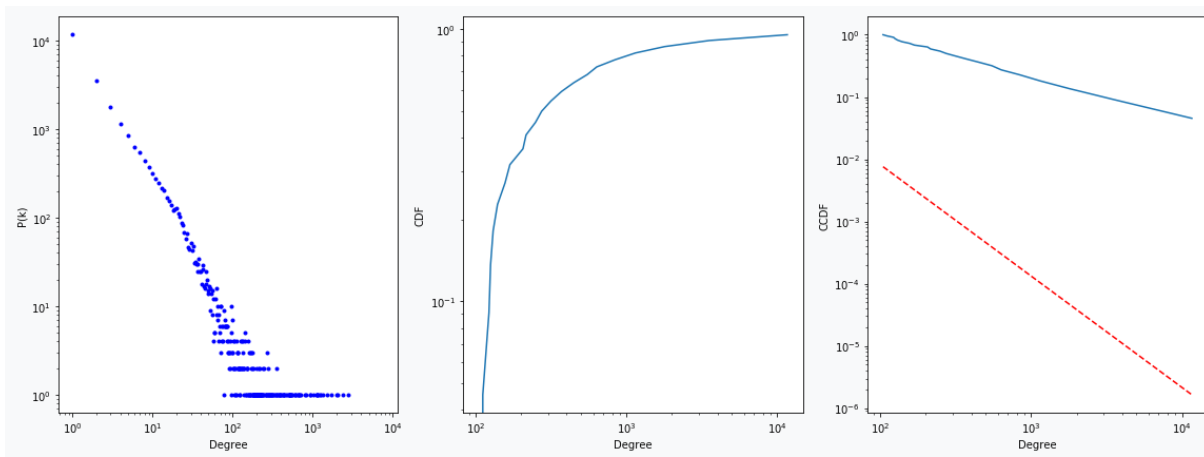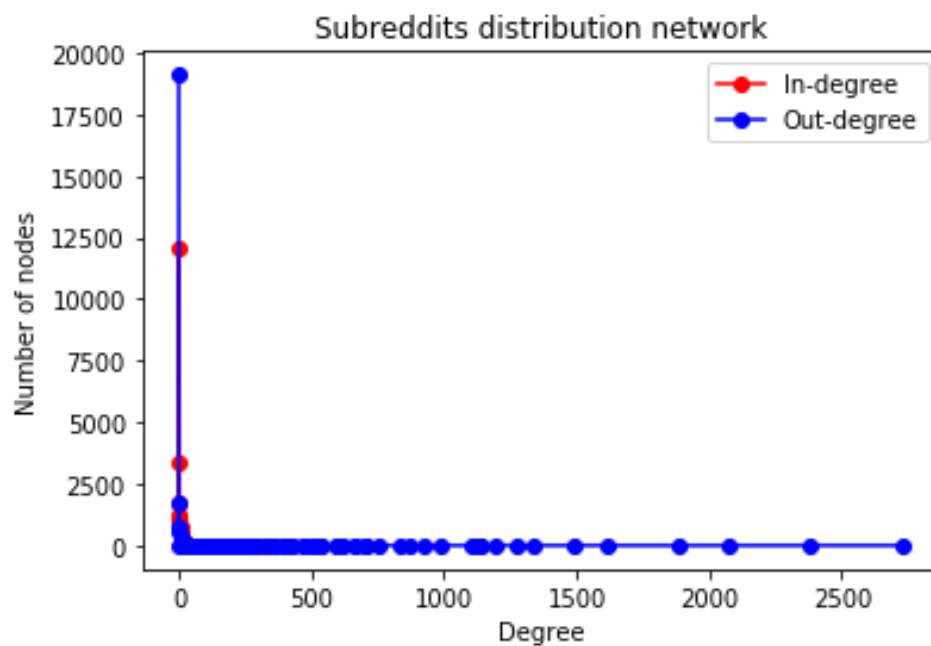
The Indirected Network has alpha=2.78 and sigma=0.168
Finally we analyzed our real Direct network, we can show in the following figures

The Directed Network has alpha=2.51 and, sigma=0.054

In the In the following figure the distribution by degrees in and out of our network.

The distribution is almost identical.
In conclusion, our network has a scale free network, since the alpha value falls within the range between 2 and 3. and the degree's distribution follow power-law degree