

Network Dynamics and Simulation
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CINET/GRANITE Exercise – III(a)

Purpose: To Compare the structural measures of an Erdős-Renyi (ER) random network with those of a Barabasi-Albert (preferential attachment based) scale-free (SF) network.

Note: Please take a look at Exercise II(a) which explains how to generate an Erdős-Renyi random graph in CINET and how to add it to the list of available networks. The method for generating and adding a Barabasi-Albert scale-free network is similar, except that you would choose the appropriate generator.

Sketch of the Procedure: In Steps 4 through 7 below, We will mention a few structural measures that can be compared. Please feel free to try other measures as well.

1. Choose the same number of nodes (say, 1000) in both graphs.
2. Choose the parameters (probability of each edge for the ER model and the number of edges attached to each new node for the SF model) so that both the graphs have (approximately) the same number of edges.
3. Generate the two graphs using CINET and upload them. (We will use G_1 and G_2 to the ER graph and the SF graph respectively.)
4. Compute and compare the degree distributions of G_1 and G_2 .
5. Compute and compare the clustering coefficient distributions of G_1 and G_2 .
6. Compute and compare the numbers of articulation points of G_1 and G_2 .
7. Compute and compare the numbers of bridge edges of G_1 and G_2 .