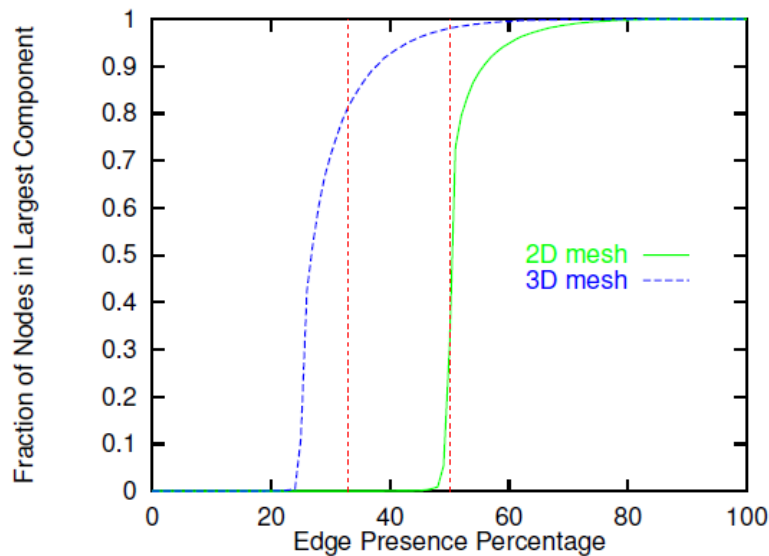


CSE 6010 Assignment 3 Version 2 1st Part

Literature Review

Tse-Wei Fu

Among the literature I found, I believe the below graph from Lumetta, Krishnamurthy and Culler[1] identify the curve we should expect -



We can observe that the fraction of nodes in the largest component of a graph is highly non-linear. As the probability that there is a link between any two vertices in the graph goes higher, there exists a phase transition period between mostly connected and mostly not connected graphs. The authors also provide us with the following table to illustrate the interesting phenomenon:

Rank	40%	50%	60%
largest	281	38,884	62,174
2nd largest	219	2,064	19
3rd largest	119	177	6

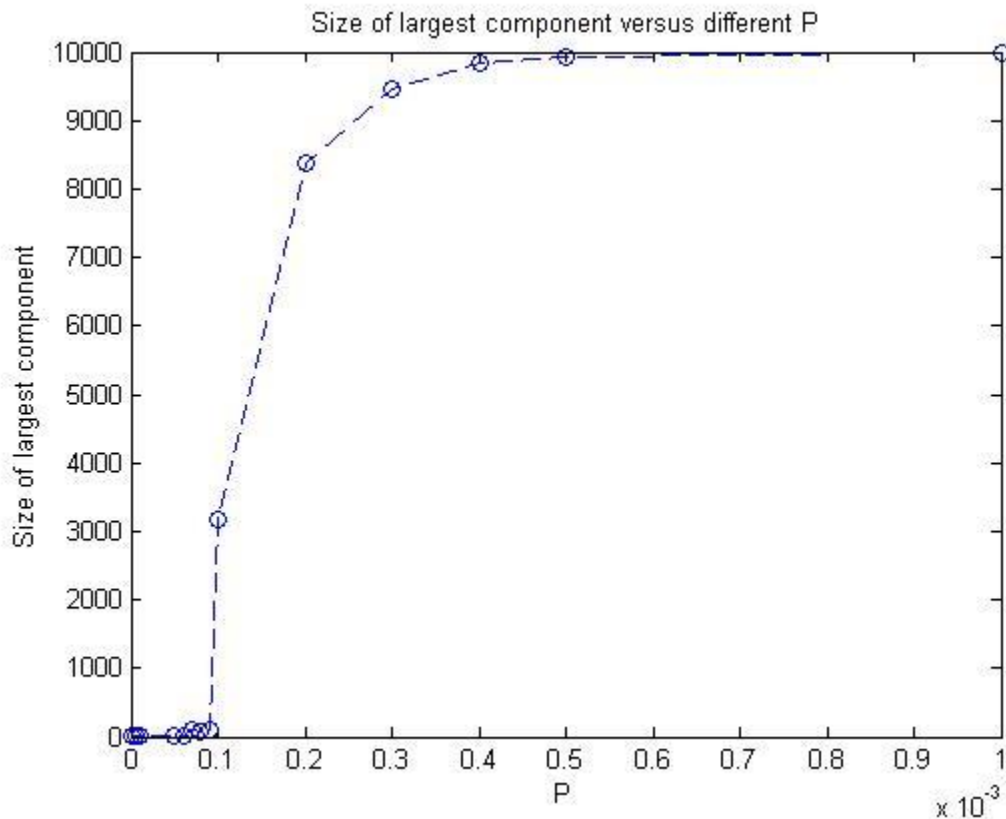
Above the phase transition period, the graph will have a very large component and small number of tiny components; below the period, the graph will have more regular sized components.

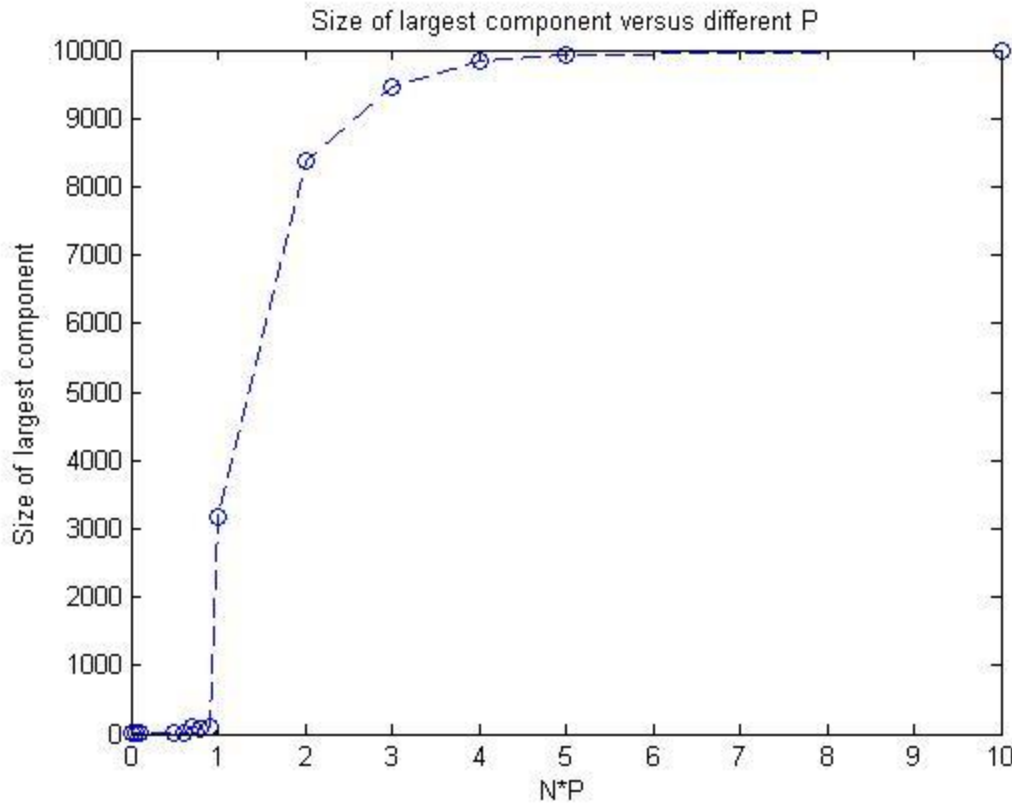
CSE 6010 Assignment 3 Version 2 2nd Part

Graph Analysis

Dawei Geng

1. The interface format we agreed upon is that in the first line, the first number is the number of vertices; the second number is the number of edges. For the following lines after the first line, we enumerate the edge pairs, which for instance, if 0 and 1 is connected, we list 0,1 in a single line.
2. For my computer, $N=10000$ is a reasonable number to play with since it is a large value while not costing me a long time to run it. Here are the plots of the size of largest component with different P .





When I changed the x-axis to be $N \cdot P$, you could see there is a turning point between 1 to 2, which is confirmed by the literatures we found.

3. I included several test text files for you to check with my program, which are graph.txt, graph1.txt, graph2.txt.
 - (1) In the graph.txt, there are two connected components, for the component with the largest size, the probability of generating this file is between 0 and 1.
 - (2) In the graph1.txt, there are two connected components also, but for the component with largest size, it is fully connected in that subgraph.
 - (3) In the graph2.txt, probability is zero, which means each vertex constitutes a component.