Literature Search And Expected Results–Jipeng

Theorem 1. (Size of Largest Components In A Random Graph) *Consider a random graph $G \in G_{n,p}$ where $p = c/n$ for some constant c. Then:*

1. *If $c < 1$, then a.a.s., the largest component of G has size $O(log(n))$, or more exactly, at least $\frac{3ln(n)}{(1-c)^2}$.*

2. *If $c > 1$, then a.a.s., G has a largest component of size $O(n)$. It is a unique "giant" component of size $(1 + o(1))\beta n$, where β is the unique solution in $[0,1]$ to the equation $\beta + e^{-\beta c} = 1$. All other components have size $O(log(n))$.*

3. *If $c = 1$, then a.a.s., G has a component of size $O(n^{\frac{2}{3}})$.*

The phrase "a.a.s"(asymptotically almost surely) is used to denote an event that holds with probability tending to 1 as $n \rightarrow \infty$.

According to this theorem, the expected size of the largest component can be plotted. There is no exact expected size value. We can evaluate the correctness by judging whether the size is consistent with $log(n)$, n or $n^{\frac{2}{3}}$ in probability.
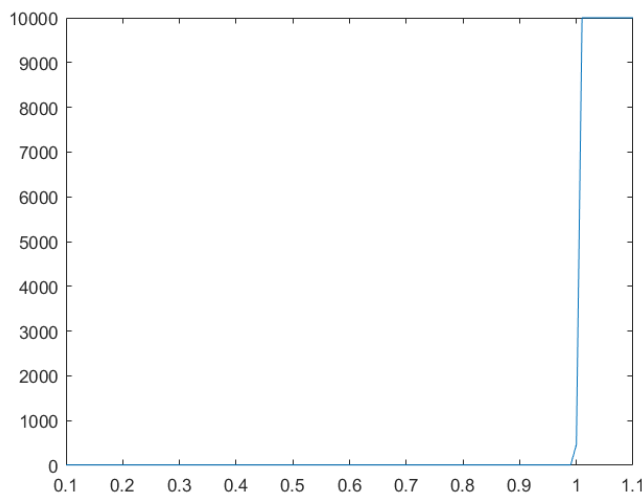

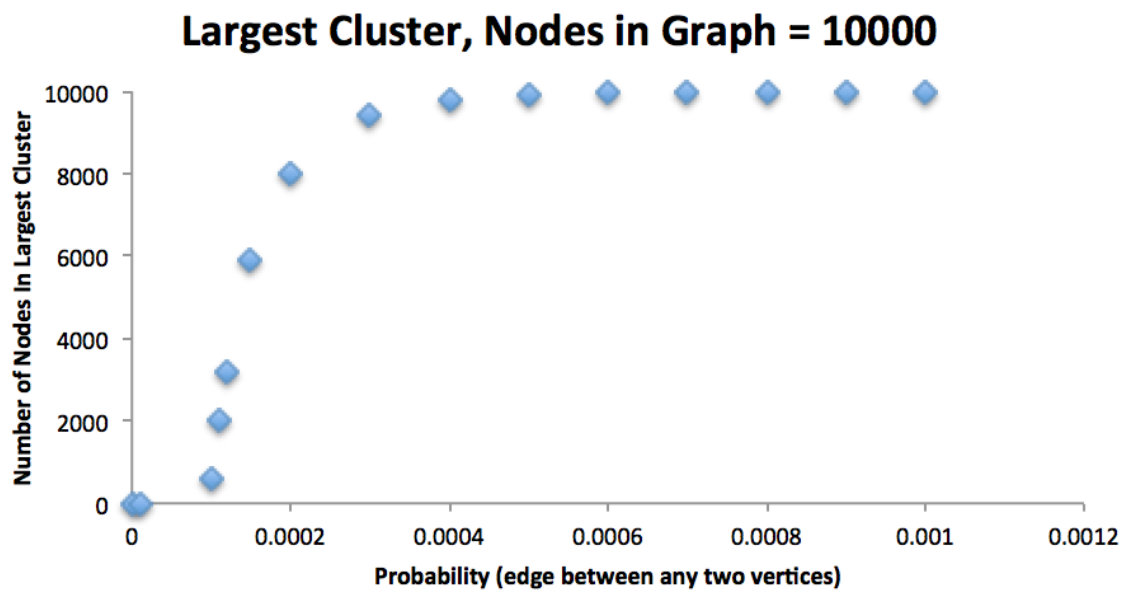Figure 1: Expected Largest Component Size in Probability

Graph Analysis–Sam

Figure 2: Max Cluster Size vs Probability of An Edge

References

[**1**.] latexcompanion S. Janson, T. Luczak, and A. Rucinski. *Random Graphs*. Wiley, 2000.