

CS485 Spring 2007

Homework 7

Due Date: March 9 2007

NOTE: To speed up homework grading, please submit each homework problem on a separate sheet of paper, with you name and NetID on the top. Thank you!

1. Do a web search for some key references on growing graphs, both with and without preferential attachment. Please list the papers you cite, along with the reason why you think they are important (not necessarily judging the content, but more by observing how often people cite the papers or link to them)
2. How do you recognize a power-law degree distribution? (i.e. degree distribution where $p_k \propto k^{-\alpha}$ for some α). Suppose somebody gives you a list of numbers, how can you tell if there were generated from a distribution similar to the power-law?
3. Grow two kinds of graphs, one with uniform and the other with preferential attachment, where every unit of time you add one vertex and δ edges. Plot the degree distributions, and compare them. Measure how many components it has, and what are the component sizes. Do this for $\delta = \frac{1}{8}$, $\delta = \frac{1}{4}$ and $\delta = 2$, or add any other value that you think is interesting (note: $\delta = \frac{1}{4}$ means you'll be adding one edge for every four vertices added).
4. What structure will a graph have if grown with preferential attachment where exactly one edge is added every time step?