15-396: Science of teh Interwebs

Homework 3

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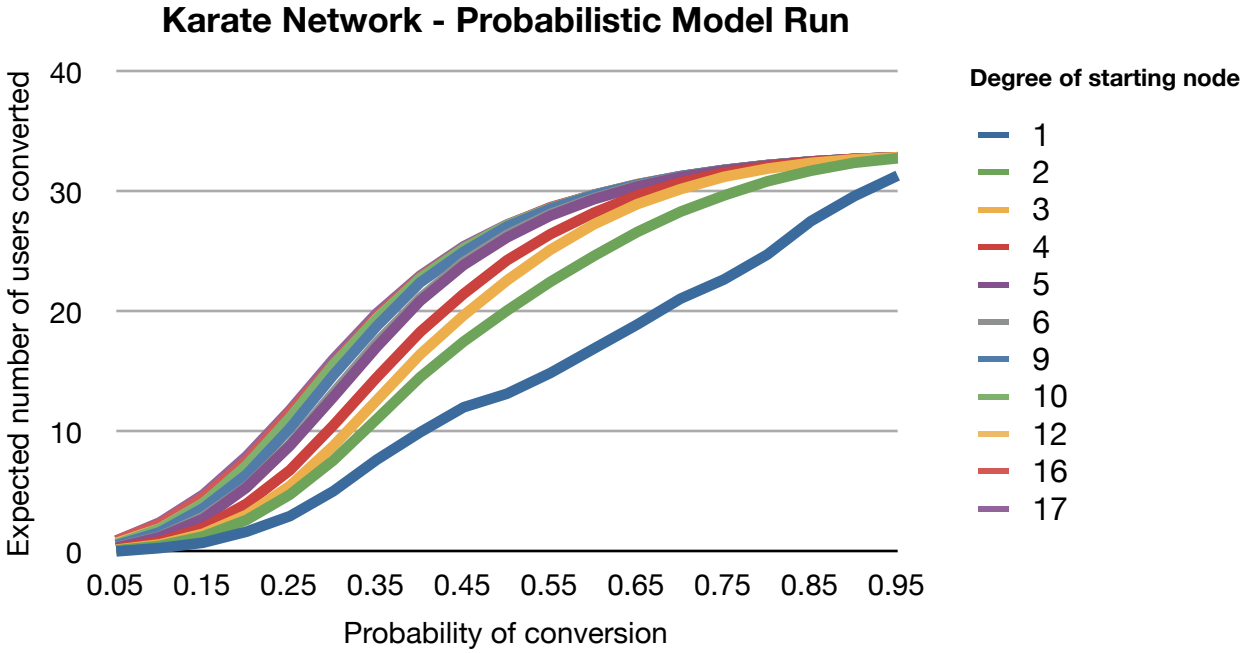
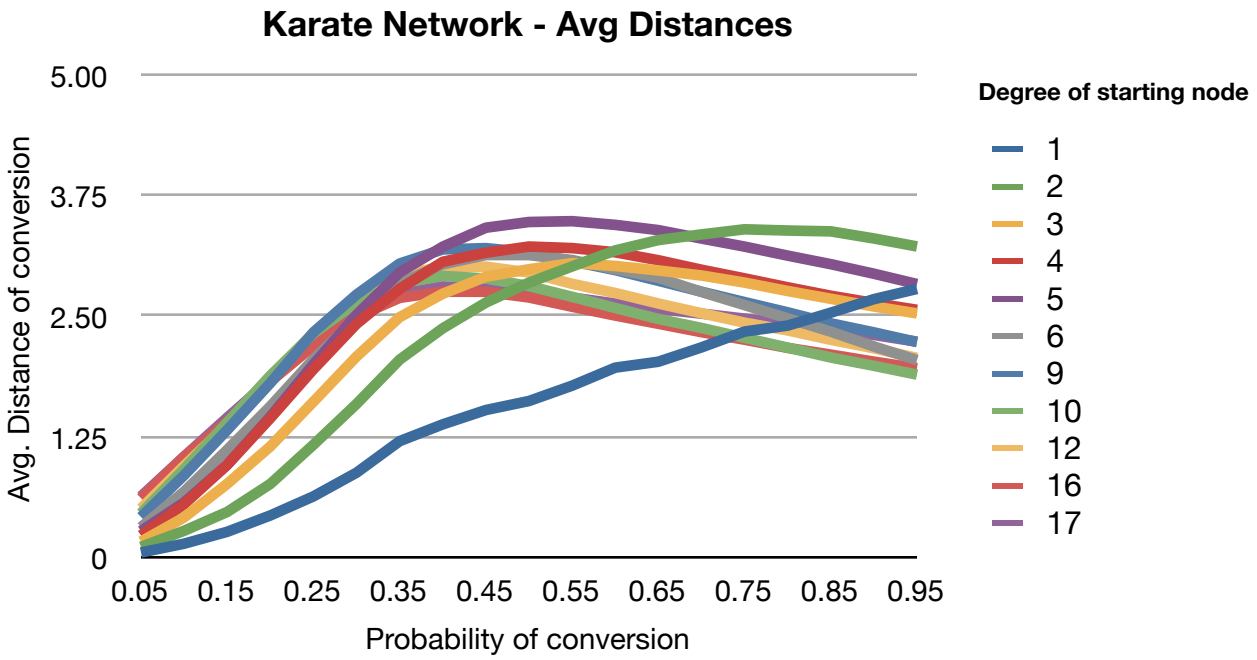
Wow this is late. I am so dumb.

1.Probabilistic Information Flow

A) My hypothesis was that the user with the highest degree would result in the greatest percentage of acceptance in the network. Running the probabilistic model on every node 10,000 times, we get the result of the graph below, with the number of nodes converted versus the probability of acceptance. Each line represents the degree of the starting node, and, as expected, the nodes of higher degree were more effective in converting users. Interestingly, the expected number of converted users is relatively stable for nodes of degree 5 and up, where the number of converted nodes is roughly p * number of nodes, where p is the probability of conversion.



B) I expected the distance of conversion from the user to also be correlated to the degree of the starting node. This turned out to be false, with the graph below showing a node of degree 2 with a greater possible reach than others, which the node with the greatest resemblance to a bridge between two clusters in the network, which could be a blocking place for nodes starting in either cluster trying to cross to the other.



2. Deterministic Information Flow

A)

For the ReferenceLinearNetwork
Optimal initial user: 0 (6 nodes)
Optimal two initial users: 0, 2 (34 nodes)
Optimal three initial users: 0, 1, 33 (34 nodes)

B) To generate a reasonable set of influence weights, assign weights from nodes i to j based on the degree of the node, from a function which assigns higher weights to users with higher degree, with a random bias ± half of the base influence.

This models more influential nodes being more socially connected, i.e. of higher degree, with random variations to account for degrees of friendship.