Small World Phenomenon

Social Networks - July 2020

MCQ Assigenment - Week 11

1. According to Watts and Strogatz, which of the following two phenomena give rise to small world networks.

   A. triadic closure and weak ties
   B. triadic closure and community structure
   C. homophily and weak ties
   D. homophily and foci closure

   Description : According to Watts and Strogatz, homophily which leads people to connect with the regionally close people; and weak ties which connects people from distant reasons; are the two phenomena which give rise to small world networks.

2. In a 2-D Watts-Strogatz model, what is the ideal value of clustering exponent for an efficient decentralized search?

   A. 1
   B. 2
   C. -1
   D. -2

   B. In a 2-D Watts-Strogatz model, for an efficient decentralised search, the ideal value of clustering exponent is 2 so that random links follow an inverse-square distribution.

3. Assume that each of your friends has 10 friends other than you. Similarly, each of their friends has 10 friends other than them and so on. Then, how many people can you reach in i levels (Level one refers to your friends, level 2 refers to your friends' friends and so on)?

   A. 100
   B. 10^{i+1}
   C. 10^{i-1}
   D. 10^{i}

   D. In 1 level, we can reach 10 friends. In level 2, each of the 10 friends make us reach to another 10 friends, so we reach 10^2 friends. In level 3, each of the 10^2 friends make us reach to 10 more friends; hence we can reach to 10^3 friends. Similarly, at the level i, we can reach 10^i friends.

4. In the generalized Watts-Strogatz model, let the distance between two nodes u and v be represented as $d(u, v)$, and the clustering exponent be represented by q, the probability that u and v are connected by a weak tie is proportional to

   A. $d(u, v)$
   B. $d(u, v)^q$
   C. $d(u, v)^{-q}$
   D. $d(u, v)^{-1}$

   C. For two nodes v and u, let $d(v, u)$ denote the number of grid steps between them. (This is their distance if one had to walk along adjacent nodes on the grid.) In generating a random edge out of v, we have this edge link to u with probability proportional to $d(v, u)^{-q}$

5. Which of the following correctly represents a Watts-Strogatz model on n nodes in 2 dimensional space?

   A. n nodes arranged in 2-D lattice where the connections between the nodes are all random.
   B. n nodes arranged in a 2-D lattice where every node is connected to every other node.
   C. n nodes arranged in a 2-D lattice where every node is connected to the nodes on its left, right, top, bottom and diagonally opposite
   D. n nodes arranged in a 2-D lattice where every node is connected to the nodes on its left, right, top, bottom and diagonally opposite, and, some edges are randomly laid in the network between any two nodes.

   D. In Watts-Strogatz model, nodes arranged in a 2-D lattice where every node is connected to the nodes on its left, right, top, bottom and diagonally opposite, and, some edges are randomly laid in the network between any two nodes.

6. In decentralized search,

   A. Only the strong ties are required.
   B. Only the weak ties (long range contacts) are required.
   C. Both the strong as well as the weak ties are required.
   D. None of the above

   C. In decentralized search, the strong ties help one to better explore a region. On the other hand, the weak ties allow one to search far away regions of the network. Hence, both of them are required.

7. Choose the correct statement

   A. Watts-Strogatz model resembles a ring in 1 dimension and a grid in 2 dimension.
   B. Watts-Strogatz model resembles a grid in 1 dimension and a ring in 2 dimension.
   C. Watts-Strogatz model resembles a ring both in 1 dimension as well as 2 dimension.
   D. Watts-Strogatz model resembles a grid both in 1 dimension as well as 2 dimension.

   A. Watts-Strogatz model resembles a ring in 1 dimension and a grid in 2 dimension .

8. Random rewiring in small world generative model refers to

   A. Addition of an extra edge in the network
   B. Deletion of a random edge in the network
   C. Deletion of a random edge from the network and addition of a new edge in the network
   D. None of the above

   Description : In random rewiring, we delete a random edge from the network and add an extra edge in the network.