Week 11 (Small World Phenomenon)- Assignment

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. We have

   A. More number of friends which are geographically closer and less number of friends which are geographically distant.
   B. Less number of friends which are geographically closer and more number of friends which are geographically distant.
   C. Number of friends which are geographically closer is equal to the number of friends which are geographically distant.
   D. None of the above

   Description : We have more number of friends which are geographically closer and less number of friends which are geographically distant.

3. 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.

4. Assume that each of your friends has 100 friends other than you. Similarly, each of their friends has 100 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. 100^{i+1}
   C. 100^{i-1}
   D. 100^{i}

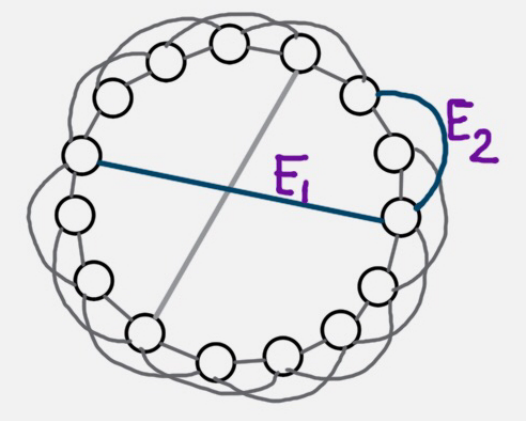
   Description : In 1 level, we can reach 100 friends. In level 2, each of the 100 friends make us reach to another 100 friends, so we reach 100^2 friends. In level 3, each of the 100^2 friends make us reach to 100 more friends; hence we can reach to 100^3 friends. Similarly, at the level i, we can reach 100^i friends.

5. For performing decentralised search, a node requires the knowledge of

   A. only its neighbors
   B. the entire network
   C. its neighbors and an estimate of their distance from the target
   D. its neighbors and neighbors of its neighbors

   Description : For performing decentralised search, a node has to look at all of its neighbors and choose the neighbor which is closest to the target. Hence it needs the knowledge of its neighbors and an estimate of their distance from the target.

6. Given the small world network as shown in Figure **??**. Choose the correct statement from the following.



A. E_1 is strong tie while E_2 is a weak tie.
B. E_1 is weak tie while E_2 is a strong tie.
C. Both E_1 and E_2 are weak ties.
D. Both E_1 and E_2 are strong ties.

Description : E_1 connects two distant nodes in the network. Hence it is a weak tie while E_2 is a strong tie.

7. Assume there is a node X in a network having 5 weak ties connected to it. It chooses one of the weak tie randomly and transmits the packet across this tie. Choose the correct statement from the following.

A. The letter will move closer to the target
B. The letter will move away from the target
C. There will be no change in the distance of the letter from the target
D. Can't say

Description : A weak tie can take us towards as well as away from the target. Hence the correct option is D.

8. 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/or 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/or diagonally opposite, and, some edges are randomly laid in the network between any two nodes.

Description : 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.