SOCIAL NETWORKS - NPTEL JULY 2024

Week 4

1. Which of the following is an example of homophily?

   (a) A diverse team working together to solve a problem

   (b) People of the same ethnicity forming a community group

   (c) Randomly assigned roommates becoming friends

   (d) A mentor-mentee relationship between individuals from different backgrounds

   Answer: (b)

   Explanation: Homophily refers to the tendency of individuals to associate and bond with others who are similar to themselves in various ways, such as ethnicity, interests, values, or social status. Individuals are forming a group based on a shared characteristic—ethnicity. This exemplifies how people tend to connect with others who are similar to themselves.

2. Which of the following best describes the concept of selection in homophily?

   (a) The tendency of people to change their beliefs to fit those of their social group

   (b) The process by which individuals choose to associate with others who are similar to themselves

   (c) The influence of group norms on individual behaviors

   (d) The random formation of social ties without regard to similarity

   Answer: (b)

   Explanation: Selection in homophily refers to the process where individuals actively choose to form connections with others who share similar characteristics, such as interests, values, or backgrounds.

3. suppose we have a network in which a p fraction of all individuals are male, and a q fraction of all individuals are female. If the fraction of cross-gender edges is significantly less than 2pq, then there is evidence for homophily. For a network to have a fraction of cross-gender edges that is significantly more than 2pq, the network exhibits

   (a) inverse homophily

   (b) triadic closure

   (c) membership closure

   (d) foci closure

   Answer: (a)

   Explanation: The network of romantic relationships is a clear example of this where most of the edges are cross-gender.

4. Suppose Ram and Chander have k common friends. Given that each common friend gives Ram and Chander an independent probability p of forming a link, what is the probability of not forming a friendship between Ram and Chander because of k common friends?

   (a) p^k

   (b) $(1-p)$

   (c) $(1-p)^k$

   (d) $1-(1-p)^k$

Answer: (c)

Explanation:
Probability of forming a link due to one of the common friends = p
Probability of a link not forming due to one of the common friends = $1 - p$
Probability of not forming a link due to all the 'k' common friends =$(1 - p)^k$
probability of forming a link due to atleast one of the 'k' common friends =$1 - (1 - p)^k$

5. Two friends Simi and Niraj have taken different courses according to their interests. Simi has completed 10 courses and Niraj has completed 5 courses in all. There are 3 courses that Simi and Niraj have taken up in common. What is the similarity measure for Simi and Niraj?

   (a) $\frac{1}{2}$
   (b) $\frac{3}{4}$
   (c) $\frac{1}{4}$
   (d) $\frac{2}{3}$

   Answer: (c)

   Solution: If A is the set of courses completed by Simi and B is the set of courses completed by Niraj, then similarity measure for Simi and Niraj is given by
   $SimilarityMeasure = \frac{A \cap B}{A \cup B} = \frac{3}{12} = \frac{1}{4}$

6. Identify the mechanism in play for the following context: 'Karate club introduces Anna to Daniel'

   (a) Triadic closure
   (b) Focal closure
   (c) Membership closure
   (d) Neighborhood overlap

   Answer: (b)

   Solution: Focal Closure is the tendency of two people to form a link when they have a focus in common. Here, Karate club is the focus that is common to Anna and Daniel which leads to a friendship.

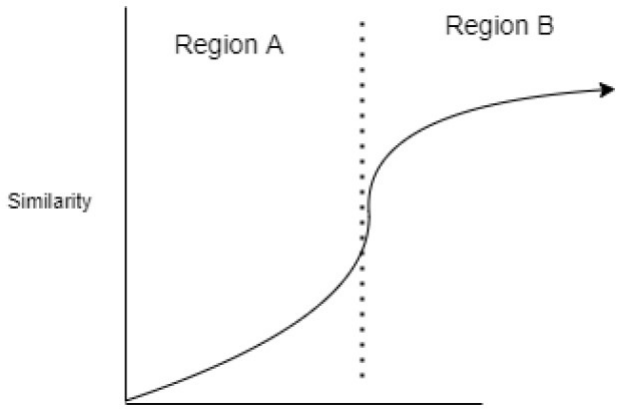
7. Identify the mechanism in play for the following context: 'Anna introduces Bob to Sam'

   (a) Triadic closure
   (b) Focal closure
   (c) Membership closure
   (d) Neighborhood overlap

   Answer: (a)

   Explanation: Triadic closure is a social network phenomenon where if two individuals (Bob and Sam) are introduced to each other by a mutual friend (Anna), a triad is formed in the network.

8. Given the average similarity of two editors on Wikipedia, relative to the time (0) represented by the dotted line at which they first communicated. Time, on the x-axis, is measured in discrete units, where each unit corresponds to a single Wikipedia action taken by either of the two editors. The rapid increase in similarity before first contact is due to



(a) Selection

(b) Social Influence

(c) Tradic closure

(d) Focal closure

Answer:(a)

Explanation: This increase is due to selection, where editors who are already similar are more likely to start communicating with each other.

9. In a scenario, if there were two friends and one person is a part of a Dance Crew and he influences the other to take part in it this will lead to

(a) Triadic closure

(b) Focal closure

(c) Membership closure

(d) Selection

Answer: (c)

Explanation: membership closure occurs because the existing member (one of the two friends) influences the other (the second friend) to also join the Dance Crew, leading to a situation where both friends are part of the same group. This strengthens the ties within the group and aligns the memberships of individuals who are already connected through friendship.

10. Consider an evolving network; evolving in the following two ways.
A: With time, new edges are being formed in the network.
B: Also, with time, nodes in the network are changing their attributes.
A and B represent

(a) Homophily and social influence

(b) Triadic closure and social influence

(c) Homophily and focal closure

(d) Triadic closure and membership closure

Answer: (a)

Explanation: A: With time, new edges are being formed in the network. This evolution could represent homophily. In the context of homophily, new edges or connections in the network are often formed between nodes that are similar to each other. As nodes with similar attributes or behaviors connect over time, new edges are more likely to form between them.

B: Also, with time, nodes in the network are changing their attributes. This evolution could represent social influence. Social influence occurs when nodes (individuals) change their attributes or behaviors in response to interactions with other nodes. As individuals are influenced by their connections, they may modify their attributes to align more closely with their peers.