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CSE CORE - 2
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SW Assignment 4

1. An information cascade occurs when individuals, having observed the action and posibly payoffs, of those ahead of them, take the same action regardless of their own information signals.
Information cascades may realize only a fraction of the potential gains from aggregating the diverse information of many individuals, which helps explain some otherwise puzzling aspects of human and animal behaviour.
An information cascade is a situation in which an indual makes a decision based on observation of others without regard to his oven private information.

ex- Suppose that your choosing a restaurant in an unfamiliar town, and based on your oven research about resturant you intend to go to resturant A. However, when you arrive, you see that no one is eating in restaurant A while restaurant B next door is nearly full. If you believe that other din

Say that herding, or an information cascade, has occurred.

Q4. Ans:- Power law gives the relationship between two quantities where, a relative change in one quantity is reflected as a proportional relative change in other quantity, regardless of the intial value of both quantities. Mathematically, it can be represented as:

$$y = ax^k \quad \text{—(1)}$$

Taking Log on both sides,

$$\text{Log}(y) = \text{Log}(ax^k)$$

$$\text{Log}(y) = \text{Log}\,a + k \log x \quad \text{—(2)}$$

where 'x' and 'y' are the variables of interest, 'k' is the power law exponent and 'a' is a const. For increasing or decreasing functions, k is +ve or -ve respectively. As seen in the eq 2, power law adopts a linear relationship if variables are plotted on a logarithm scale. Power law is frequently used to determine the underlying properties of social, scientific, human as well as natural systems.

The power law can be used to ~~reveal characteristics~~ characteristics of a social network. As the network evolves with time, large no. of new edges might get added to nodes which already have a large no. of links, thereby increasing the degree of nodes disproportionately.

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06. Ans:- In social networks, there is a phenomenon called Rich getting Richer also known as Preferential Attachment In Preferential Attachment; a person who is already rich gets more and more and a person who is having less gets less. This is called Rich getting Rich phenomenon or Preferential Attachement.

For example, assume there are some students in a class and every student is friends with some students which is called its degree i.e a degree of a student is the no. of friends it has. Now the student with a higher degree is rich and the student with a low degree is poor. Now suppose there comes a new student in the class and he/she has to make m friends so he/she select students with a higher degree and become friends with them which increases the degree of rich. This is called Rich getting Rich or Preferential Attachment.

07. Ans: The Long tail Phenomenon:-

The destribution of popularity can have important business consequences, particularly in the media and industry. In particular, let's imagine a media company with a large inventory a giant retailer of books or music, for ex, Consider the following question: are the most sales being generated by a small set of items that are enormously popular, or by a much larger population of items that are each individually less popular? In the former case, the company

is basing its success on selling "hits" - a small no. of blockbusters that create huge revenues. In the latter case, the company is basing its success on a multitude of "niche" products, each of which appeals to a small segment of the audience.

Q11. Ans:- We build our model for the diffusion of a new behaviour in terms of a more basic, underlying model of individual decision making: as individuals make decisions based on the choices of their neighbors, a particular pattern of behaviour can begin to spread across the links of the network.

Network models based on direct benefit effects involves the following underlying consideration: you have certain social network neighbors - friends, acquaintances, or colleagues and the benefits to you of adopting a new behaviour increases as more and more of these neighbors adopt it.

Q8. Small world phenomenon:-

- Social Networks are so rich in short paths, known as Small-world phenomenon, or "six degrees of separation" and it has long been the subject of both anecdotal and scientific fascination.

- Mathematically, small world networks of size n have an average distance $O(\log n)$, meaning that between any two random nodes, the expected distance is $O(\log n)$.

$(L) \propto \log n$

- Compare to ultra-small world, where the average distance become significantly smaller and scale as:

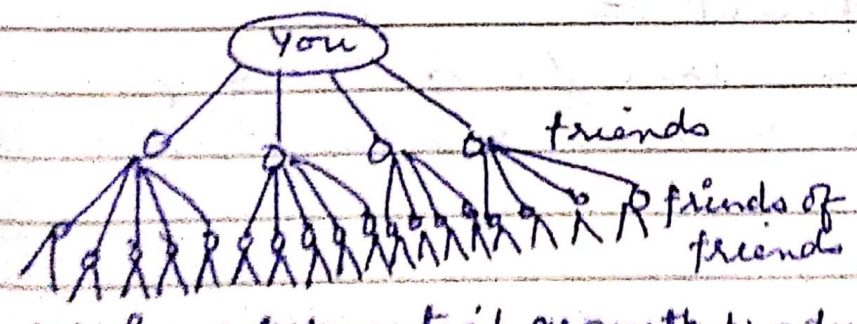
$$L \propto \log(\log n).$$

- Milgram's experiment really demonstrated two striking facts about large social networks:-

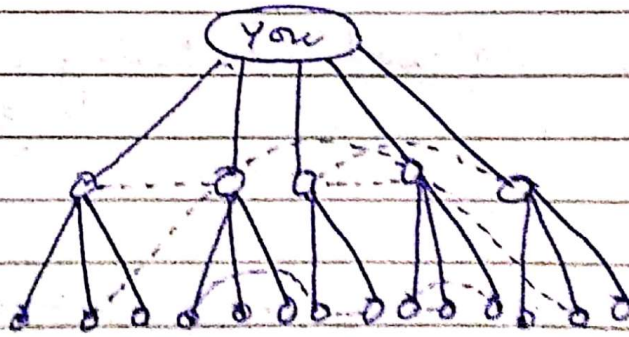
(a) First, that short paths are abundant,

(b) Second, that people acting without any sort of global "map" of the network, are effective at collectively finding these short path.

- Network grows exponentially, leading to the Existance of short paths.
- However, the effects of triadic closure works to limit the no. of people you can reach by different paths.



(a) Pure exponential growth produces a small world.



(b) Triadic closure reduces the growth rate.