Social Networks
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Link Analysis
Lecture - 77
Equal Coin Distribution

Going with the flow, we had two questions.

(Refer Slide Time: 00:11)

Question 1 was collect the web graph. Question 2 is use this web graph to solve your search problem. Question 1 you all are convinced is very doable, why? You saw the plot just now. When there are n number of nodes, it is not ~~very difficult~~difficult to explore the entire graph with n nodes. Random walk makes you search for all possible nodes and visit all the places that way you would know what is linking to what; not only will you get all the nodes; you will get a whole lot of edges as well right.

So, which means a partial structure of the graph is reveal to you. The second question that we asked how can we use such a web graph to solve our search problem? That we should go slightly slowly. I am going to divide my explanations in several pieces. I will go piece by piece; at the end put all these pieces together and you will see that we can solve the search problem just by using this web graph. So, I am going to go in bits and pieces and solve the problem of how we can use this web graph to solve the search question. The first piece is as and always a puzzle.
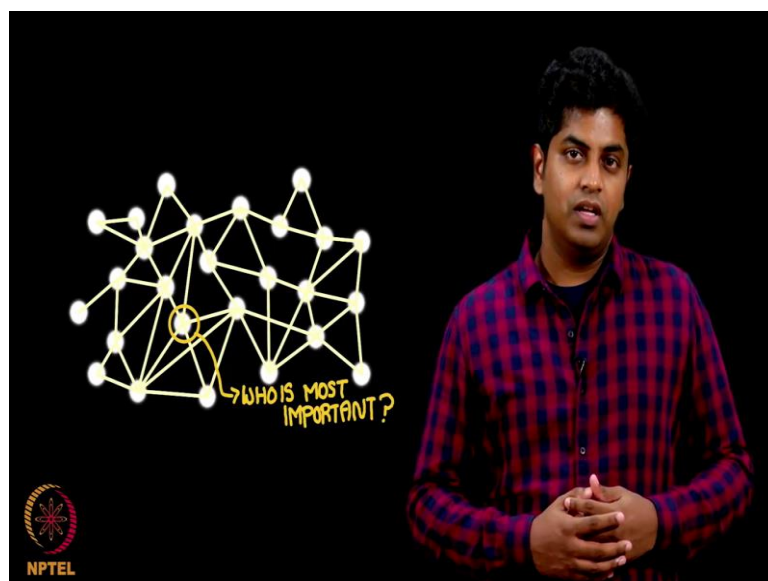
You are given 30 people with complicated friendship between them, you have to decide who is the most important person here and I am going to use a very weird strategy to find out who is the most important person. Repeat 30 node graph, they are all friends. I am going to find out a nice way in which, I am going to use a nice way in which I can find out who is the most important person here. What do I do? As I told you it is a very weird strategy; do not break your head on why ~~am I~~I am doing it.

What has this to do with a question? As I told you I am going to go in bits and pieces. The first piece is the stand alone question the standalone question; I mean do not try to ~~related~~relate with anything else just look at this is a problem in its own right. 30 people and I am going to use the following strategy to find who is good here, who is the best here.

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Basically, I am going to rank everyone who is the best, who is the second best, third best. What I do is I take 100 gold coins and give it to every single person on this network of 30 people. So, the first person gets 100 gold coins second person gets 100 gold coins 100 100 100 100 100 30 people; each of them get 100 gold coins. And what ~~is~~does the first person do?
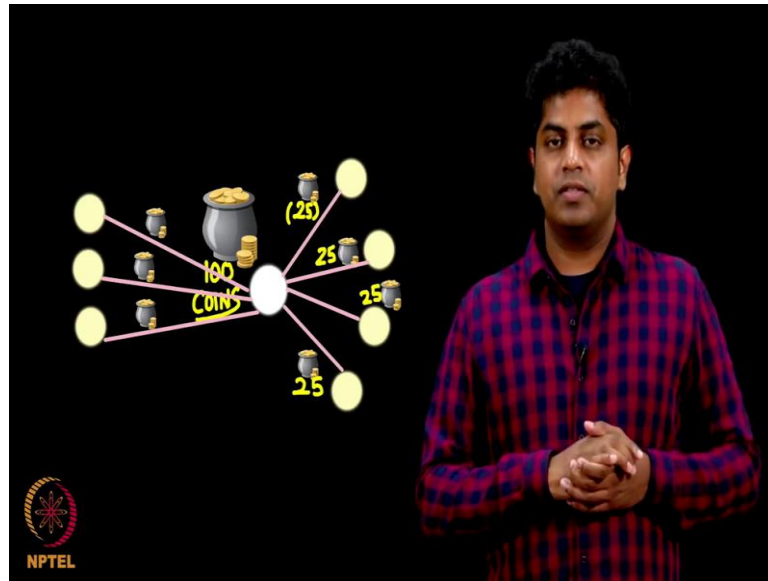
Assume a person has 3 edges. This node has 3; let us just take one node it has 3 outgoing edges. So, 100 can be divided into 33 33 33; I am going to round of ok. So, let us say 90 let us say 4 edges are going not 3, 4 edges are going 100 gold coins to a node and this node gives 25 gold coins to each of its neighbours. If it was 3, I will just divide it by 3 and 33.33 each. I will assume gold coins ~~can you can~~you can consider decimal part of it and then give it and by powdering it let us say.

So, every person distributes the gold coins that they have to their neighbours. Now this one who has 4 neighbours to him will have some people who have him as a neighbour. So, he will also get some gold coins right.
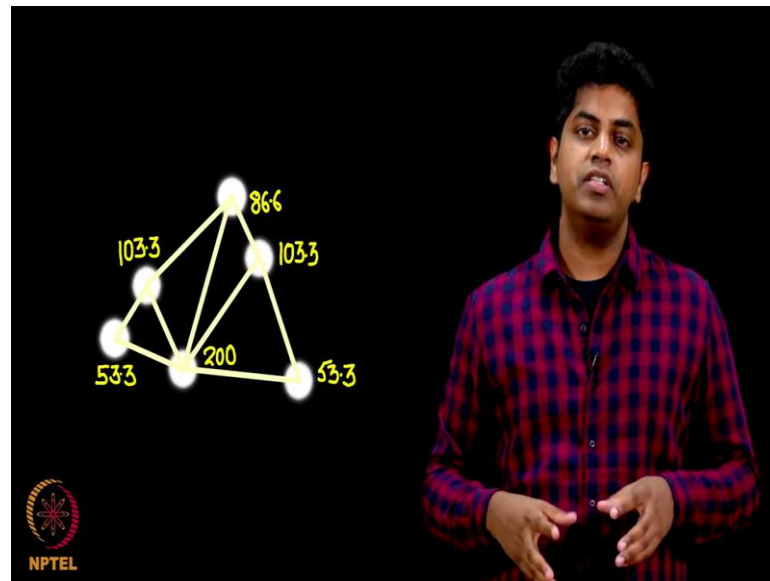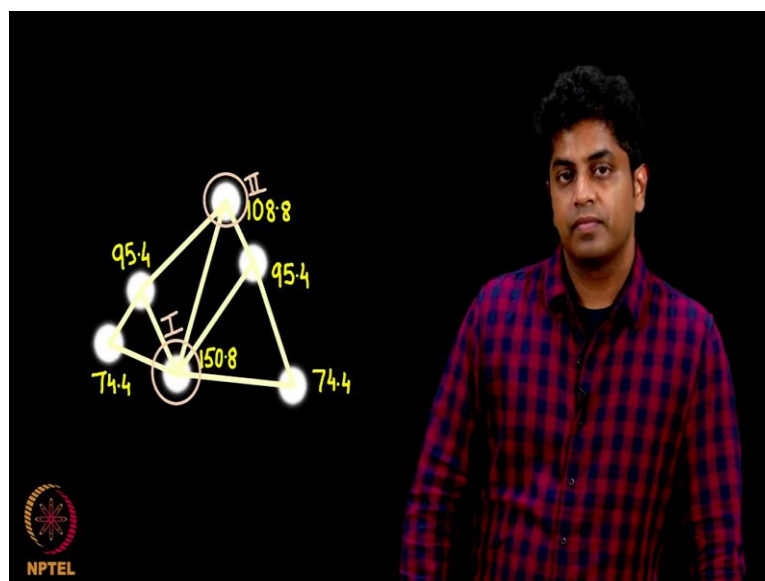
So, all I do is I take a network. As you can see 100 gold coins, each one iteration one snap like this will make everyone distribute their existing gold coins to all their neighbours.
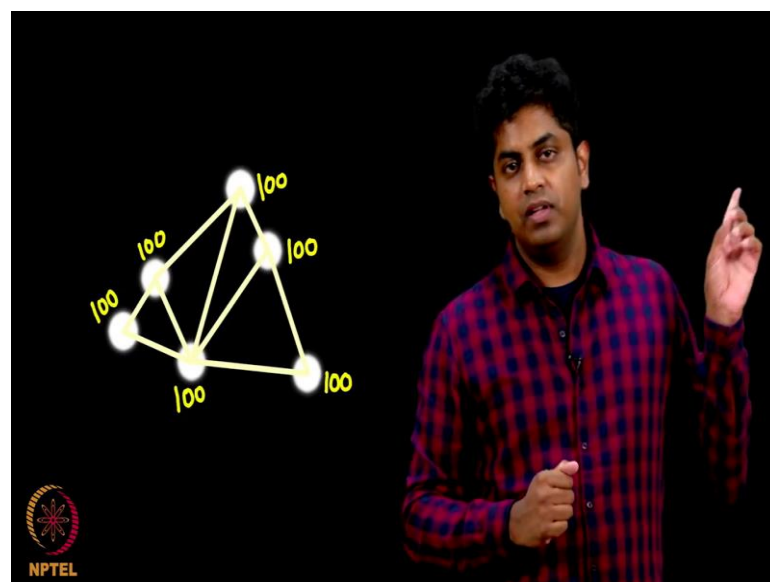
You see with one snap, everything changechanges in the network on these 30 nodes. Another snap again it gets distributed. Observe very closely.

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What is the distribution? Whatever gold coins you have, whoever are your neighbours you should just go and give it to them and whoever is pointing to you they will give their gold coins to you. In every snap this happens, every snap this happens. Keep doing this, snaps are basically iterations you see the graph changing; first snap, change; second snap, change; third snap, change. You see it keeps changing like this, keeps changing like this and so on and so forth. I keep doing this up to eternity guess what happens.

Very interestingly, this converges which means there is a stage after which the gold coins get accumulated and it does not change; just stays stagnant. And in that ~~state~~state, you go and see who has the maximum gold coins, you will see there is this node which has the maximum gold coins. You call him rank 1. Now what is it denote how did you accumulate so many gold coins? You did some random process, you simply started giving gold coins that you have what ~~is~~does this even denote in the first place?

Let us see that in a while, but I just did this for fun, a very weird strategy to find out who is the most important person. Whoever accumulates the maximum gold coins eventually with time is the most important person. The second most gold coin collector is the second most important person; third, third most important person; fourth, fourth; fifth, fifth so on. What just happened? Pause and think about it.