Social Networks
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Cascading Behaviour in Networks

Lecture – 89
Diffusion in Networks

So, we have seen that we follow each other and we have looked at why do we follow each other. Let us now take this concept of following one step further. What do I mean by one step further? It is not me who is following others; all of us are following each other. Let us take this sport shoes example.

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My friend came up with nice sport shoes and then he gave me some offer and I kind of I adopted his sport shoes, his product of sport shoes I adopted. Then I have many more friends, they might look at me and one or two of them will then adopt these sport shoes and then their friends will looked at them and some of them might adopt these sport shoes. So, do you kind of see a network phenomena going on here.

If I model this complete world as a network like this where every person in this billion of population, I represent every person as a node. And, then again like before I put an edge between two people, if they talk to each other, if they kind of follow each other they listen to each other I put an edge between them. So, this product starts from somewhere, it starts from my friend then I adopt it, then my friends adopt it, their friends adopted us and so on.

So, do you see that this product is kind of travelling in this big social network? Traveling is actually a misnomer; we can actually say it is diffusing through the network. So, travelling is like when something makes a path and goes, but it is branching. So, my friend would have shared it with some people, let us say 2 people and then these 2 people if they share it with 2 people more it becomes 4. So, it is not just one path, this product is branching through this entire network and we call it diffusion. Now, one question of interest here which my friend would actually be very interested in how many people at the end adopt his product.
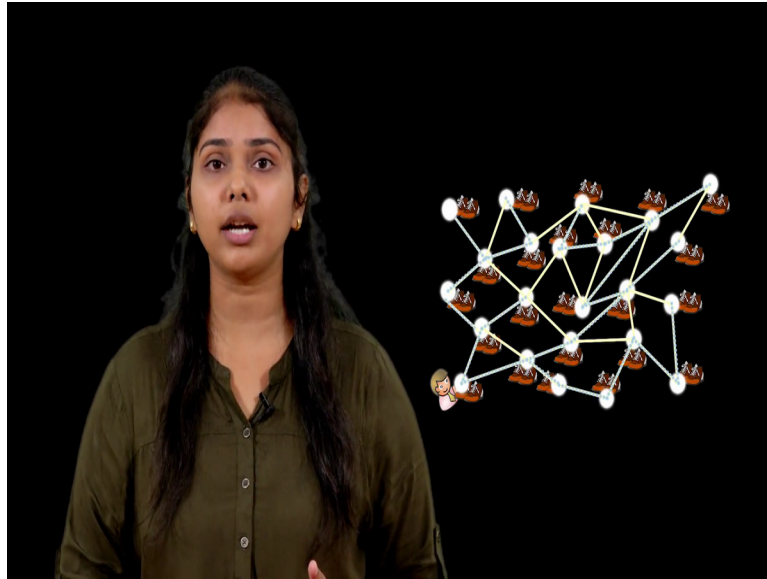
So, whenever a piece of information or a product or something else diffuses in a network from person to person it starts from someplace, then hit some people; hit some more people and so on. What happens at the end? What will happen at the end, can we tell? Will this product sweep the entire population and everybody will adopt it or it will die away quickly. Nobody will adopt it, may be very few people. How do we tell it? How do we say what happens and now; obviously, what would be coming in your mind is it actually depends upon what is traveling as well what is diffusing as well.

So, let us say it was a code snippet about some algorithm I am sharing not many people would be interested, but if it is a juicy piece of gossip about some Hollywood celebrity, Bollywood celebrity or rather one of my close friends it will very quickly diffused through the network. So, yes it depends upon the product, but how do we actually quantify this complete process of a product or an information starting from some part in the network, infecting some more, getting adopted by some more and so on. So, we will look at it in detail in this chapter with the help of nice mathematical notations and conceptual entities which are coming next.