Social Networks
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Cascading Behavior in Networks
Lecture - 95
An Introduction to the Programming Screencast
(Coding 4 major ideas)

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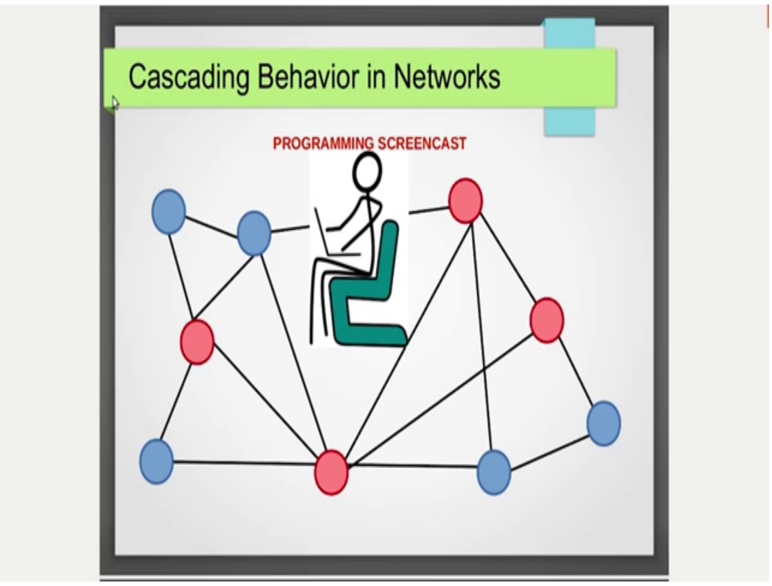

So now, we had shifting to the coding part, the programming screen cast part for the chapter Cascading Behaviour in Networks we have discussed just now. What we will be doing here in this programming screen cast is, we will be taking the major concepts that we have discussed in this chapter. So, I will be taking 4 major concepts that we have discussed in this chapter and we will be coding and validating all those 4 major concepts one by one. So, I will quickly recap these concepts for you and then we will start with the coding part.

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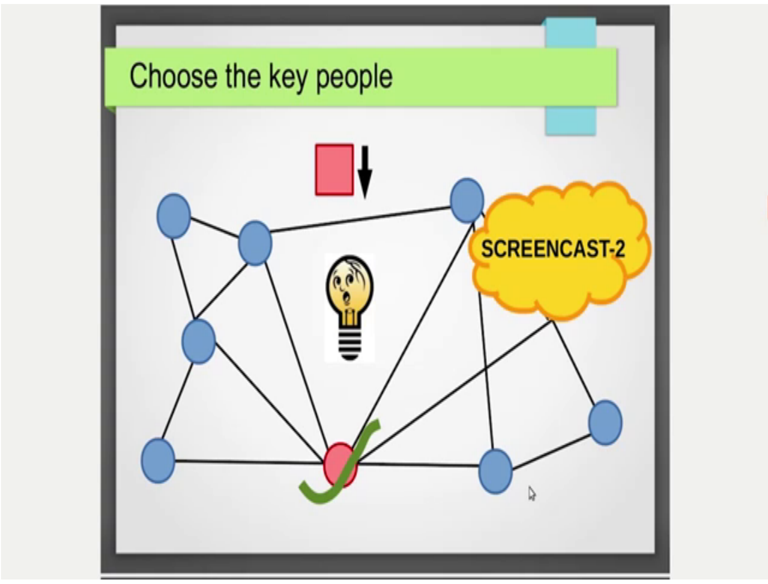

In this entire chapter we talked about a particular scenario and the scenario was, there is a network and on this network every person has adopted some action or some behaviour. So, every person has adopted the same action or same behaviour and everybody was living comfortably with it on this network, but then with time comes a new idea, new action or new behaviour in this network and then, people start changing.

This new idea or new behaviour starts cascading on this network. So, the example which we have discussed in the chapter is there is a network on a class people in a class, where all of them have initially decided to work in library or an pending assignment, on a pending assignment. And then, came this new idea of going outside and having fun and then slowly and slowly this idea started cascading and more and more people started going outside and having fun, instead of sitting in library and working.

So, that is the exact thing which we will be talking about. So, as you can see that here is a network. Initially, all the nodes in this network were blue. So, they have adopted an action and idea, a behaviour; let us call it a blue action, blue idea or blue behaviour, but then comes in picture a red idea, a red action, a red behaviour and it wants to defuse on this network. And then we have looked at the obvious problems with this. What is the problem with this blue idea, blue sorry, what is the problem here with this red idea to defuse on this network and make all the nodes red here? The problem was, as we discussed that people find it risky to adopt a new idea or a new behaviour. They are not comfortable shifting to a new thing specially, when all of their friends are doing the old thing. So, no node in this network actually wants to shift to this red idea; they find it risky to adopt.

Then what do we do? What should this red idea do to defuse on this network? And we have looked at 2 solutions to this problem. The first solution was to increase the payoff associated with this red idea, to increase the benefits associated with this red idea. As the benefit associated with this red idea increases, more and more people start adopting it. So, you have looked at how we have modelled the entire thing with the help of pay off and number of friends. Each idea here let us be the blue one or a red one gives you a payoff. And then, based on that payoff and your number of friends which I have adopted that idea you decide, what to do right. So, you increase the payoff associated with this red idea and probably it will cascade on this network and rather cause a complete cascade.

What is a complete cascade? Complete cascade is when every node in this network turns red, this red idea is adopted by all the nodes in this network, we call it a complete cascade. There will be modelling; we will be modelling it in screen cast 1 sorry. So, what we will be doing in screen cast 1 is we will take a network where everyone has adopted an old idea and then, a new idea comes which is having some payoff which is; obviously, greater than the payoff of the old idea, but still on a lower side. And, we see that with this payoff this new idea is unable to cascade on this network. It is unable to cause a complete cascade on this network.

But as we keep increasing the pay off associated with this new idea finally, it creates a complete cascade. We will be looking at it in screen cast 1. So, screen cast 1 is associated with the first idea, you increase the pay off associated with this new idea.

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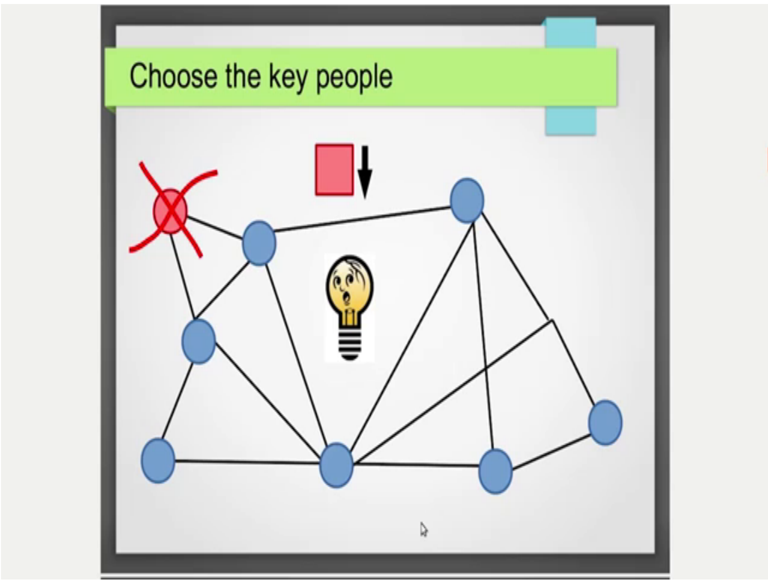

What is the second idea? What was the second idea that we discussed? The second idea was about choosing the right people. So, maybe if you start with this node here you are unable to create a complete cascade or if you start with this node here you are unable to create a complete cascade. But, if you start from this node here which is very well connected to rest of the network you might end up creating a complete cascade.

So, if you start with some nodes in this network, the cascade does not occur. If you start with some other nodes in this network the cascade might occur. And, I am quite sure you remember this we talked about this bike example. If you want a new buy it should not be your mother here or your siblings here which you should be convincing, it should be your father. So, this thing we will be discussing in screen cast 2 where we will again all do almost the same thing.

We will have this network which on which every person has adopted an old idea and then, this new idea comes and now, we will keep the payoff associated with this new idea to be same. We are not going to change the pay off, but we are going to change the people from where this cascade starts and which show that if you start from some bunch of people, it is unable to create a complete cascade, but if you start from some other bunch of people it is able to create a cascade. So, we will be talking about it in screen cast 2.

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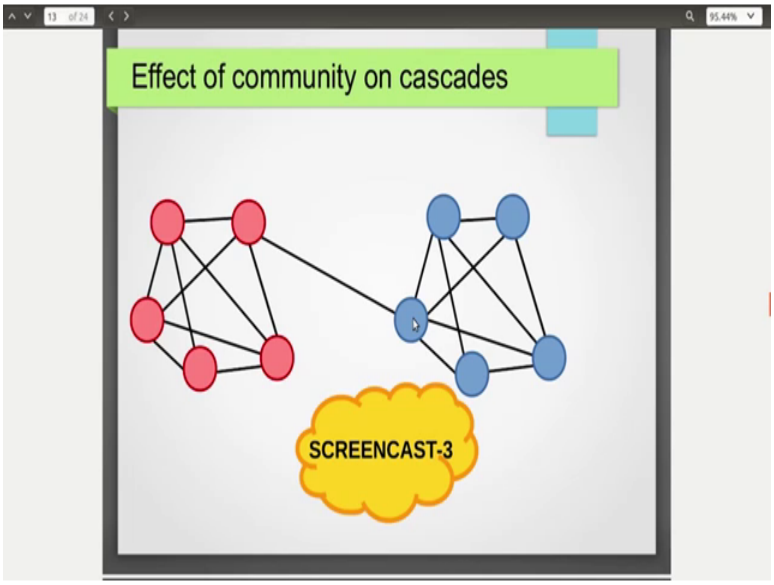

Screen cast 3: this very cute idea of the effect of community on cascades. We have looked at community drapes cascades. So, here if there are 2 communities and this idea originates here; it cascades, cascades and this entire community has adopted this idea, but it is difficult for this idea to come and defuse to this community.

So, one community remains with the old idea and other has adopted this new idea and we have looked at the reason for why it happens. So, we will be coding it in screen cast 3 where we will take a network having 2 communities and we will start our cascade from one community and we will see that it infects everybody in this community, but this unable to reach out to this another community.

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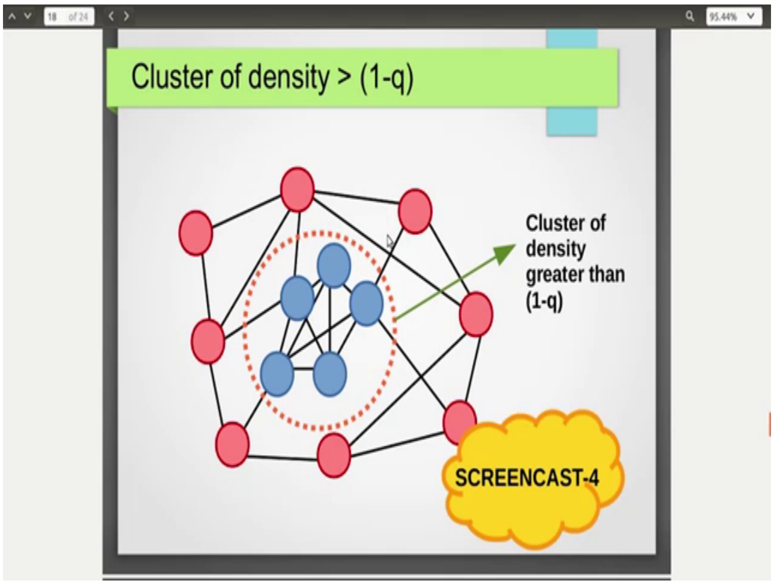

In the last part, we will be implementing the theorem we talked about. So, the theorem was, the statement was, if there is a cluster of density greater than 1 minus q a complete cascade is not possible. So, many technical words here; I suggest that you go back and quickly watch what do I mean by cluster density 1 minus q here. I will quickly recap it here.

So, we say that there are clusters in every network and we say that a cluster is of density p, if for every node in the cluster, each and every node in this cluster has at least p fraction of their friends in the same cluster then, we call it a cluster of density p. And q here is a threshold associated with the new idea which means that, if q of my friends, q fraction of my friends or greater than q fraction of my friends adopt a particular idea, adopt this new idea, I will also adopt this new idea.

So, the theorem said that if there is a cluster of density greater than 1 minus q in this network then, your idea cannot defuse inside this cluster here. So, here is a cluster of density greater than 1 minus q and your cascade starts from here. Even if your cascade infects all these nodes in this network, all the nodes in this network, we will see that it is unable to defuse inside this cluster. And, we have talked about the proof of this theorem in the chapter, but here we will be coding it and validating it with the help of a code. So, this will be our screen cast 4.