Social Networks
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Lecture - 01
Introduction to Social Networks
Introduction

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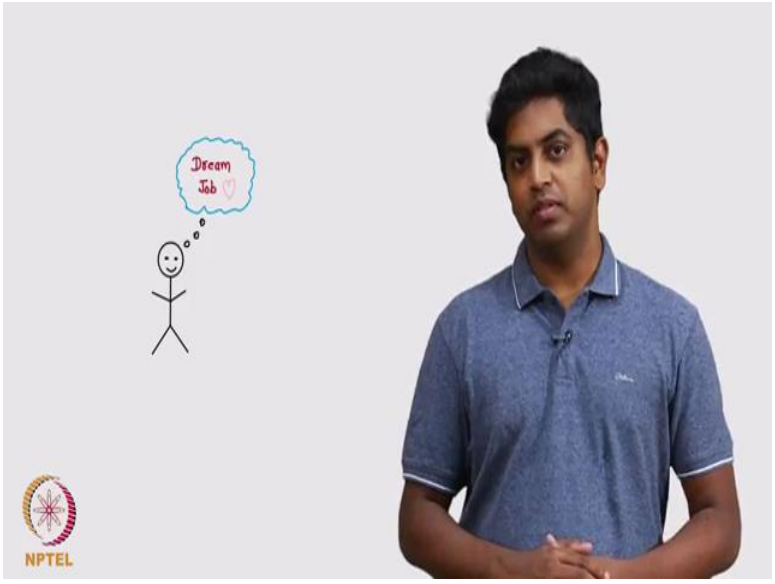

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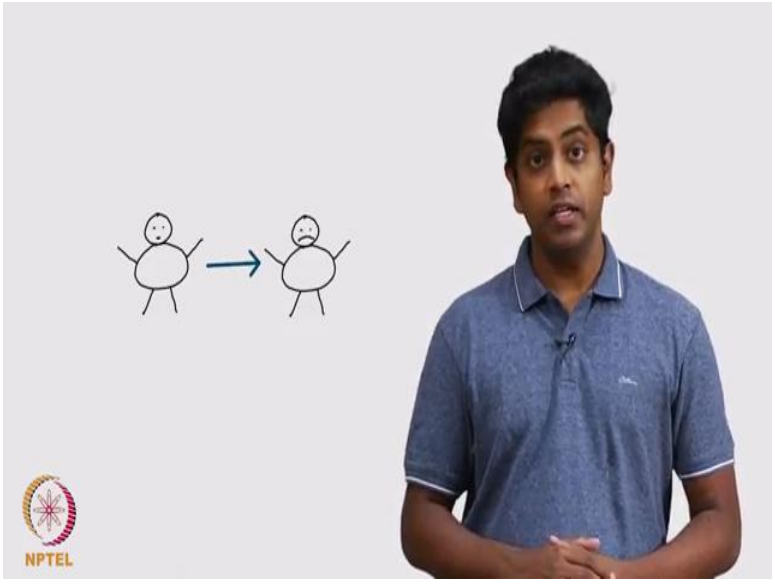

How do you find your dream job is obesity contagious? Do you think a friend's friend whom you do not know has any influence at all in your life?

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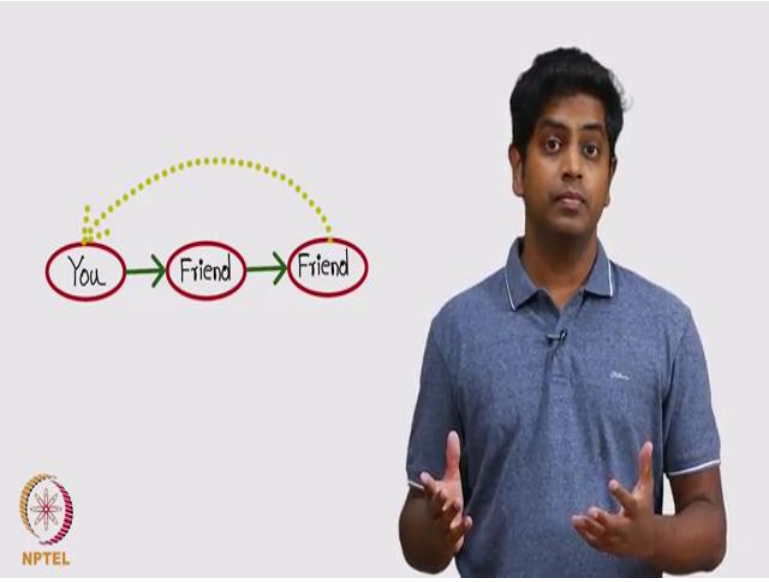

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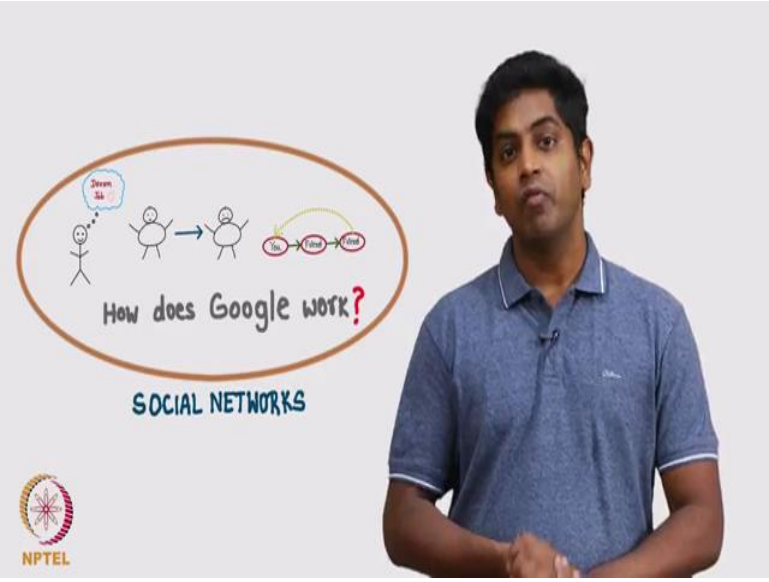

And what has these questions to do with let say how google works? What are the commonalities across these questions? Are there any commonalities in the first place? Well yes, that is what makes the subject called social networks. So, we will be studying all these questions and more throughout the course without any further ado let us start off

with a nice question. So, we are going to watch a video clip right now, I am going to come back and then analyze what just happened in the video clip.

Hey.

Hey Ahmed, where were you? Class is about to start.

Leave it, do you even know Vardan and Simran are dating and for the Heaven's sake this is just the second day of our college.

How did you come to know about that?

You do not know? Everyone knows about it.

How is that even possible? Anamika told me about it yesterday and that too personally and I just told Harita about it.

Harita! Who is Harita? I do not know about her.

As far as I know she does not talk to many people here. It has been just one day since we have met and I am still wondering; how did you come to know about that?

Of course, not many of us know each other and we have met each other yesterday only and that too only few of us interacted.

I see some signs going around here.

Let me revise it. So, we are the bunch of people who have not met each other before and then met each other yesterday only and only few of us interacted and still.

And yet everyone knows about the news, Anamika told me personally.

Indeed only few of us know each other still we are so connected.

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Did you see what just happened in the video clip, there were these 2 friends who newly joined this college and they are talking about a piece of gossip.

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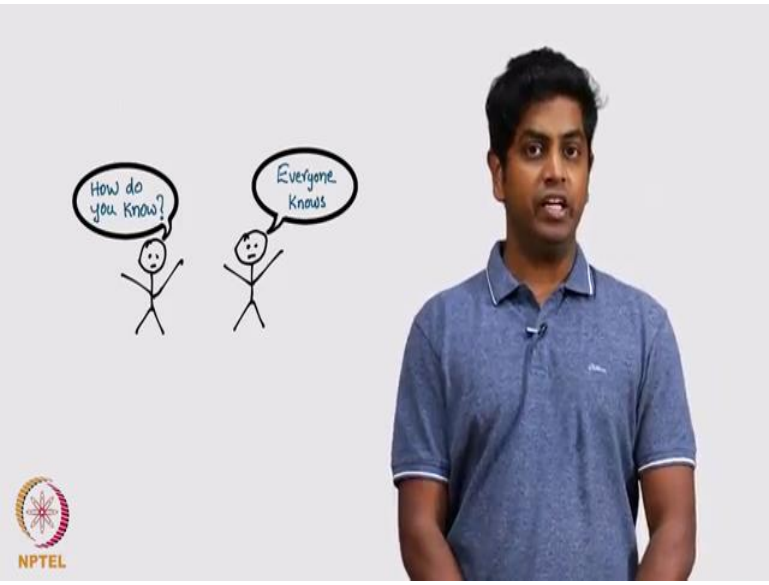

And a person is asking this question; how come you know of this while I thought nobody knows of this except me and in fact, that the person says the entire class knows of this what is so intriguing about this I actually find it intriguing for the following reason.

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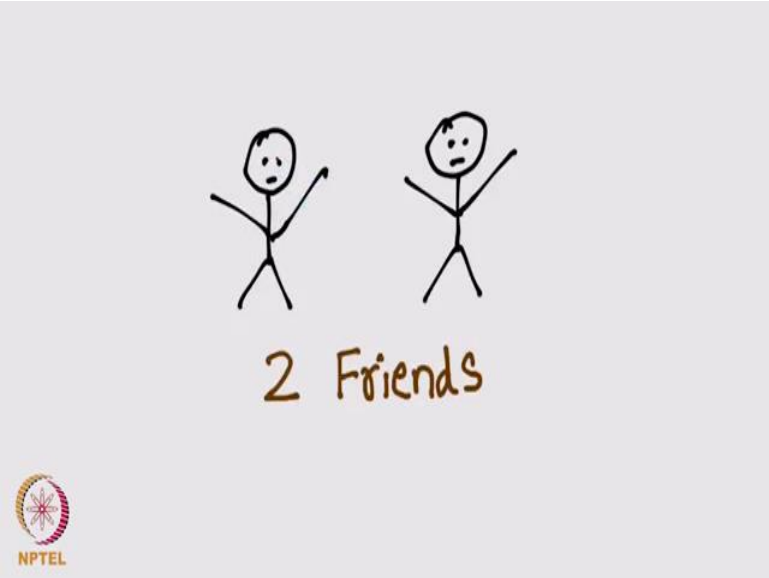

They are just less than one week into the class in the college and for everybody to know this piece of gossip they all must be friends with each other, is it not, without being friends with each other, who will come and tell each other about all these things? They may not even be Facebook friends this early, right. It has been less than a week since they have joined the college what is happening here, let us analyze.

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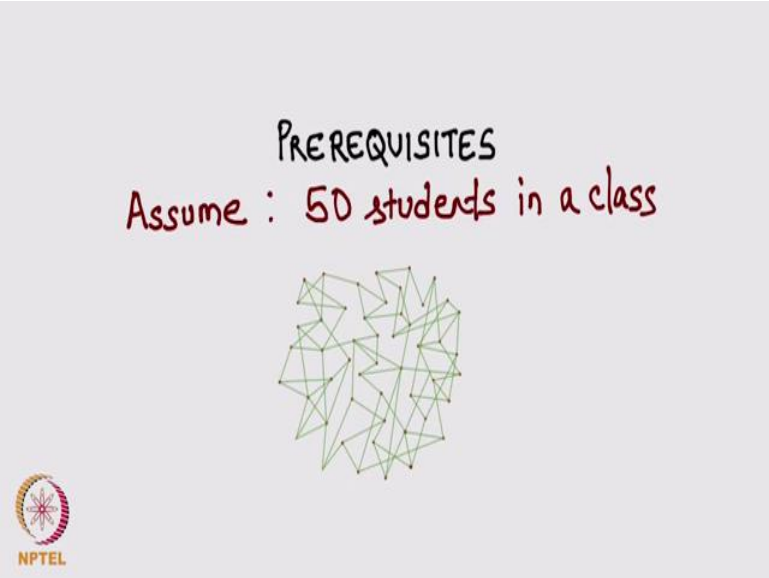

We need to develop a few pre requisites before we can answer this question. So, let me go slowly, the classroom let us say has some 50 people, 50 people may not be friends

with each other because as I told you it is just the first few days of the class, let me try modeling this these are the 50 friends let me use dots to denote these friends and the friendships between them let me draw a line to denote the friendship by this I mean.

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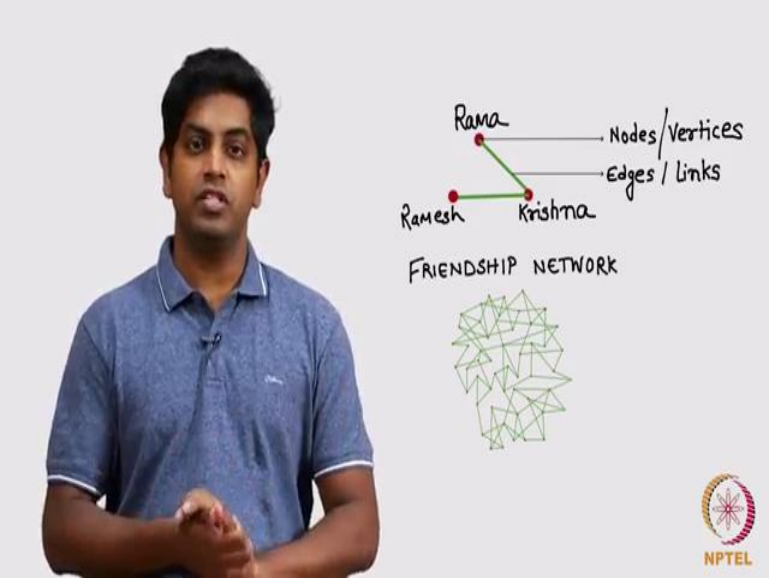

Assume Rama and Krishna are part of this classroom and they are friends with each other I put a line between them and Krishna and Ramesh are friends with each other I put this line between them and, but Rama and Ramesh are not friends. So, I do not put line between them and I develop the friendship network I call this friendship network.

It might look something like this some points denoting people and lines denoting friends. There are different ways in which people call this dots are called vertices or nodes in the subject and the lines are called edges or links. So, what we will be doing is we will we are going to use the jargon vertices or nodes for dots, edges or links for lines from now onwards throughout the course that is with the nomenclature.

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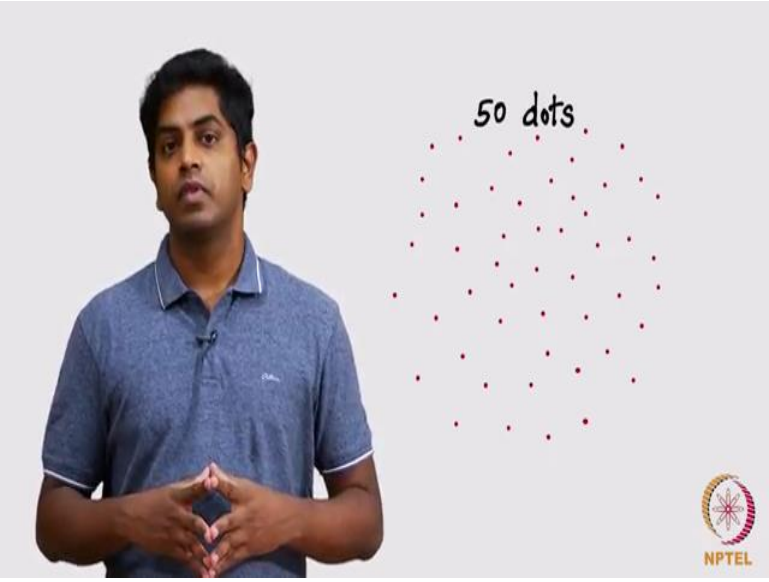

And now let me do a small experiment and observe what is happening here.

I will take 50 dots representing friends rather people in the class what I will do is let me take a guess first week of the program first week of the college and they are from different places from the country and it has only been first week.

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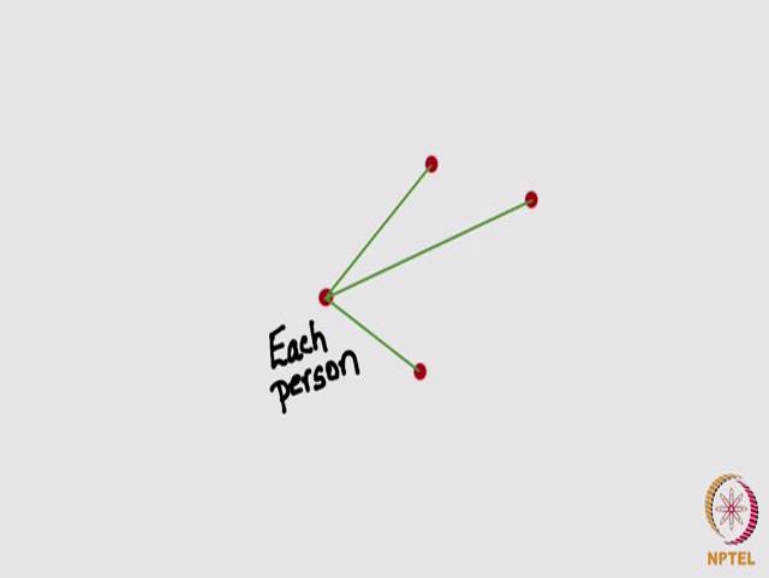

So, let us say each person would have managed to have 3 friends on an average. So, what I will do I will take a person here and try to randomly pick 3 people and declare him as friends with these 3 people, I do it for every single person look at what is happening.

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The final graph I am going to call it as structure a graph the final graph might look like this what is surprising about this graph? The surprising fact is that while a person can actually make all 50 people as his friends the entire class as his friends 49 to be precise excluding him. Let say he just makes 3 people as friends why because it is the beginning of the course and what do I observe here in this graph what is startling for me is that this graph this network is connected what do I mean by connected.

You see take any 2 people here in this graph there is a path that connects these 2 people this is strange is this always true not really.

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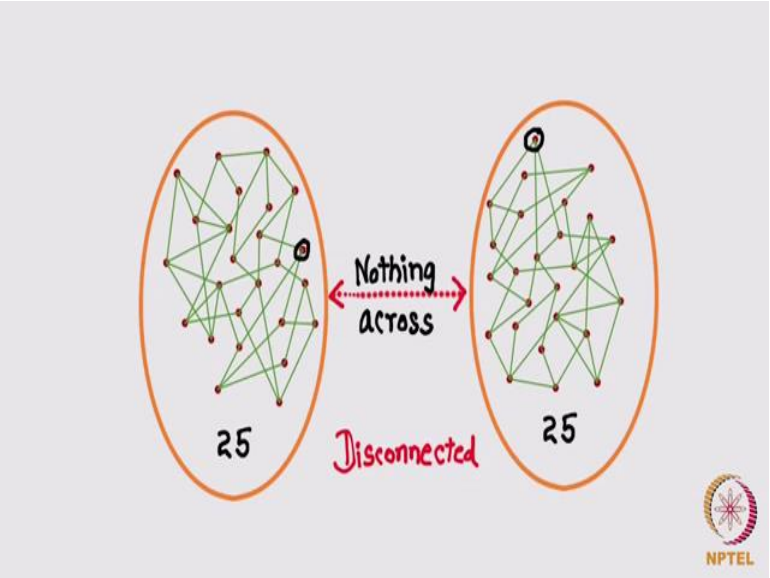

Observe this particular example where there are 50 people, the 20 people, this side 25 people that side they have some friendships within, but there is no friendships across this might also happen in such a case I do not call this graph connected.

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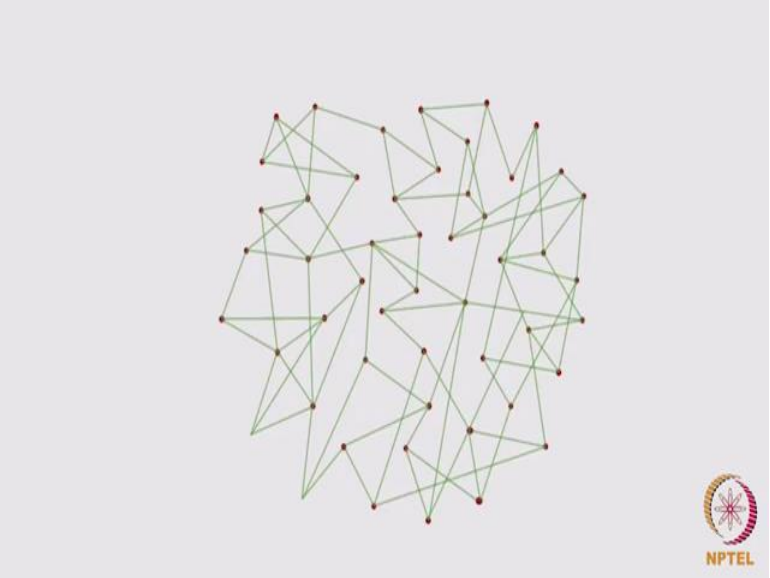

Why because I can take a person from this end and a person from that end there is not path connecting these 2 people, but then look at my previous graph on an average if I make 3 friends per person by picking these 3 people uniformly at random I observe that the graphs gets connected is this always true.

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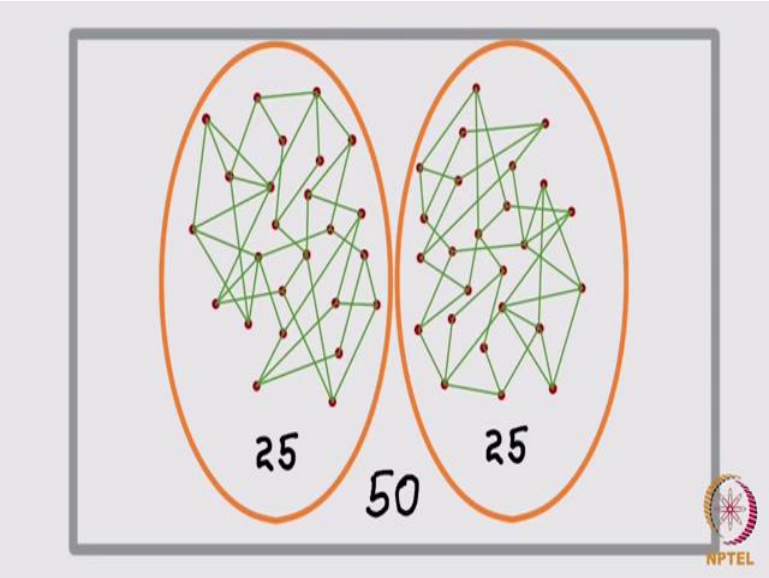

So, let us look at this network 25 people this side, 25 people that side as I told you and this side there is a network of connections and that side there is a network of connections remember here is a classroom of 50 people and there is a bifurcation of 25 this side, 25 that side.

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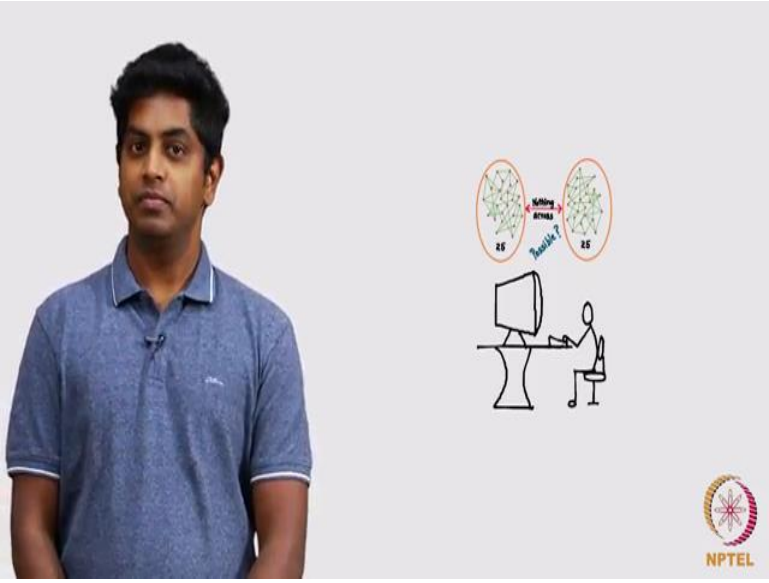

What do I mean by bifurcation? I mean if you look at the friendships between these people 25 people have friendships within them, 25 people have friendships within them

that side and a point to note is there is no friendship across my question was is this even possible.

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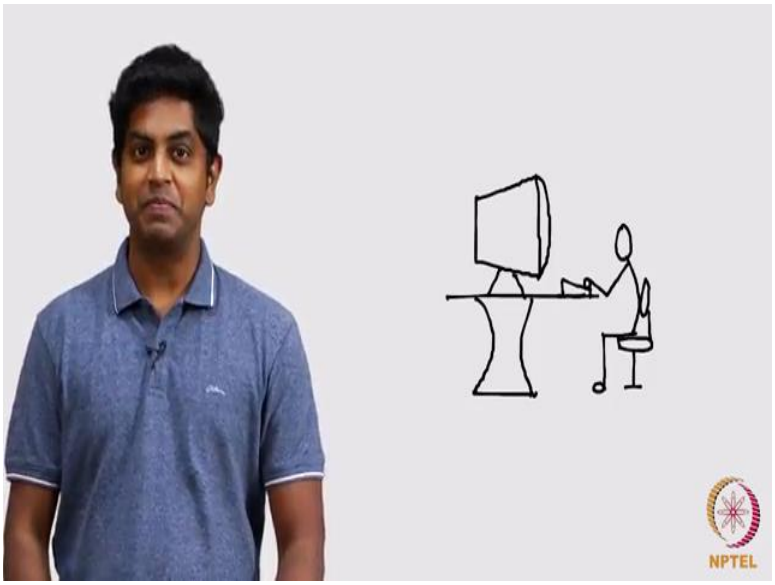

So, let me do one thing, I will now take a break, write a piece of program and get back to you people and tell you my observation of course, I will not show you the program, I will go do the program and came back and tell you the output of the program.