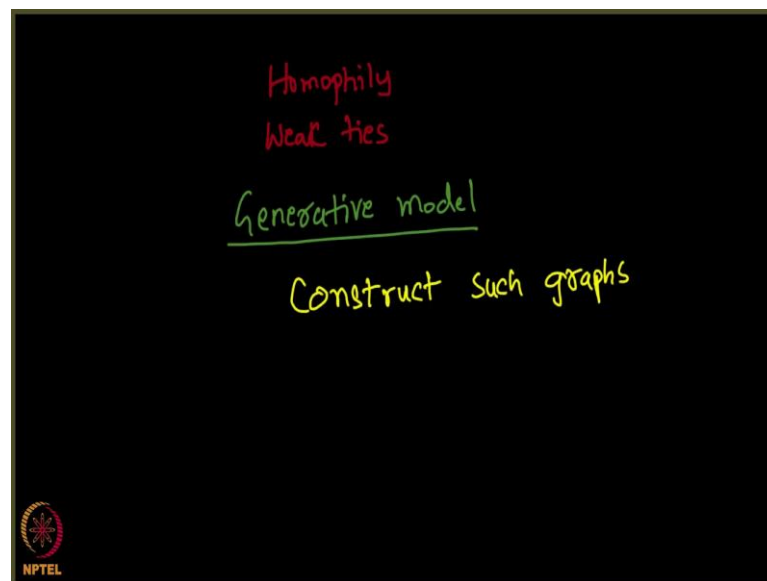


**Social Networks**  
**Prof. S. R. S. Iyengar**  
**Department of Computer Science**  
**Indian Institute of Technology, Ropar**

**The Small World Effect**  
**Lecture - 146**  
**The Generative Model**

Scientific theories like any other theories are sometimes hypothesized. By hypothesis we make something that is proposed to be true proposed as true for which we may not have complete scientific evidence. So, this was one such proposal where Watts and Strogatz observed it and said homophily and weak ties could be the reason why this is happening right.

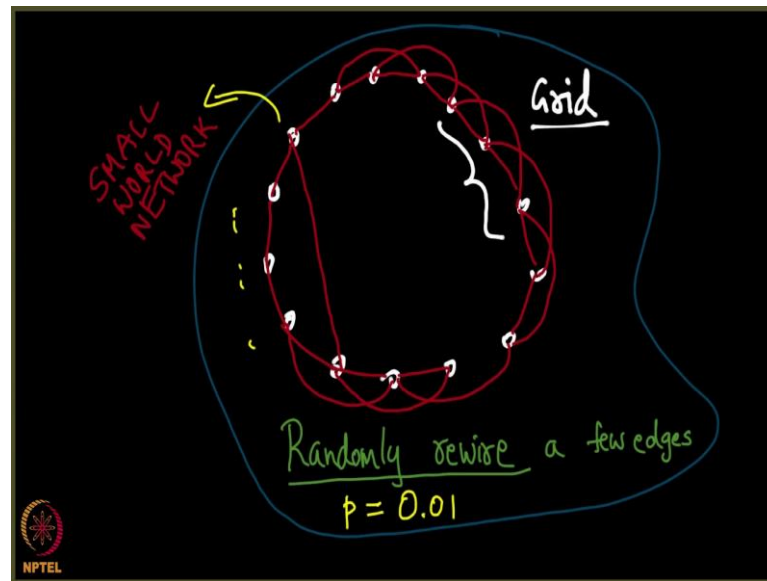
(Refer Slide Time: 00:28)



Then they said we will now give a generative model for this. By generative model we mean the following. A generative model stands for a way in which you can construct such graphs, an algorithm or a method through which you can construct such graphs. What do we mean by such graphs?

Graphs with the property that we are discussing graphs with small world properties. So, there proposal was this.

(Refer Slide Time: 01:11)



First consider a cycle ok, put all the nodes on a circle like this cycle like this whatever, so, how many wire you want. And then start drawing edges to their nearest neighbors. Let us say something like this. So, everybody is friends with let us say the next two people adjacent to them. So, let me try explaining it. This chap will be a friends with him and him, this chap will be a friends with him, this chap will be a friends with him and so on and so on, right; so on and so forth.

So, now what watt since Strogatz model suggested is that start with this is very similar to a grid that we saw right. Start with a grid where you know people who are geographically close to you right and then and then there is a just head that you should randomly re wire; sounds little technical, but let me explain in a minute what; that means. Randomly re wire a few edges by that we mean taken edge here of your choice whatever you want. Let us say I will remove this edge as you saw I remove this edge and I am going to randomly put it back as well ok, I will randomly put it back, it can be between any two edges, I do this kind of re wiring.

So, there is a probability that we can associated with that kind of re wiring. I will say I will do some 1 percent of the edges that I have, I will randomly rewiring re wire them; that is called the random re wiring probability. It was observed that whenever we did something like this, the resultant network was indeed a small world network. What do I mean by that? As I have been explaining this is the kind of network where you will

observe that any two nodes are in fact, very close to each other. You take a billion nodes here and then repeat this and you will observe that give a negative nodes there is a very short distance between them; this is called the Watts Strogatz generative model.

You can probably try writing a code for this and then check whether it really works. The way it is shown here, you will be surprised to see that it indeed works and that is the motivation for why the world is big yet too small.