INTRODUCTION TO NETWORKX 01

Hello everyone, in this video we will see the network analysis part using the python library known as networkx so our next joy is six degree of separation it is basically analysing the social network. Before we dive into the world of network i would like you to see this cool library of python known as networkx which is used to analyse visualise networks and even generate them so will see a very basic example of a network, how to create them? How to see them and how to visualise them? In this video i will use network to create simple graphs and then visualise them so let us see this. So let me show you a graph so suppose you can see in my screen that there is a graph of three nodes, nodes these circles are known as nodes and these lines are the edges between them all you can say interactions between them. So for example if you see these nodes as people an edges is friendship among them then see it is a social network kind of thing so for example person one is a friend with person two, person two is a friend with person three, person three is a friend with a person one so this is a you can visualise it as a social interaction graph where people are node and interactions are edges between them so you can see in this graph for example there are three nodes and three edges. If some of you know little bit of graph thing then you must know that this is a complete graph between three nodes if you create a complete graph of three nodes you will have three nodes and three edges. What is a complete graph? Complete graph is nothing where when you have an n nodes if any two pair if you pick there should be an edge between them so i will start my networkx program by creating this graph this three node graph so let's see this so i will import my library networkx library using the command import networkx as nx will be my alias here ok i have imported my networkx now i want to create a graph. To creating a graph the command is let's say my graph name will be g and nx dot graph that's it you can see here dropdown list its already showing the graph ok so this will create a graph now what i have to do my graph is empty, it is created but it doesn't have anything it doesn't have any node it doesn't have any edges so what i will do, i will add some node to add an node in a graph there is an command which is known as g, g is my graph g dot add you can see it will come add node my dropdown list so g dot add node is my command now i will add my node number that's it i will just add the name of my node here it is one so i will add one so it means that after this command one as a node has been added to my graph, graph is g so let me see my graph one has been added now i will add two same thing g dot add node in second node two so node two has been added node one and node two has been added now i will add node three so g dot add node and three awesome so all the nodes have been added what else now my graph contains three nodes one two and three but there are no interactions i mean there are no edges between them i have to define i have to tell the networkx to add the edges between the nodes which i want so i want edge between one and two, two and three and one and three. How to do it? Let's see this. So the command is very simple, like adding node i can add edges so g dot you can predict what i am going to write add edge ok and what is my edge? It should be between you can see its written their arguments ad edge u of edge v of edge it means that from where it is starting, from where it is ending. See it is a undirected edge undirected it means that there is no direction from u to v, you can consider v as u, u as v it doesn't matter so i will add from one to two one comma two ok one node has been one edge has been added sorry second is two to three i will add g dot add edge two comma three

ok and my last edge is one comma three so i will add g dot add edge one comma three ok so according to me my graph has been created i don't have anything to see here so what i will do i will just print my graph so how to print? I will just add print not graph my edges sorry nodes g dot nodes that's it lets see what happens i will just run it you can see my nodes are one to three it has been shown here ok you can see the nodes are one comma two comma three ok great but still i ma not able to see my let me try to print the edges ok let's see what it does ok my edges also being printed this is edges from one to two, one to three, two to three see this is a very small graph so i can i can using this data i can see whether what kind of graph i have bit suppose the graph contains hundreds of nodes then some two hundred edges then what will you do, you cannot just by watching the data you can see what kind of graph it is and you can visualise it so what can you do networkx provides a visualisation of graph using the mat plot lib library so that is too also very simple i will just import the mat dot lib library so import mat plot lib dot pyplot as my alias plt ok i imported mat plot lib library now this graph which i have created the g i will draw it as nx dot it will show and plt dot show thats it let me just clear my clear my ipython console here ok i will just run my program to see what it does. Ok it is saying that draw is missing the required positional argument g, i didn't draw what i am i didn't say what i am going to draw g is my i need to draw g so i will put g here ok i don't like this fifty ipython console so i will clear it ok i will run it again awesome you can see my graph this is exactly what i wanted to make ok this is my graph of three nodes and the interactions are ok great ok now suppose i told you that this is a graph of three nodes and this is a complete graph of three nodes what if i want to create the graph a complete graph of ten nodes maybe twenty nodes i will have to add this nodes and edges again when there is a way which you know the first thing that will come in your mind is creating a lop through loop you can add off course you can do it. There is an another way also one way is to create a list of nodes, let me show you how, rather than adding this nodes like this whatever i can do i will create a list let's say l and i put the nodes here that's one comma two comma three ok i don't need all these thing i will just delete and what i will do rather than adding just command g dot add node there is one more command which is g dot add nodes underscore from you can see from is written and you can give the nodes for adding it can be any kind of container which can be a list so i will add l here ok to i added same nodes one two three so that i can check whether it is showing me the same kind of thing or not i will just run this program awesome i am getting the same output so you can do something like that. Now there is one more beautiful thing with the networkx it comes with all kinds of graphs pre defined graphs, suppose i want to create a complete graph of let's say what i said before that i want to create a complete graph of twenty nodes i don't need all these things we just delete all this things and i will just add nx dot complete you can see complete graph is there, complete graph of how many nodes i want, so let add ten nodes ok and save it as g let us just delete this awesome so g will be my graph and i create nx dot complete graph of ten nodes one two three four five six seven eight nine ten there are ten nodes and it is a complete graph you can see you can change the number of nodes let's say i want twenty nodes so i will just run this again save it and run it you see complete graph of twenty nodes great so there is a lot of things which you can do with networkx this is just i wanted to show how can visualise simple simple graph so suppose i want to create a there are so many layouts for networkx you can see you can just type networkx generators, generators are the graph generators there are so many ways

through which you can create awesome graphs so suppose i want to create a random graph, what is a random graph exactly? So suppose there are hundred nodes in a graph what i will do, i will pick two nodes and then i will put an edge between these two nodes with some probability so what i will do i will take every two nodes and i will add an edge with probability let's say zero point five and i will do with this i will do this step with all pair of nodes so with this algorithm i will create a graph, this graph is known as random graph. So what is the speciality of this random graph? Is that in such kind of graph if you pick any node you will see that the degree of that node will be the average degree will be near to the average degree of the graph so you can learn about this graph this is known as adosh graph or random graph you can just search on goggle and read about this so i can create this graph through networkx the command is gnp underscore random underscore graph so i can just type here so i will just type here gnp underscore random underscore graph and it will be random these are the number of nodes as you can see here gnp random graph n is the number of node, p is the probability but which i am putting an edge between an two vertices or nodes so i can put here let say twenty graph and let's say i was telling you there zero point five is the probability ok so let's see what happens. I will run it again you can see this is random graph so you can see all the nodes have almost equal kind of degrees or you can say it is if you pick any node here the degree is almost equal to the average degree of the whole graph so i can change the probability here i can increase it i can decrease it so i can make it zero point two and twenty nodes you can see the graph here there is one isolated node which is not this graph is not connected means you cannot reach to any node by traversing the edges with networkx you can do lot of thing just go to this networkx page and you can see a lot of things here i just wanted to make sure that you understand the visualisation part and little very little very basic network which we are going to use in our social network analysis or you can say network analysis part which is our next joy so in next video we will see some more of this we are going to use a very good visualisation tool which is known as gaphi and will see how we can visualise a graph using that tool and how you can generate beautiful graphs. Thank you.