INTRODUCTION TO NETWORKX 02

Hello guys, in last video we saw small example of networkx how we can create smaller graphs and how we can visualise them using our mat plot lib library. So in this video we will see some more of networkx and then will see how to generate graphs in a new format as a file which is known as gexf format and then we will use a new tool know as gephi two to see and visualise the graph. There are so many things which you can do with the gephi tool so let's see this. So again i will, let me clear my ipython console ok let me clear let me make a basic graph random graph using gexf format sorry networkx so i will write my command to create a random graph nx dot gnp random graph its coming here and i will just put my numbers of nodes and the probability with which i am putting edge between two nodes so let me put let me put some more number of nodes so i can see something, let me put number of nodes as fifty and probability be zero point three ok great. Let me just see this graph once so mat dot lib i have imported ok so i will put nx dot draw my sorry i will i will save this graph as G i will save it ok g is equal to values and i will draw this graph. After that i will show this graph great let me see this let me run this ok you can see its very dense because number of nodes are more and the probability is ok point thirty percent with thirty percent probability and adding at just it not a complete graph it looks like a complete graph but it is a random graph ok let me do some, some more things with this graph so let me come to my let me go to my ipython console ok let me make it side by side so that it is visible ok what i am going to do? I am going to just print the number of nodes here sorry not the number of nodes the nodes so this is g dot nodes ok these are my nodes zero one two three four five six seven eight nine two eleven twelve up to forty nine its starts with zero ok let me if you it's coming as a container so let me print it print g dot nodes ok now it is a list so these are the this is the list of all nodes which are present tin this graph same way i will print the edges so print g dot edges ok it is printed the edge list it means which node is connected to which node for example you can see here zero is connected to three, zero is connected to five, zero is connected to eight, zero is connected to ten, zero is connected to so on and something like that so now i can do a lot of things here you can see the edge list here suppose i want to know the degree of each node so i can just print it here. Else print g dot degree of let's say zero show me thirteen zero has thirteen degree. So something like that i can do with this graph i can analyse a lot of things ok you can see you can go to the documentation i can see a lot of things here there are lot of functions lot of algorithms lot of graph type just explore it. What i am going to do, i will generate one more different type of graph here which is known as scale free graphs which was given by barabasi i am going to generate it. You do not have to know what exactly it is i am just i just wanted a new type of graph which is different from a random graph that's why i am generating it so that i can show you that difference. So i will just generate this let it be here so i will generate this scale free graph so it is nx dot the command is barabasi Albert graph barabasi underscore Albert graph ok it takes two arguments one is n number of nodes and second is m, m means each node is each node coming with two edges so how it works? In starting there are very few nodes for example there are two nodes and then at each iteration a new node comes and whenever the new node comes it comes with two edges and these two edges get connected to those node which has higher degree so the probability of getting connected to already existing node is higher for that node whose degree

is very high. So this why this process this process happens and at the end the node which is having higher degree at the end will have more degree so and there will be having few nodes of having high degree and very high number of nodes having very low degree so this is known as scale free graph. So i will so i have put this random sorry again i will put this fifty here and m has two and each node is coming with two new edges ok and i will see what else is different from this mode ok i will just run this you can see its exact it's so deferent from this gnp i mean the random graph. Now why is it? You can see there are few nodes one two these nodes which are closer to the centre having high degree and these nodes which are at the periphery are having less some has low as one this is the connected graph you can see all nodes are connected but very few nodes are having high degree and very large nodes are having low degree so this is known as professional attachment new nodes when they come they prefer to attach to old nodes which are having higher degree. So it is known as the in real world examples most of the many nodes are not exactly random most of the networks are not exactly random they are actually skill free the people have claimed like that. So what are our aim is now, this graph what we have generated will see this graph in a new format will write this graph in a file and the format of that file will be gexf so to do that what i will do, ok so i want have to write this graph i created the graph so after that i will just write a statement to, to write a graph in gexf the command is nx dot write underscore gexf you can see it is a gexf is my format the first argument will be my graph which is g and the second will be the path or the file name if you are not giving the path the file will be saved in your current directory. I will just put the name as analysis one dot gexf that's it ok great i will run this again the network has been created and you can see the if i go to my directory you can see this file has been created. If i just open it let me just open it with my sublime text, you can see that this format is there to represent this graph some this is some xml format. If you if you try to see this you can see that they are nodes, nodes with some id and with some label and there are edges with some id and source from where to where it is. Ok and so this is how we this is some xml format so my graph has been created in gexf format why i am doing it? This is gexf format i am going to import in a new tool known as gephi, gephi is an application through which you can visualise graph easily and you can do a lot of different kind of analysis in a in one click so i have already downloaded gephi in my computer it's very easy just goggle gephi the first link gephi download the first link you get go there and just download it nothing else is required. Maybe java one point eight is one point seven or one point eight is required that you can download easily nothing else is there, just download it, i have downloaded it, if you require if you facing any problem with gephi just let us know or put it on discussion form will show you. So i am going to skip that download part of gephi i will just open gephi in my in my system and i will see this graph i will analyse this graph or visualise this graph so this is my gephi then your version point o point nine so i will just go to file and open my graph which i just created on through my networkx which is which is barabasi Albert graph. So this is my graph ok analysis one i will just open it showing how many number of nodes are there ninety number of edges are ninety six is asking me what kind of graph it is, it is a undirected graph i will just put ok we can see the graph is there i will just zoom it using my scrollar ok i am on windows on Mac its things are different and even though also little bit things are different so you can see this is my graph ok now let me show you a very unique thing here, you can put any node and you can change the directions

of the nodes very easily here and you can see how many to which node it is exactly getting attached to, this t is the level if i put this it will show me the node level so this is my node number one there are some plug-ins which i will show you what exactly it is but just let just don't worry about what i ma doing ok that's it i will just unlabeled it so i can see the nodes. Now what i want i told you that in this graph in this particular graph which is scale free there are few nodes which has higher degree and there are lot of nodes which are having lower degree so what i am going to do here is you can see this button follow cursor this is my button this showing the node colour and this is size so what i am going to do i will change the colour according to the degree how will i do it? I will go partition not ranking i will do the ranking choose the attribute as degree and i will change the colour here as let's say which colour is easily distinguishable let say this ok and i will apply you can see these are the dark nodes let me just zoom it the dark nodes are those which are having higher degree, you can see there are so many nodes which are light, now still it is not very much visible or comfortable so what i am going to do i will change the size of the nodes based on again degree, min size i will put let say ten here and max size i will put as twenty alright see what happens. See let me make it twenty and make it forty its clearly visible now see, you can see exactly very few nodes which are very big and a lot of nodes are smaller smaller smaller ok such kind of easy visualisation if you want to just analyse your network through eyes and see what exactly is going on and you can do such kind of thing on there are so many things which you can do. One more thing i will show here you can see follow my cursor and you can see there are so many layouts what is this? I will just put this and i will just run it you can see the nodes are re assigned in a circular way this way you can see a lot of things and you can analyse graph very easily i will just increase the size of nodes sorry edges it is visible, now see the right pane on the right side there are so many things which you can do for example i want to see the average degree i will run it, it will show me the degree distribution. If you see the degree distribution here see the points here you see that there are few nodes which are having high degree they is one node exactly two or one node sorry having eighteen degree there are so many nodes of degree two there are twenty four nodes of degree two so this is what scale free network it follows something like this or it is known as power law this is known as power law. You can read more about this what else you can do there you can run this network diameter and in one click and for undirected you in one click you will see the diameter here so the diameter is four. There are so many things which you can do you can run the page rank modularity so i am not doing it because we don't understand it properly i mean its very basic i wanted to show a very basic thing, how to create a graph in networkx and visualise it using your gexf format you can even using this data laboratory you can import or export this graph in a spread sheet or see comma separated value we have talked about this comma separated values in gps fun activity. You can import it comma separated value file and then visualise it you can then preview your network through this you can see a very beautiful network as been created here. Where the edges are curved you can save it save your network as pdf and you can do lot of things here so this i just wanted to give you a quick introduction to this very beautiful tool known as gephi g e p h i and you can just download it you can see in next in next joy which is network analysis actually six degree of separation you will see what exactly it is. Will see you can you see the importance of network in our life and i just wanted to motivate you with this visualisation tool how sometime it is very important to see

things and before just getting to the coding and writing functions to analyse it just sometime you need to watch things closely and then see what exactly is going on, so you can see this is extremely good and do a lot of things with this tool so please if you have any problems if you are facing any problem with this with that gephi download please post it on form we can put a quick video to download gephi, how to download gephi, how to install gephi. So thank you.