PAGE RANK: HOW DOES GOOGLE WORK? 13

Alright guys so in the previous videos we had seen what is a directed graph how can we work using networkx and what is point distribution method we had simulated that in an excel sheet with an small network with a small graph with just three nodes we juts simulated now we are proceeding towards checking what happens in a complex network having lots of nodes ad edges so the first step we had created directed graph we have added a few nodes and edges were added randomly simulating a coin task now we had visualise the graph as well this is what we done till now now will get started with the points distribution procedure so let me get started the first step is you have to assign initial point right initial points that is a first step that you have to do let so do it so let me say assign points let me call and once i assign the points i need to have a list of points right so this node zero has got these many points node one got these many points and so on i need a list of points so let me say let me call that as points so i will assign points so to assign points i need to assign it to for each node eight so i need the graph. From the graph i will keep each node and i will assign points to the nodes so i need this and you could see the warning undefined name so we need to define this is so let us define it here define assign points and we use the graph G and so we have assign the points so first as i have said for each node we need to assign it so let me first get the list of nodes nothing but list of G dot nodes so let me get the list of nodes and now i have to assign it assign the points so i need a array points let me say P i need a list so for each in nodes so for each node i have to append how many points? We have started with hundred initially right so let us do that same. Append hundred and once all the nodes has been assign the points you return this array P so we had assign the points so what have we done? We take the graph G and assign points to each nodes and we get back the points so we take the graph G we take the list of all nodes for each nodes we are assigning hundred points initially that's what i am doing i am assigning hundred points hundred points i am assigning initially this is not the hardern part through that you have to assign hundred only you can experiment with different initial value this is the seed value you can say, you can experiment with different seed values as well we i have said you can model it as probability you can say one by number of nodes you initialise it you can see what happens you can try different things so let in this demonstration let us take hundred as the seed value. We have hundred nodes we can have different seed values with different seed values the final convergence values would be different but one thing would be the same for example we had taken in our demonstration we had done with our excel sheet we had taken hundred hundred hundred each for each node so three hundred at the end it convergence state it was one twenty sixty one twenty that i remember it may be something like this instead of having hundred initially i had taken ten the values may be different if i had taken twenty five the values may be different but one thing that is same is if you take the fraction one twenty divided by the total three hundred and sixty divided by three hundred, one twenty divided by three hundred that is point four point two point eight this is same something like that even if you take twenty five twenty five twenty five at the end if you take it the individual point divided by seventy five the total you will get the same thing point four, point two, point four that distribution is maintain so that is why i had given a hint you can modulate as a probability problem c the final sum is one if you model it if you getting the distribution is constant so you can modulate as a probability

problem and you can mathematically you can go rigorously and prove that definitely there will be convergence irrespective of whatever be the structure of the graph whatever be the initial stage you start with. It's not necessary that you have to start with equal, equally hundred each that's even not necessary you can even start with ten points for one node five hundred points for another node three hundred pints for some other node you can start with the any configuration. At the end you will reach the stable state, stable state there was one twenty sixty given that we started with hundred hundred hundred or in terms of scale down to one version that is point four point two point four that was the stability state. Something like that every graph has got a stability state that is the mathematical result so ok let us come back we have assigned the points and now the next step is we should keep distributing keep distributing the points so if you keep distributing the points you would get some final points let me call it as final points the converged points you can call it as the converged points you will be getting you will get the final points by keep on distributing distributing the points along the nodes of graph G so ok again i got a warning undefined name so i need to define it so let me define let me copy and define it here let me define it define this and let me say so i have to distribute the points among the nodes for that again i need the list of nodes let me say nodes is nothing but the list of G dot nodes i need to get the list of nodes i have got it now i have to kick so we have started with the definition of keep distributing functionality so i have to start keep on distributing as i said keep distributing so it is an infinite loop so let me start an infinite loop so if it is an infinite loop when will we stop it's our wish right so excel even when we stimulate if i wanted i can drag it till one lack iterations you can drag it as you wish so i am going to give the control to the user when he decides to stop that will be the time he will stop. So i am going to give the control so till then it will be an infinite loop so what should i do? I will get i have to distribute the points to the nodes of the graphs from this intial points configuration initially we have equal points that's the configuration we are starting with and we have to take that configuration and distribute as per our rule ok so if you distribute the points you will get a new set of points in the next iteration. So let me call that as new points it will be my new points so once i get my new points i need to print my new points what are my new points? I have printed so once this new points have been obtained you have to take this as your initial configuration and repeat the procedure the next procedure. How would i do that? I have to say my points will be nothing but my new points so basically what you will do? You get some initial configuration you distribute it as per your procedure after distribution you get some new configuration the new points oh! Take that as your base configuration i am repeating in iteration two iteration one values as your base values in iteration three you will take iterations two values as your base value right? so that's what we are going to do so that's why we are doing this assignment now you have to decide whether to stop or not so let me say stop i will say is nothing but i am going to get an input from the user let me say i will take some key from the key board press hash to stop or any other key to continue, you can have any key i have just taken hash randomly you can have percentage symbols but you can have anything you can have anything that's not hard and fast thing you can have anything. So i say you have to press hash as long as user presses hash they have to continue if you want to continue you have to press some other key. If you want to stop you press hash that is the rule i am defining for the user so i will get the input now given that user has given the input i need to process it if these stop value is equal to hash then what

should i do? I should break; i should come out of the loop alright so once i have broken so user wanted to stop. Whatever is the value of new points that will be my final points so i need to return it so i will return new points right once i come out of the loop whatever is the values of new points i will return it back so i keep distributing it so what have we done here? We have assign equal points initially now plus another it has to be equal we had done equal you can try a different variable as well as i have said. You assign randomly some values then you see you can use a random generator again for example from one to five hundred you pick a random value and assign that as point to the node and you can try different things. We have started with the equal configuration. And after that after you have assign you keep distributing the points so in keep distributing what are we doing we have to we have to distribute the points and as a result of this distribution you will get a new configuration you will print that configuration and take that configuration as your base and repeat that you repeat that as long as the user doesn't want to stop as long as the user wants keep repeating it, if he wants to stop he will stop in that place you return whatever is the new points whatever is the last configuration you have got so you return that ok. So here we have undefined name distribution points, yes we have to define it we see distribution point what is the procedure to distribute? Will have to define it, we will do it in the next part.