PAGE RANK: HOW DOES GOOGLE WORK? 08

Hello guys welcome to this programming screen cast on page rank using points distribution method so before getting into the points distribution method actually we will revise it some concepts from the previous weeks as well as we will see some pre requisites that would help you understand the points distribution method better. So will get started first will go with the revision so we had seen a data structure called graphs when we had seen the concept of six degree of separation using the facebook data set we had analysed that between two people what is the distance you can reach we had analysed there we had taken a data structure called graph through which the facebook the friendship network is modelled so we had seen about it. So while explaining about graphs i had taken railway networks as an example so here is a network that we had taken so the graph is nothing but the set of points and lines points are technically called as nodes and lines are technically called as edges. So in this railway network we had the cities of the railway stations the stations as nodes and there is an edge there is a line between the two nodes if there is a direct train from this city to that city. That's how we had taken we had modelled and we had created the network created the graph so this is graph so nodes and edges are the terminologies i would like you guys to recall and another thing we had seen is neighbours, neighbours are nothing but what are all the nodes a particular node is connected to using an edge that's what we call as a neighbour. For example if you take this node Kolkata the neighbours are guwahati, bengaluru and Chennai the node Chennai has two neighbours bengaluru and Kolkata so this is what you call as neighbours and whatever you have this network is an undirected graph that is there is no direction the edges are by directional we assume that is if there is a train from Chennai to bengaluru there is a another train from bengaluru to Chennai as that is an assumption we have that's how our Indian railway network in major cities is that's an assumption we had made but its not the case always that this kind of representation is enough to represent any data sometimes you may need to consider the directions as well. So we will see an example of such networks in this lecture as a new concept so such graphs are what we call as the directed graphs so here is a directed graph where directions of edges that is from which node to which node is the connection present this direction information also important in directed graph an example form real world that we can take is as i have given in this slide its email communication network. So here the nodes are different email id's the different people of their email id's and there is an edge from one node to another node if this email id has sent a mail to another one that is see in this network there are let us take a very small group there are three email id's we have taken A B and C and generally we keep them anonymously that's why we take toy example A B and C lets say there are some three nodes so the from this mail there is a mail that is sent to this mail id A to B there is an edge so person A has sent a mail to person B but it's not necessary that person B should reply so that's why we don't have the back edge an edge from B to A whereas the mail he has sent to C, C has replied so if you have sent mail form this person to that person you have a directed edge direction denotes who has received the mail so from A B has received so there is an arrow towards B this is how email network communication network can be constructed. So the point to note here is you have directed edges the direction of edges is very important in this directed graphs and some other example that we can considered is maybe from the academics, the academy year i can say fightation

network we have something called fightation network where the nodes are the research paper and if one paper is sighting or it is refereeing to another research paper there will be a directed edge and as you could understand its not necessary that edge has to be bi directional say for example you may sight a paper that has been written in say two thousand five it is not necessary that, that paper authors should sight you back in some other papers or in that same paper so directed edge right so you understand the concept of directed edges this is from academy year and another example of social network just like facebook something involving people that could be something like you could have people as nodes and if this person likes another person, if a person A likes person B there is a directed edge from A to B so this person has expressed a liking for this person this could be used in for example matrimonial sites you can used it you can make analysis of matrimonial sites and you can suggests better recommendation and there are lot of applications which can be easily solved if you model the data as a graph especially as a directed graph this is one thing an example of social networks may be another example you want to give i may give from the marketing domain the marketing domain we have something called as supply chain network so basically the different companies are the nodes here and if this company supplies some materials to this company there is a directed edge so basically let us see this company B in that case company B is acquiring some raw materials from company A and it is making some products and it is selling those products it is supplying those products to company C something like this. So for example if B lets say battery if this company is manufacturing batteries the raw materials needed the electrolytes the lithium rods all those such raw materials it will acquire from different companies so they will be the incoming edges so it is acquiring the raw materials from different companies and once it has manufacture the batteries, the batteries may be of different requirement one you used it for your television remote the one for your clock the one for your car everything the batteries are different so this may manufacture batteries using this raw materials and the manufacture products are sold to different other companies so the car batteries should be sold to the major car companies and the clock batteries to the clock manufacturers and so on so this is how you can form a network using the different companies and the transaction they have such a network is called the supply chain network this would be a directed graph and i don't think there will be a bi directional edge in supply chain network although i am not marketing expert this is just a little knowledge that i have but may be if you feel that there are some examples where there can be bi directional edge in a supply chain network also please do let us know in the discussion form. Like this yeah the motto here is to make you understand that there would be directed edged and what is the what directed edges signify in different networks we had taken one example of email communication network it can be watsapp communication someone has messaged you on watsapp there is a directed edge from that person to you, if you reply back you will get a back edge, if you don't reply you won't get back edge so that can be watsapp communication network, mail communication network anything a communication network in general or in academy you have sightation network and in marketing domain we have the supply chain network in case of social network you can consider it sort of matrimonial networks like which person has contacted which person based on that whether the person has replied back to his profile something like that. You can construct it as a network and you can perform analytics. Once you have modelled your data in the form of a graph data structure analytics is very easy

further so that's why there are many applications where this graph data structure the directed graph especially comes very useful so will get into some terminologies of directed graphs as well so the edges we have right so we will have other names as well nodes as i had said as points and edges are lines is the layman terms other technical names can also be present that is nodes can also be called as vertices and edges can also be called as links i am just telling because in lectures we may use those terms interchangeably or may be if you look up to some material online some research papers or some text books you look up any where these two terms may be changed interchangeably nodes are vertices and edges are links they may be used interchangeably and let us see some terminologies so links are the edges in case of undirected graph they are bi directional so we just say they are the edges but here its directed graph so the direction matters so we will say incoming links and outgoing links incoming edged and outgoing links outgoing edges so for node in this graph if you considered for node A the incoming edges from C to A that's why we have a tupple C comma A and the outgoing edge is from A, A to B and from A to C like this you can say the outgoing links and incoming links so the representation is source comma target, source is the starting point and target is the destination or the end point of that edge, an edge is resent between two nodes the starting points are called the source that will be given as the first item here and the end point of the edge is the target that is given as the second item of the tupple so like this edges will be denoted by tupples. This is the representation regarding directed graphs alright so i have started off with directed graphs i would like that you guys think of any other applications where this directed graphs can come handy that would be the thing i would expect you guys as a result of watching this video, you must thinking that direction and you will see further pre requisites in the upcoming parts.