Social Networks
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Link Analysis (Continued)
Lecture - 103
Principle of Repeated Improvement (An example)

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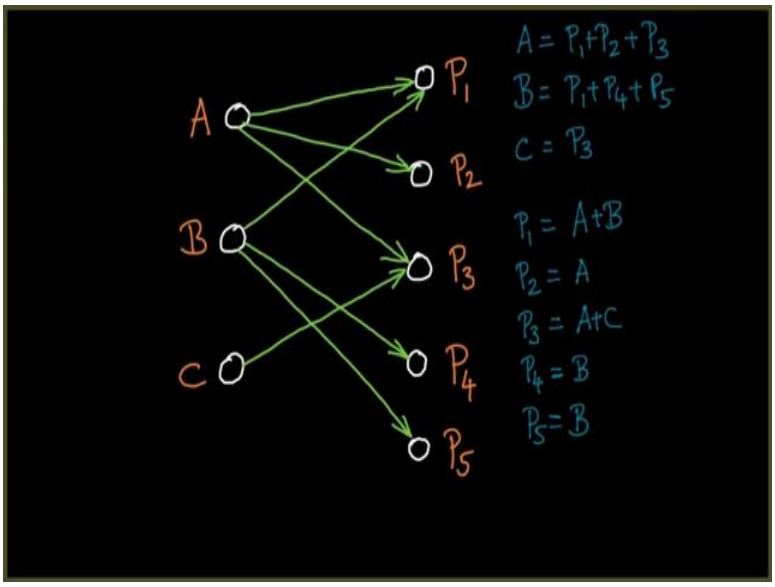

Let me consider 3 people on the lab and five places on the right: place 1, place 2 and so on. And there on the left you have people A B C, recommending, these five places to you. Let us say A recommends P 1, A also recommends P 2 so on A recommends P 3 so on and so forth, right assume this is the given graph.

So, what do you think is A 1 here? A 1 will be P 1 plus P 2 plus P 3 as I was saying, the principle of repeated improvement is what this is called as, I will assign the score P 1 + P 2 + P 3 to A. I will start P 1, P 2, P 3, P 4, P 5, A B and C with 1 1 1 point. So, I go and doing this; B is so much, C is so much; may be you may want to pause, and take a look at how this is be it true? I am writing this now so on, so on, so on and that is it.

So, what I am trying to do right now is I (Refer Time: 01:16) am going to open an excel sheet, spreadsheet rather any spreadsheet; we will do. I am going to open a Google spreadsheet, and I am going to try these values there; and I am going to see, whether it

will converge or not. It will help, if you can make a note of this graph and also this, A B C, P 1, P 2, P 3, P 4, P 5 here.

So that, you know what are the formulas which you can try punching and on the Google search.

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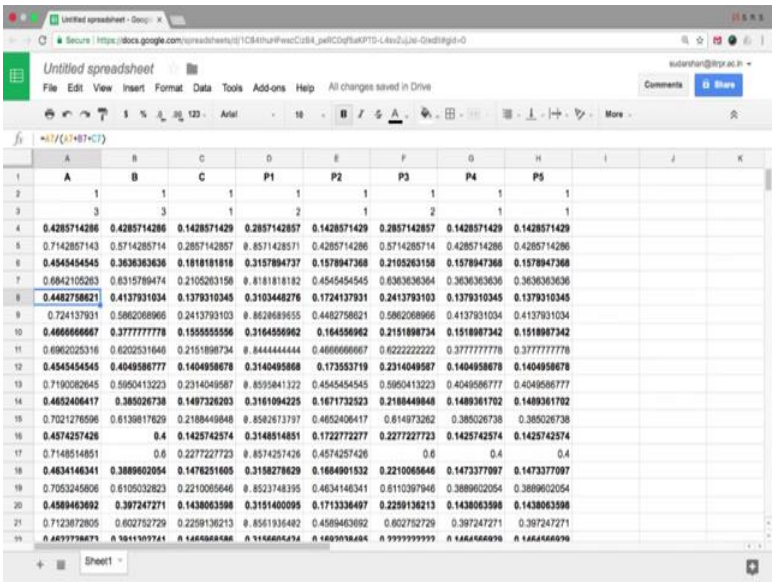

I have now come to the Google spreadsheet; as you can see, you have, A B C D, A B C, P 1, P 2, P 3, P 4, P 5 here, let me try making it bold and the underline it, perfect. And then, I start with the value; A is 1, B is 1, C is 1, P 1, P 2, P 3, P 4, P 5 are all 1s.

And the value of a as you can see, is P 1 + P 2, because D 2, E 2 and F 2, P 1 + P 2 + P 3. You can see, I have punched in all the values of A B and C. Since B is, what is B? B is P 1 I have asked it a write down the graph, I am show you have written it down. If you can cross check, you will see that; B is P 1, P 4 and P 5. So, it will be, 1 + 1 + 1, which is three, so on and so forth; C is simply you are picking. So, I go on like this, I write down everything that is this row.

And then the next row; is I, normalize it; what do I do? I take this 3, 3. 1 which is 3 + 3 is 6 + 1 is 7 and I divide it 3 by 7. The 3 is divided as you can see; the entry of A 3 is divided by the entry of A 3 + B 3 + C 3. For a change, I am using a spreadsheet, they are instances where spreadsheets easier than, programming; all the programming is a, very

powerful thing to do. Sometimes spreadsheet is a quick reference for you to compute and see, what is happening.

So, you see; that I am just trying to normalize it here. Similarly for P 1, P 2, P 3, P 4, P 5; I have normalize this, which is 2 plus 1, 3, 4, 5, 6. I am dividing everything by this sum; I will draw formula here. So, what I do is, when I keep repeating this, repeating what? These assignments, I do this, what is called, principle of repeated improvement. I add the corresponding entities, and then keep normalizing it.

Then I do it in the second iteration I get, so much. So, what is this? This will obviously be, the sum of; as you can see, D E F. Which is this one, this one and this one; this P 1 plus P 2 plus P 3. Just above it D 4, E 4, F 4 is simply this, this and this; values added together is this so on and so forth is automatic gets added. That is the power of the spreadsheet, when you pull it the automatic values are being flooded.

And then, as and always; as I told you, what I did here, similarly the same thing is repeating here I am normalizing it. Now you see the value are changing here 0.42 became 0.45. Let me do this one more iteration; so, this is what is important for us right; this value. So, let me make this, bold; bold. This is what we get after normalizing it, go back.

So, you see it sort of getting closer and closer may not be here this is going here, via this is going somewhere else; 0.14, 0.18, 0.13. So, I do not think, it is very, very in anyway close to converge it; maybe I may have to do this again let me try continuing this, maybe up to 20 right.

So, what do I see? I see that 0.45, 0.46 0.45 still not converging right. So, I will do is, I will try pulling this till 100. When I keep doing this as I keep doing this, maybe even 200 I will go until, mean around 200 iterations, and I stop it here it is flooding, yeah, its flooded.

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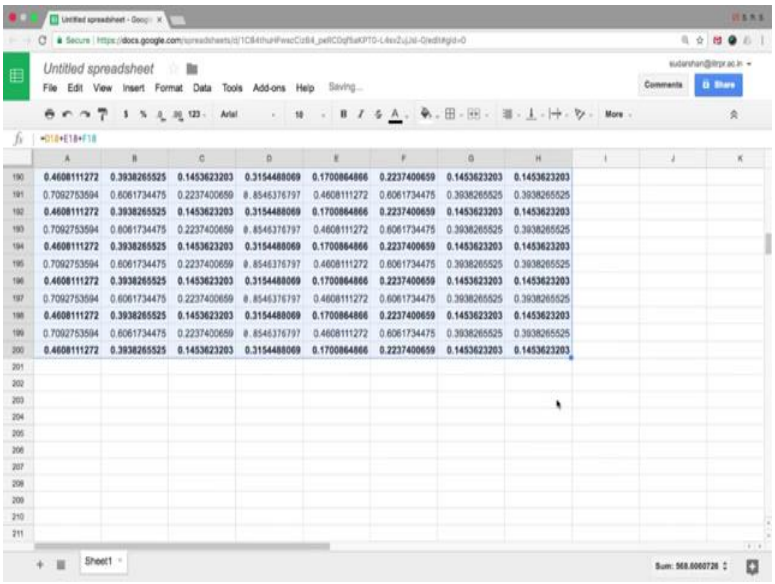

Now, you see something start line, it is converging. So, the values 0.4608111272 that the node A had remains the same, right. Look at this, this and this is the same. So, this is the same. It is exactly the same, this is called the principle of iterated improvement, where in you observe that, when you keep I am come to the first line, when you assign all the nodes to have 0.1, and I and you keep doing this point assignment thinking, you will see that the values converge. We will use this in a, fourth coming lectures to explain what exactly one can infer from this.