

Link Analysis (Continued)
Lecture - 106
PageRank Revisited – Convergence in the Example

Untitled spreadsheet - Google x

Secure https://docs.google.com/spreadsheets/d/1Z06ivryYkAImv-S9GtHB3ON10G4JySdWu7Uqpa4_Mxdt8gId-o

Unedited spreadsheet

File Edit View Insert Format Data Tools Add-ons Help All changes saved in Drive


Comments Share

123 Arial 10 B I A

fx =B5*45

	A	B	C	D	E	F	G	H	I	J	K
1											
2											
3	0.3333333333	0.3333333333	0.3333333333								
4	0.1666666667	0.3333333333	0.5								
5	0.1666666667	0.5	0.3333333333								
6	0.25	0.3333333333	0.4166666667								
7	0.1666666667	0.4166666667	0.4166666667								
8	0.2083333333	0.4166666667	0.375								
9	0.2083333333	0.375	0.4166666667								
10	0.1875	0.4166666667	0.3958333333								
11	0.2083333333	0.3958333333	0.3958333333								
12	0.1979166667	0.3958333333	0.40625								
13	0.1979166667	0.40625	0.3958333333								
14											
15											
16											
17											
18											
19											
20											
21											
22											

Sheet1



So, I will say is equal to A as value which is A 3 that is how that is how you use a spreadsheet. So, I am sort of bored using python interpreter for such easy and trivial things so, I am using spreadsheet. That is one reason one reason is because I find it very easy that is why I am using a spreadsheet, the second reason is that when you want to observe convergence it is very easy to use a excel sheet and then see the convergence, especially when it comes to topic such as this.

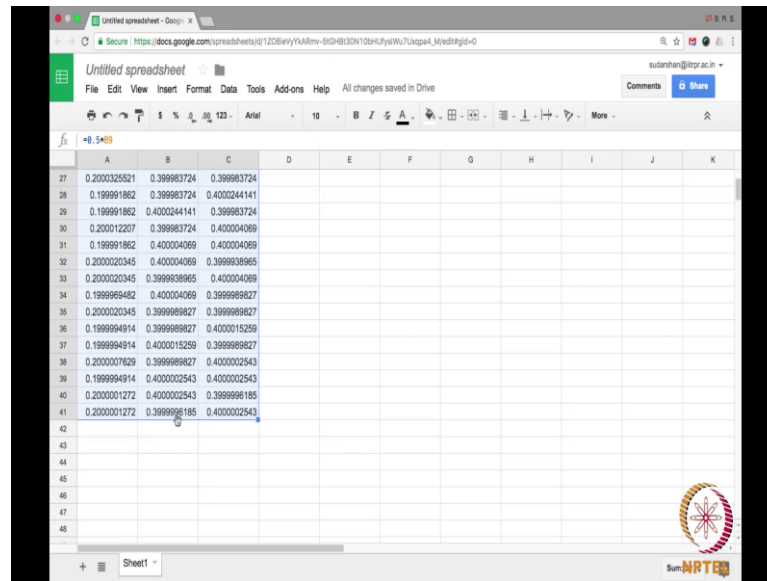
So, getting back C's value will be same as A 3 correct C was the bottom right node and the value of B if you remember was simply the value of C right, but then the value of A was half has let me just write this down was equal to what is that this I am sorry B's value was simply the value of C fine. And the value of A was half of the value of B, I write B3; B3 stands for this the column B and then row3. So, 0.5 times B 3 was the value of A, but then the value of C also had 0.5 times the value of B 3 correct.

Please not what I am doing here the formulas are visible here 0.5 times B3, the value of A is half of B3. And then the value of B is exactly the value of C 3 in the previous iteration whatever that was. And the value of C turns out to be the value of A3, if you remember from A it takes everything and half of what B 3 had B had which is this much right.

So, this is perfect so what I do is the facility that a spreadsheet gives is, when I just select this and come down and paste it. It will do the same thing that you did here for the next step. For example, A was equal to 0.5 as you can see A was equal to 0.5 times B3 right this should be 0.5 times B 4 you will observe it will automatically, see look at this it became B 4.

When you copy paste it excel gives you that liberty to automatically repeat the pattern of formula. So, B 5 happens to be C 4 and C 5 as you can see happens to be whatever was in A 4 plus half of whatever was in B 4. The best part now is if you just select these things and then pull this down it will populate the rest of the values. Now, you see the values are changing tremendously of a let us see when you look at A it is so on, so on, so on and you see the sort of values are same here, values are same here, it looks like it is converging right. So, let us look at it, let us continue this formula for more and then see whether it converges.

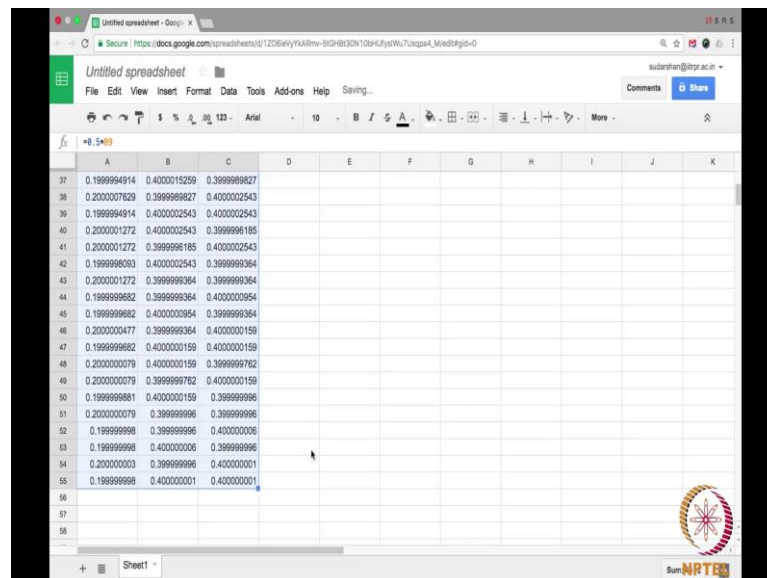
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	A	B	C	D	E	F	G	H	I	J	K
27	0.200032521	0.399983724	0.399983724								
28	0.199991862	0.399983724	0.4000244141								
29	0.199991862	0.4000244141	0.399983724								
30	0.200012207	0.399983724	0.400004069								
31	0.199991862	0.400004069	0.400004069								
32	0.2000020345	0.400004069	0.399983895								
33	0.2000020345	0.399983895	0.400004069								
34	0.199996482	0.400004069	0.399989827								
35	0.2000020345	0.399989827	0.399989827								
36	0.199994914	0.399989827	0.4000015259								
37	0.199994914	0.4000015259	0.399989827								
38	0.2000007629	0.399989827	0.4000002543								
39	0.199994914	0.4000002543	0.4000002543								
40	0.2000001272	0.4000002543	0.399998185								
41	0.2000001272	0.399998185	0.4000002543								

Well, look at this it is almost 0.2, 0.39, 0.4 the values are not changing. Let me continue it even further right, its getting more and more sort of refined and even further let me go even further keep going, keep going, please note excel this just Google spreadsheet approximates the values here right.

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	A	B	C	D	E	F	G	H	I	J	K
37	0.199994914	0.4000015259	0.399989827								
38	0.2000007629	0.399989827	0.4000002543								
39	0.199994914	0.4000002543	0.4000002543								
40	0.2000001272	0.4000002543	0.399998185								
41	0.2000001272	0.399998185	0.4000002543								
42	0.199998083	0.4000002543	0.399999364								
43	0.2000001272	0.399999364	0.399999364								
44	0.199999982	0.399999364	0.4000000954								
45	0.199999982	0.4000000954	0.399999364								
46	0.2000000477	0.399999364	0.4000000159								
47	0.199999982	0.4000000159	0.4000000159								
48	0.2000000079	0.4000000159	0.399999762								
49	0.2000000079	0.399999762	0.4000000159								
50	0.199999981	0.4000000159	0.399999996								
51	0.2000000079	0.399999996	0.399999996								
52	0.199999998	0.399999996	0.400000006								
53	0.199999998	0.400000006	0.399999996								
54	0.200000003	0.399999996	0.400000001								
55	0.199999998	0.400000001	0.400000001								

Eventually, let us see what happens not much of a change. You still have 0.2 0.4 0.4 happening, but then you see what is happening here this is very, very, close to 0.2 very

close to 0.4,, very close to 0.4 A's I keep continuing it you will be surprised to see that it will converge to the exact value.

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	A	B	C	D	E	F	G	H	I	J	K
57	0.200000005	0.3999999985	0.400000001								
58	0.1999999983	0.400000001	0.3999999998								
59	0.200000005	0.3999999998	0.3999999998								
60	0.1999999999	0.3999999998	0.4000000004								
61	0.1999999999	0.4000000004	0.3999999998								
62	0.2000000002	0.3999999998	0.4000000001								
63	0.1999999999	0.4000000001	0.4000000001								
64	0.2	0.4000000001	0.3999999999								
65	0.2	0.3999999999	0.4000000001								
66	0.2	0.4000000001	0.4								
67	0.2	0.4	0.4	CONVERGES!							
68	0.2	0.4	0.4								
69	0.2	0.4	0.4								
70	0.2	0.4	0.4								
71	0.2	0.4	0.4								
72											
73											
74											
75											
76											
77											
78											

Now look at this hip; hip hooray there is 0.2 here, 0.4 here, and 0.4 here. And this is the place where I would say it converges not just here; here itself right converges that is right. So, what just happened? Let us switch back to the screen cast, in my next lecture and then see what exactly we did here and what did we observe. Please note the values A turned out to be 0.2, B turned out to be 0.4 and C turned out to be 0.4.