**MATLAB科学计算HW\_1**

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【1.1】 There are seven sites interconnected with one another as in the following graph.

【1.2】The metrix M should be like as follow:

M=[0 0.33 0.5 0.33 0.5 0.33 0.5; 0.33 0 0 0 0 0.33 0; 0 0 0 0.33 0.5 0 0; 0.33 0.33 0 0 0 0 0; 0 0 0 0 0 0.33 0.5; 0.33 0 0 0.33 0 0 0; 0 0.33 0.5 0 0 0 0]

In a table form, the matrix M should look like:

M =

0.00000 0.33000 0.50000 0.33000 0.50000 0.33000 0.50000

0.33000 0.00000 0.00000 0.00000 0.00000 0.33000 0.00000

0.00000 0.00000 0.00000 0.33000 0.50000 0.00000 0.00000

0.33000 0.33000 0.00000 0.00000 0.00000 0.00000 0.00000

0.00000 0.00000 0.00000 0.00000 0.00000 0.33000 0.50000

0.33000 0.00000 0.00000 0.33000 0.00000 0.00000 0.00000

0.00000 0.33000 0.50000 0.00000 0.00000 0.00000 0.00000

In the beginning, the probability of starting from each and every spot is 1/7. That is:

R0=[1/7, 1/7, 1/7, 1/7, 1/7, 1/7, 1/7]’

【1.3】 When d=1, Rn=M\*Rn-1=M^n\*R0. R1, R2 and Dfrc are variables used in Script ”HW\_1\_1.3\_28157.m”.

Set n=102, Rn=R1=[0.138138, 0.068771, 0.046046, 0.068771, 0.046046, 0.068771, 0.046046]’, Rn-1=R2=[0.139131, 0.069265, 0.046377, 0.069265, 0.046377, 0.069265, 0.046377]’. The difference between R1 and R2, Dfrc, is equal to 9.9306e-004 < 1e-3, which is a negligible difference. Also, the relative importance of each site doesn’t change as calculation goes on.

**Therefore, the page rank vector should be:**

R1=[0.138138, 0.068771, 0.046046, 0.068771, 0.046046, 0.068771, 0.046046]’.

【1.4】 R and R\_n are variables used in Script “HW\_1\_1.4\_28157.m” to denote the page rank vector. R\_n=(1-d)/7+d\*M\*R.

The following results, except for the last one, are attained when max(abs(R\_n-R))<=1e-4

The last result is attained when max(abs(R\_n-R))<=1e-3

d=0.10, R\_n = [0.16331, 0.13853, 0.14015, 0.13853, 0.14015, 0.13853, 0.14015]’

d=0.15, R\_n = [0.17292, 0.13676, 0.13859, 0.13676, 0.13859, 0.13676, 0.13859]’

d=0.20, R\_n = [0.18214, 0.13523, 0.13690, 0.13523, 0.13690, 0.13523, 0.13690]’

d=0.25, R\_n = [0.19095, 0.13395, 0.13508, 0.13395, 0.13508, 0.13395, 0.13508]’

d=0.30, R\_n = [0.19938, 0.13290, 0.13313, 0.13290, 0.13313, 0.13290, 0.13313]’

d=0.35, R\_n = [0.20743, 0.13208, 0.13105, 0.13208, 0.13105, 0.13208, 0.13105]’

d=0.40, R\_n = [0.21508, 0.13146, 0.12884, 0.13146, 0.12884, 0.13146, 0.12884]’

d=0.45, R\_n = [0.22237, 0.13106, 0.12650, 0.13106, 0.12650, 0.13106, 0.12650]’

d=0.50, R\_n = [0.22927, 0.13087, 0.12404, 0.13087, 0.12404, 0.13087, 0.12404]’

d=0.55, R\_n = [0.23580, 0.13086, 0.12146, 0.13086, 0.12146, 0.13086, 0.12146]’

d=0.60, R\_n = [0.24185, 0.13099, 0.11871, 0.13099, 0.11871, 0.13099, 0.11871]’

d=0.65, R\_n = [0.24746, 0.13127, 0.11582, 0.13127, 0.11582, 0.13127, 0.11582]’

d=0.70, R\_n = [0.25249, 0.13161, 0.11273, 0.13161, 0.11273, 0.13161, 0.11273]’

d=0.75, R\_n = [0.25691, 0.13200, 0.10945, 0.13200, 0.10945, 0.13200, 0.10945]’

d=0.80, R\_n = [0.26043, 0.13228, 0.10586, 0.13228, 0.10586, 0.13228, 0.10586]’

d=0.85, R\_n = [0.26255, 0.13220, 0.10180, 0.13220, 0.10180, 0.13220, 0.10180]’

d=0.90, R\_n = [0.261518, 0.130869, 0.096697, 0.130869, 0.096697, 0.130869, 0.096697]’

d=0.95, R\_n = [0.249937, 0.124609, 0.088074, 0.124609, 0.088074, 0.124609, 0.088074]’

d=1.00, R\_n = [0.138138, 0.068771, 0.046046, 0.068771, 0.046046, 0.068771, 0.046046]’

For site A, its page rank (the number) increases as d increases, culminates at d=0.85, and then decreases as d increases. For site B, D and F, their page ranks (the number) go down as d increases when 0.10<=d<=0.55 and 0.80<=d<=1.00, and go up when 0.55<=d<=0.80. For site C,E and G, their page rank (the number) decreases as d increases.

**For 0.10<=d<=0.30, the relative importance of each site is A>C=E=G>B=D=F**

**For 0.35<=d<=1.00, the relative importance of each site is A>B=D=F>C=E=G**

【1.5 & 1.6】 When d=0.9, R­n=0.1/7+0.9\*M\*Rn-1. R\_n and R are variables used in Script “HW\_1\_1.5\_28157.m” and Script “HW\_1\_1.6\_28157.m” to denote the page rank vector, while ii is used in Script ” HW\_1\_1.5\_28157.m” to control the times of a loop.

Repeat the calculation for 27 times. Until then, **max(abs(R\_n-R))<1e-4**. **At that time:**

**Rn=R\_n = [0.261518, 0.130869, 0.096697, 0.130869, 0.096697, 0.130869, 0.096697]’**. This calculation is accomplished using “while loop”.

Set ii=1:27, The same results can be attained with “for loop”.