Assignment 8 Social Network Analysis

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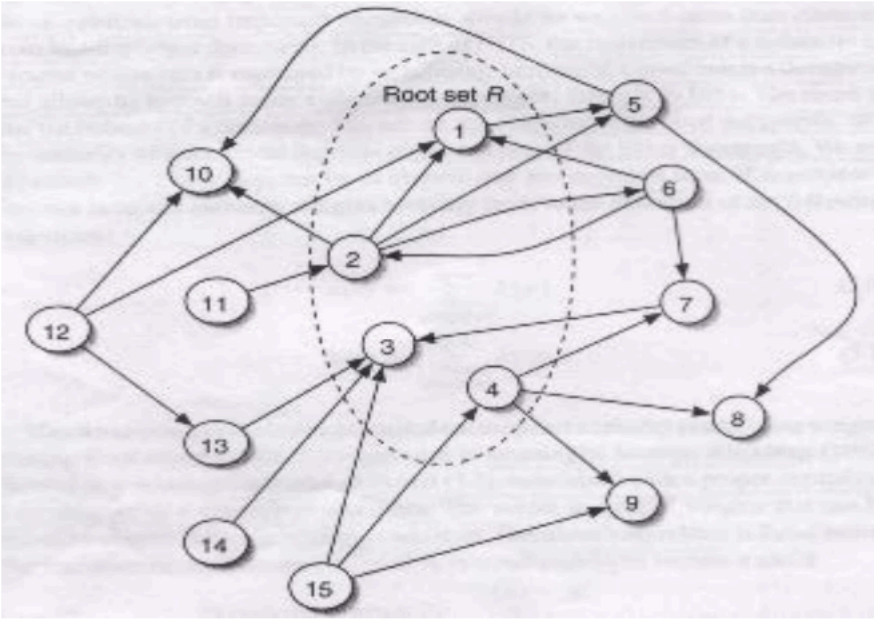
1.Apply the HITS algorithm to the following network (there is no one correct answer)

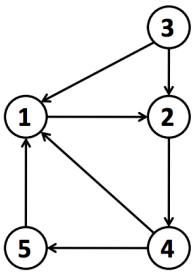


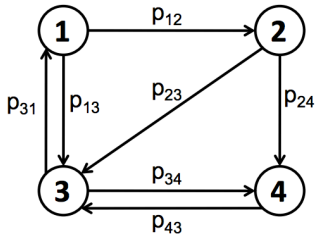
Root Set R ={1,2,3,4} Extend it to form the base set S

(1) Initialize S to R: S=R = {1,2,3,4}
(2) Add to S all pages pointed to by any page in R
Add to S all pages that point to any page in R.
S = {1,2,3,4,5,6,7,8,9,10,11,12,13,14,15}
(3) For each node initialize the ap and hp to 1/n
a1,a2,a3…a15=1/15
h1,h2,h3…h15=1/15
(4) In each iteration calculate the authority weight for each node in S
a1=h2+h6+h12=3/15
a2=h6+h11=2/15
a3=h7+h13+h14+h15=4/15
a4=h15=1/15
a5=h1+h2=2/15
a6=h2=1/15
a7=h4+h6=2/15
a8=h4+h5=2/15
a9=h4+h15=2/15

a10=h2+h5+h12=3/15
a11=0
a12=0
a13=h12=1/15
a14=0
a15=0
Normalize: a1=0.130,a2=0.087,a3=0.174,a4=0.043,a5=0.087,a6=0.043,a7=a8=a9=0.087,
a10=0.130,a11=a12=a14=a15=0,a13=0.043
h1=a5=0.087
h2=a1+a5+a6+a10=0.391
h3=0
h4=a7+a8+a9=0.261
h5=a8+a10=0.217
h6=a1+a2+a7=0.304
h7=a3=0.174
h8=0
h9=0
h10=0
h11=a2=0.087
h12=a1+a10+a13=0.304
h13=a3=0.174
h14=a3=0.174
h15=a3+a4+a9=0.304
Normalize:h1=0.035,h2=0.158,h3=0,h4=0.105,h5=0.088,h6=0.123,h7=0.070,h8=h9=h10=0,
h11=0.035,h12=0.123,h13=0.070,h14=0.070,h15=0.123

2. Find the Hubs and Authorities of the graphs below given by HITS. Are the results consistent with the notions of Hubs and Authorities?





(1)Initialize: a1=a2=a3=a4=a5=1/5
h1=h2=h3=h4=h5=1/5

Calculate
a1=h3+h4+h5=3/5
a2=h1+h3=2/5
a3=0
a4=h2=1/5
a5=h4=1/5
Normalize: a1=0.429,a2=0.286,a3=0,a4=0.143,a5=0.143
h1=a2=0.286
h2=a4=0.143
h3=a1+a2=0.725
h4=a1+a5=0.572
h5=a1=0.429
Normalize: h1=0.133,h2=0.066,h3=0.336,h4=0.265,h5=0.199
Hubs are 3 and 4
Authorities are 1 and 2.

(2)Initialize: a1=a2=a3=a4=1/4
h1=h2=h3=h4=1/4

Calculate
a1=h3=1/4
a2=h1=1/4
a3=h1+h2+h4=3/4
a4=h2+h3=2/4
Normalize: a1=0.143,a2=0.143,a3=0.429,a4=0.286
h1=a2+a3=0.572
h2=a3+a4=0.715
h3=a1+a4=0.429
h4=a3=0.429
Normalize: h1=0.267,h2=0.333,h3=0.2,h4=0.2
Hubs are 1 and 2
Authorities are 3 and 4.

The results are consistent with the notions of hubs and authorities.