

# Assignment-8

## Team member:

Lv Kaiyang

Ma Ying

Tuo Weiyi

## 1、Apply the HITS algorithm to the following network

```
# # Load the data
Question.1 <- read.delim("C:/Users/user/Desktop/Data_Analysis/Assignment - 8 / Question - 1 . t x t " , header = F A L S E )
library(igraph)

m <- as.matrix ( Question . 1 )
m

##          V1 V2 V3 V4 V5 V6 V7 V8 V9 V10 V11 V12 V13 V14 V15
## [1,]    0  0  0  0  1  0  0  0  0  0  0  0  0  0  0
## [2,]    1  0  0  0  1  1  0  0  0  1  0  0  0  0  0
## [3,]    0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
## [4,]    0  0  0  0  0  0  1  1  1  0  0  0  0  0  0
## [5,]    0  0  0  0  0  0  0  1  0  1  0  0  0  0  0
## [6,]    1  1  0  0  0  0  1  0  0  0  0  0  0  0  0
## [7,]    0  0  1  0  0  0  0  0  0  0  0  0  0  0  0
## [8,]    0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
## [9,]    0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
## [10,]   0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
## [11,]   0  1  0  0  0  0  0  0  0  0  0  0  0  0  0
## [12,]   1  0  0  0  0  0  0  0  0  1  0  0  1  0  0
## [13,]   0  0  1  0  0  0  0  0  0  0  0  0  0  0  0
## [14,]   0  0  1  0  0  0  0  0  0  0  0  0  0  0  0
## [15,]   0  0  1  1  0  0  0  1  0  0  0  0  0  0  0

g = graph.adjacency ( m , mode = " directed " )
# # Plot authority score
aut = authority.score ( g ) $ vector
top = order ( aut , decreasing = T ) [ 1 : 4 ]
top ## The first fourth rank of nodes

## [1]  1 10  5  6

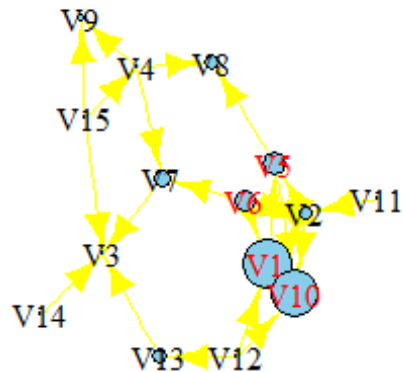
V ( g ) $ color = " sky blue "
V(g)$size = abs(aut) * 30 ## size node by authority scores
V ( g ) $ label . color = " black "
```

```

V ( g ) [   t o p   ] $ l a b e l . c o l o r   =   " r e d "
s   e   t   .   s   e   e   d   (   1   )
p l o t ( g , e d g e . c o l o r = ' y e l l o w ' )
title("HITS (authority)")

```

## HITS (authority)



```

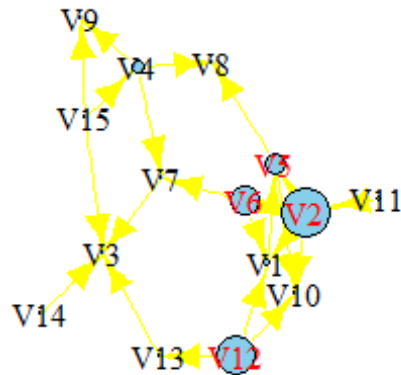
#   #   P   l   o   t   h   u   b
h u b   =   h u b . s c o r e ( g ) $ v e c t o r
t o p   =   o r d e r ( h u b , d e c r e a s i n g = T ) [ 1 : 4 ]
top ## The first fourth rank of nodes

## [1]  2 12  6  5

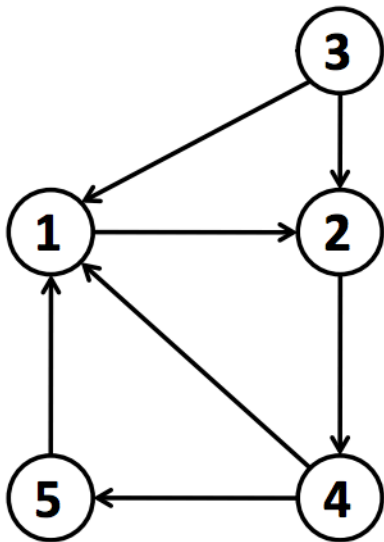
V ( g ) $ c o l o r   =   " s k y b l u e "
V(g)$size = abs(hub) * 30 ## size node by authority scores
V ( g ) $ l a b e l . c o l o r   =   " b l a c k "
V ( g ) [   t o p   ] $ l a b e l . c o l o r   =   " r e d "
s   e   t   .   s   e   e   d   (   1   )
p l o t ( g , e d g e . c o l o r = ' y e l l o w ' )
title("HITS (hub)")

```

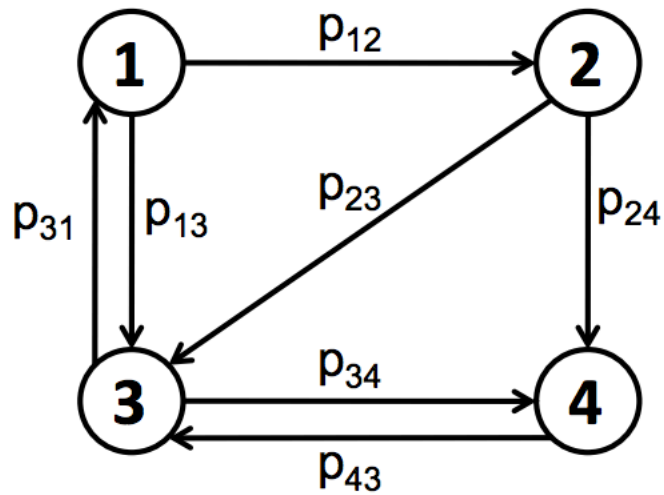
## HITS (hub)



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



According to the above picture. It's easy to see that all nodes (1,2,3,4,5) are hub, because all of them could led you to another points. And 1,2,4,5 are authority, because you can find them through other points



We can see that nodes 1,2,3,4 are authority and 1,2,3,4 are all hub.

As we all know that in the hits algorithm, an authority is a page that is popular and a hub is a page that we can find a lot of sources. However, many pages are linking to others while are being linked. So we cannot define a node singly as hub or authority.