

```

setwd("g:\\math\\504")
edge<-read.table("edges.txt")
options(scipen=999)

G<-matrix(0,max(edge),max(edge))
n=max(edge)

for( i in 1:max(edge) ) {

  if( length( which(edge[,1] == i)) == 0 ){ G[i,i]<-1;next}
  G[i,edge[ which(edge[,1] == i) ,2]]<-1 }

G<- apply(G, 2, "/", rowSums(G) )

B<-matrix(1/n,n,n)
p=.15

```

Not Leveraging sparseness

```

nodes<-read.table("nodes.txt")

x<-sample(1:10,max(edge),replace=T)
system.time(
repeat{
  y<-x
  x<- ( (1-p) * t(G) %*%x ) + ( rep( (1/n)* p * sum(x),n) ) /
    norm(( (1-p) * t(G) %*%x ) + ( rep( (1/n)* p * sum(x),n) ))
  if( norm(x-y) < 10^-6 ) {break} }
)

##      user  system elapsed
## 261.91    66.52   349.56

nodes$P<-round(x,5)

print(head( nodes[with(nodes, order(P,decreasing = T)), ], 10),row.names=F)

##      V1                                     V2      P
## 73      http://www.hollins.edu/calendar 0.00951
## 2      http://www.hollins.edu/ 0.00854
## 593      http://www.hollins.edu/calendar/null.htm 0.00803
## 37      http://www.hollins.edu/admissions/visit/visit.htm 0.00399
## 38      http://www.hollins.edu/about/about_tour.htm 0.00370
## 61      http://www.hollins.edu/htdig/index.html 0.00347
## 52 http://www.hollins.edu/admissions/info-request/info-request.cfm 0.00345
## 43      http://www.hollins.edu/admissions/apply/apply.htm 0.00308
## 91      http://www1.hollins.edu/docs/library/libtoc.htm 0.00298
## 425 http://www.hollins.edu/academics/library/resources/web_linx.htm 0.00283

```

Leveraging sparseness

```

edge<-read.table("edges.txt")
nodez<-read.table("nodes.txt")

```

```

library(Matrix)

dat<-data.frame(setdiff(edge$V2,edge$V1), setdiff(edge$V2,edge$V1))
names(dat)<-names(edge)
edge<-rbind(edge,dat)
rm(dat)

dat<-data.frame(setdiff(edge$V1,edge$V2), setdiff(edge$V1,edge$V2))
names(dat)<-names(edge)
edge<-rbind(edge,dat)
rm(dat)

setdiff(edge$V2,edge$V1)

## integer(0)
setdiff(edge$V1,edge$V2)

## integer(0)
edge$V3<-1
edge[nrow(edge),3]<-edge[(nrow(edge)-1),3]<-0

A <- sparseMatrix(i = edge$V1, j = edge$V2, x = edge$V3)
A <- A/rowSums(A)
n=dim(A)[1]
p=.15

x<-sample(1:10,n,replace=T)
system.time(
repeat{
  y<-x
  x<- as.matrix( (1-p) * t(A) %*%x ) + ( rep( (1/n)* p * sum(x),n) ) /
    norm(( (1-p) * t(A) %*%x ) + ( rep( (1/n)* p * sum(x),n) ))
  if( norm(x-y) < 10^-6 ) {break} }
)

##      user  system elapsed
##      0.38    0.00    0.40

nodez$P<-round(x,5)
print( head( nodez[with(nodez, order(P,decreasing = T)), ], 10), row.names=F)

##      V1                                     V2      P
##      73                                http://www.hollins.edu/calendar 0.00951
##      2                                http://www.hollins.edu/ 0.00854
##      593                             http://www.hollins.edu/calendar/null.htm 0.00803
##      37                             http://www.hollins.edu/admissions/visit/visit.htm 0.00399
##      38                             http://www.hollins.edu/about/about_tour.htm 0.00370
##      61                             http://www.hollins.edu/htdig/index.html 0.00347
##      52 http://www.hollins.edu/admissions/info-request/info-request.cfm 0.00345
##      43                             http://www.hollins.edu/admissions/apply/apply.htm 0.00308
##      91                             http://www1.hollins.edu/docs/library/libtoc.htm 0.00298
##      425 http://www.hollins.edu/academics/library/resources/web_linx.htm 0.00283

```

```
print( head( nodes[with(nodes, order(P,decreasing = T)), ] , 10), row.names=F)
```

##	V1	V2	P
##	73	http://www.hollins.edu/calendar	0.00951
##	2	http://www.hollins.edu/	0.00854
##	593	http://www.hollins.edu/calendar/null.htm	0.00803
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##	61	http://www.hollins.edu/htdig/index.html	0.00347
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