Wenjing Sun _Homework 1

Clean Data

```
rm(list = ls(all = TRUE))
library(igraph)
```

```
## Warning: package 'igraph' was built under R version 3.4.2
```

```
##
## Attaching package: 'igraph'
```

```
## The following objects are masked from 'package:stats':
##
##     decompose, spectrum
```

```
## The following object is masked from 'package:base':
##
##     union
```

```
library(data.table)
```

```
## Warning: package 'data.table' was built under R version 3.4.2
```

```
setwd("D:/social network analysis/HW1")
data1 = fread(file="sample_generated_network.csv", header = TRUE)
data1=as.data.frame(data1)

v<-c()

for (j in c(2:(ncol(data1)-5))){
  for (i in c(1:(nrow(data1)))){
    if (data1[i,j]==""& !(j %in% v))
      v<-append(v,j)}}
data1=data1[,-v]

r<-c()
for (j in c(2:(ncol(data1)-5))){
  if (!((colnames(data1)[j]) %in% as.character(data1[[1]])))
    r<-append(r,j)
}
data1=data1[,-r]
s<-c()
for (j in c(1:(nrow(data1)-5))){
  if (!(as.character(data1[j,1]) %in% colnames(data1)))
    s<-append(s,j)
}
data1=data1[-s,]
data=data1
library(psych)
data=dfOrder(data,1)
```

```
column_wise_replace = function(DT, x, y) {
    for(i in seq_along(x)){
         for (j in seq_len(ncol(DT))){
            set(DT,which(DT[[j]] == x[i]),j,y[i])
        }
    }
}
```

```
#fwrite(data, "HW1_1.csv")

# getting adjacency data into igraph

# make the choice data numeric
scale = cbind(c("Extremely Distrust  1",
                "Distrust  2",
                "Slightly Distrust  3",
                "Neither Distrust Nor Trust  4",
                "Slightly Trust  5",
                "Trust  6",
                "Extremely Trust  7",
                "I don't know this person.",
                "This is my own name."), c(1, 2, 3, 4,5,6,7,0, 0))

column_wise_replace(data, scale[,1], scale[,2])

# make adjacency matrix

# subset to just the trust choices, then sort on the columns and rows to make each entry match up
# data are directed, so matrix will not be symmetric
adj = as.data.frame(data[,1:(ncol(data) - 5)])
rownames(adj) = adj[,1]
adj = adj[,-1]
adj = adj[sort(rownames(adj)),sort(colnames(adj))]
```

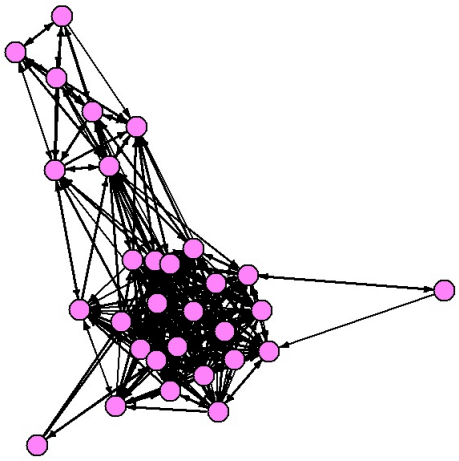
Question 1 Trusting network

Read in the file “sample_generated_network.csv”, located on Canvas. For the trust network, reproduce a plot similar to the one shown in class, showing the ties between individuals, their strength, and their direction. Exclude individuals who did not respond to the survey and who did not receive a complete set of responses about themselves from other students, but include everyone else.

```
trusting = adj
trusting[trusting<=4] = 0

trusting = graph.adjacency(as.matrix(trusting), "directed", weighted = TRUE)

plot.igraph(trusting,vertex.label=NA,layout=layout.fruchterman.reingold, vertex.color="orchid1",edge.color="bla
ck",edge.width=E(trusting)$weight/4,vertex.size = 10, edge.arrow.size=.3,edge.curved=FALSE)
```



Question 2 Distrusting Network

Repeat the same as in Question 1, but for the distrust network. For this plot, color the nodes ordinally to correspond to how distrusted they are (check rainbow or colorRampPalette). Exclude individuals who did not respond to the survey and who did not receive a complete set of responses about themselves from other students, but include everyone else.

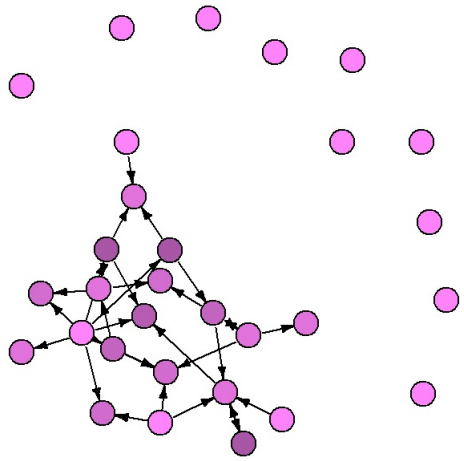
```
distrusting <- adj
distrusting[distrusting>3] = 0

distrusting = graph.adjacency(as.matrix(distrusting), "directed", weighted = TRUE)
color<-colorRampPalette(c("mediumorchid1","mediumorchid3","mediumorchid4"))

q<-data.matrix(distrusting[])
colsum<-colSums(data.matrix(distrusting[]))
distrustingrec=adj
distrustingrec[distrustingrec>3] = 0
distrustingrec[distrustingrec>0] = 1
colsum1<-colSums(data.matrix(distrustingrec))
distrustscore<-colsum/colsum1 # the lower the score, the more distrusted
distrustscore[is.na(distrustscore)]=4
distrustscore1<-data.matrix(distrustscore[])*2
distrustscore1sort<-sort(distrustscore1)
color<-colorRampPalette(c("orchid4","orchid1"))
m<-nrow(table(distrustscore1))

for (i in 1:30){
  V(distrusting)$color[i]=color(m+1)[ceiling(distrustscore1[i])+1]
}

plot.igraph(distrusting,vertex.label=NA,layout=layout.fruchterman.reingold, vertex.lable=8, edge.color="black",
 edge.width=V(distrusting)$weight,vertex.size = 12, edge.arrow.size=.4,edge.curved=FALSE)
```



Question 3 Advice Network

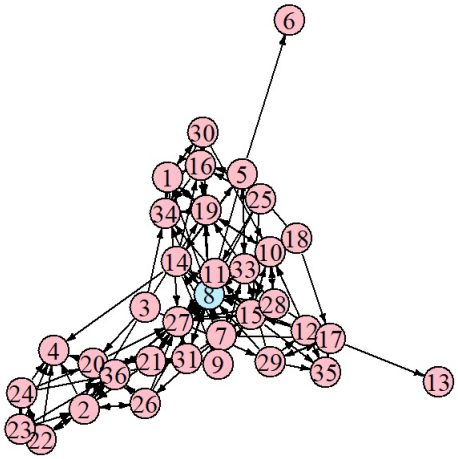
Generate a plot for the advice network showing the ties between individuals and their direction. For this plot, indentify with a color the individual to whom the most people go to for advice.

```
advice_edge1 = cbind(data[,1], data$V38)
advice_edge2 = cbind(data[,1], data$V39)
advice_edge3 = cbind(data[,1], data$V40)
advice_edge4 = cbind(data[,1], data$V41)
advice_edge5 = cbind(data[,1], data$V42)

advice_edges = rbind(advice_edge1, advice_edge2, advice_edge3, advice_edge4, advice_edge5)
advice_seeking = graph.data.frame(advice_edges, directed = TRUE)
m=which.max(table(advice_edges[,2]))

# make the plot
V(advice_seeking)$color = "pink"
V(advice_seeking)$color[m] = "lightblue1"

plot.igraph(advice_seeking,vertex.label=rownames(advice_seeking),layout=layout.fruchterman.reingold, vertex.lab
el.color="black",edge.color="black",vertex.size = 15, edge.arrow.size=.3,edge.curved=FALSE)
```



Question 4 reciprocated relationships

How many of the relationships are reciprocated in each of the three networks? Do you think that this is more or less than would be reciprocated by random chance? Treat the trust and distrust relationships as binary. Perform this calculation directly on the matrices.

```
#trusting network

trustingrec = adj
trustingrec[trustingrec<5] = 0
trustingrec[trustingrec>4]=1
t=graph.adjacency(as.matrix(trustingrec), "directed", weighted = TRUE)
ts<-sum(which_mutual(t, es = E(t)))/2
ts
```

```
## [1] 152
```

```
#distrusting network
distrustingrec=adj
distrustingrec[distrustingrec>3] = 0
distrustingrec[distrustingrec>0] = 1
dist=graph.adjacency(as.matrix(distrustingrec), "directed", weighted = TRUE)
dists<-sum(which_mutual(dist, es = E(dist)))/2
dists
```

```
## [1] 2
```

```
#advice network
advice_s<-sum(which_mutual(advice_seeking, es = E(advice_seeking)))/2
advice_s
```

```
## [1] 33
```

Question 5

How many of the relationships in the trust network also exist in the advice network? How many of the relationships in the distrust network also exist in the advice network? Do you think this is surprising? Exclude individuals who did not respond to the survey and who did not receive a complete set of responses about themselves from other students, but include everyone else. Treat the trust and distrust relationships as binary. Perform this calculation directly on the matrices

```
adv<-data.matrix(advice_seeking[])
trust<-data.matrix(t[])
advnew<-adv[sort(rownames(trust)),sort(colnames(trust))]
trustnew<-trust[sort(rownames(advnew)),sort(colnames(advnew))]

n<-0

for ( i in c(1:nrow(trustnew))){
  for ( j in c(1:ncol(trustnew))){
      if (trustnew[i,j]==advnew[i,j]& trustnew[i,j]>0 & advnew[i,j]>0)
         n=n+1
      }
}
n
```

```
## [1] 121
```

```
adv<-data.matrix(advice_seeking[])
distrust<-data.matrix(dist[])
advnew1<-adv[rownames(distrust),colnames(distrust)]
distrustnew<-distrust[rownames(advnew1),colnames(advnew1)]
advsort1 = advnew1[sort(rownames(advnew1)),sort(colnames(advnew1))]
distrustsort=distrustnew[sort(rownames(distrustnew)),sort(colnames(distrustnew))]

z<-0

for ( i in seq_len(length(nrow(distrustsort)))){
  for ( j in seq_len(length(ncol(distrustsort)))){
      if (distrustsort[i,j]==advsort1[i,j])
         z=z+1
      }
}
z
```

```
## [1] 1
```