Class 5 Lab

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1. Load the SNA and iGraph Packages

```
#Loading the packages I'll need
library(ggpubr)
library(ggraph)
library(dplyr)
library(igraph)
library(sna)
library(intergraph)
```

2. Load your directed network data

```
#Importing the node and edge csv's
nodes <- read.csv('/Users/TomTheIntern/Desktop/Mendoza/Mod 4/Networks/Lab 2/nodelist.csv')
summary(nodes)
```

```
##        ID            Name                Age           Gender
##  Min.   : 1.00   Length:12          Min.   :21.00   Length:12
##  1st Qu.: 3.75   Class :character   1st Qu.:23.00   Class :character
##  Median : 6.50   Mode  :character   Median :36.50   Mode  :character
##  Mean   : 6.50                      Mean   :38.00
##  3rd Qu.: 9.25                      3rd Qu.:45.75
##  Max.   :12.00                      Max.   :65.00
```

```
edges <- read.csv('/Users/TomTheIntern/Desktop/Mendoza/Mod 4/Networks/Lab 2/edgelist.csv')
summary(edges)
```

```
##     ego_num         alter_num          ego                alter
##  Min.   : 1.000   Min.   : 1.000   Length:40          Length:40
##  1st Qu.: 2.750   1st Qu.: 2.750   Class :character   Class :character
##  Median : 5.000   Median : 5.000   Mode  :character   Mode  :character
##  Mean   : 5.575   Mean   : 5.575
##  3rd Qu.: 9.000   3rd Qu.: 9.000
##  Max.   :12.000   Max.   :12.000
##      type              strength
##  Length:40          Min.   :1.00
##  Class :character   1st Qu.:2.00
##  Mode  :character   Median :4.00
##                     Mean   :3.45
##                     3rd Qu.:4.25
##                     Max.   :5.00
```

3. Create Directed SNA and iGraph

```
# Create igraph and sna object and visualize the network
# first list the edgelist, whether the network is directed, and the vertex attributes.
net <- graph_from_data_frame(edges, directed = T, vertices = nodes)

#making the igraph object into an sna object
net_s <- igraph::simplify(net)
net_s_sna <- asNetwork(net_s)
```

4. Calculating Triad Census

```
#Making the directed Triad Census
#using sna triad for the better labels
sna::triad.census(net_s_sna)
```

```
##      003 012 102 021D 021U 021C 111D 111U 030T 030C 201 120D 120U 120C 210 300
## [1,]  69   0 113    0    0    0    0    0    0    0  27    0    0    0   0  11
```

```
#getting the highest type of triad
colnames(sna::triad.census(net_s_sna))[which.max(sna::triad.census(net_s_sna))]
```

```
## [1] "102"
```

The 102 triad (1 mutual, 0 asymetirc and 2 nulls) was the most prevalent in the network with a total of 113 instances.

5. Age Assortativity of the Network

```
assortativity(net, V(net)$Age, directed = T)
```

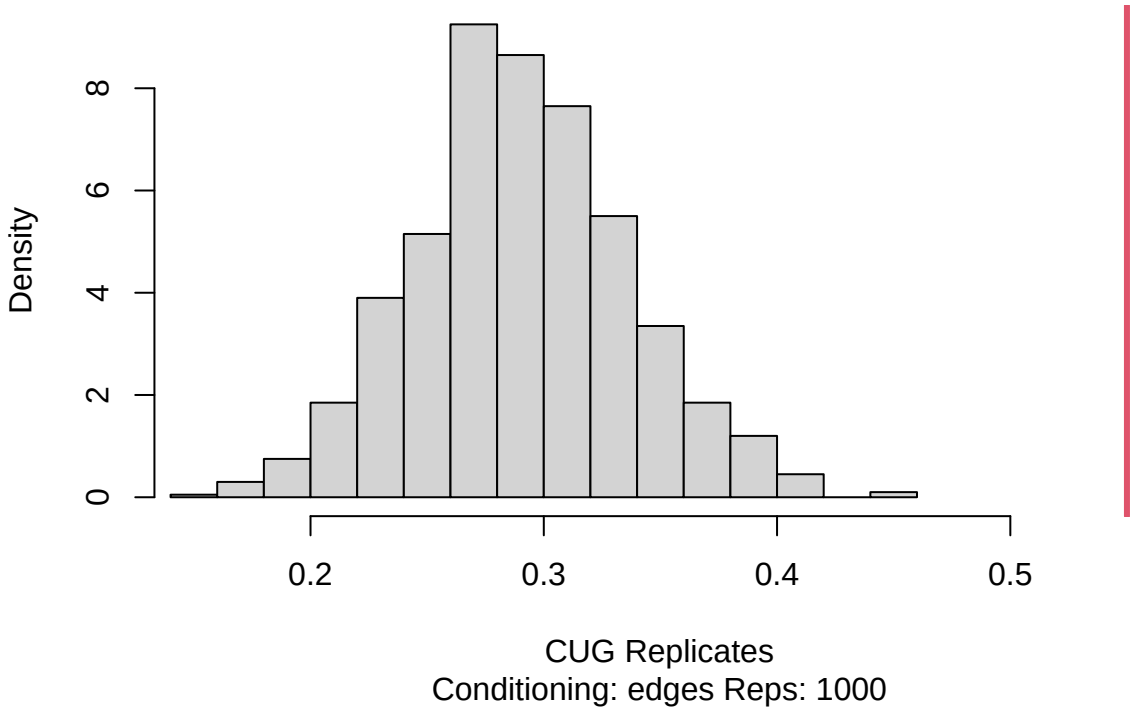
```
## [1] 0.04203086
```

The age assortativity was 0.04203086, meaning I had some older ages associating with other older aged people.

6. Conditional Uniform Graph of Transitivity vs Density

```
#Test transitivity vs density
Cug_Edges <- sna::cug.test(net_s_sna, gtrans, cmode="edges")

#making the plot
plot(Cug_Edges)
```




```
#our network
Cug_Edges$obs.stat
```

```
## [1] 0.55
```

```
# simulated networks
summary(Cug_Edges$rep.stat)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  0.1491  0.2613  0.2903  0.2909  0.3197  0.4444
```

Compared to the 1000 simulations, my network had a much, much higher density than the average simulation and was still more dense than some of the outlier simulations, meaning my network was much more dense than any of the simulations.