

Assignment 1

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Loading Libraries:

1a)

```
affektive_network <- read.csv('2400_affektive_w1.csv')
gender <- read.csv('2400_sex.csv')

##Dropping IDs

affektive_network = affektive_network[,-1]
colnames(affektive_network) <- gender$student.ID
```

1b)

1c)

```
friendship.igraph <- graph_from_adjacency_matrix(affektive_network_mat,
                                                mode = "directed",
                                                diag = FALSE
)

num_students = dim(affektive_network_mat)[1]

paste("Network Size: ", num_students)
```

```
## [1] "Network Size: 27"
```

```
paste("Density: ", sum(affektive_network_mat) / length(affektive_network_mat))
```

```
## [1] "Density: 0.181069958847737"
```

```
paste("Average Degree: ", sum(affektive_network_mat) / num_students)
```

```
## [1] "Average Degree: 4.88888888888889"
```

```
paste("Reciprocity: ", grecip(affektive_network_mat, measure = "dyadic.nonnull"))
```

```
## [1] "Reciprocity: 0.360824742268041"
```

```
paste("Number of Males: ", sum(gender$sex == 1))
```

```
## [1] "Number of Males: 11"
```

```
paste("Number of Females:", sum(gender$sex == 2))
```

```
## [1] "Number of Females: 16"
```

```
paste("Female to Female connections: ", sum(affektive_network[gender$sex == 2,gender$sex == 2]))
```

```
## [1] "Female to Female connections: 72"
```

```
paste("Male to Male connections", sum(affektive_network[gender$sex == 1,gender$sex == 1]))
```

```
## [1] "Male to Male connections 36"
```

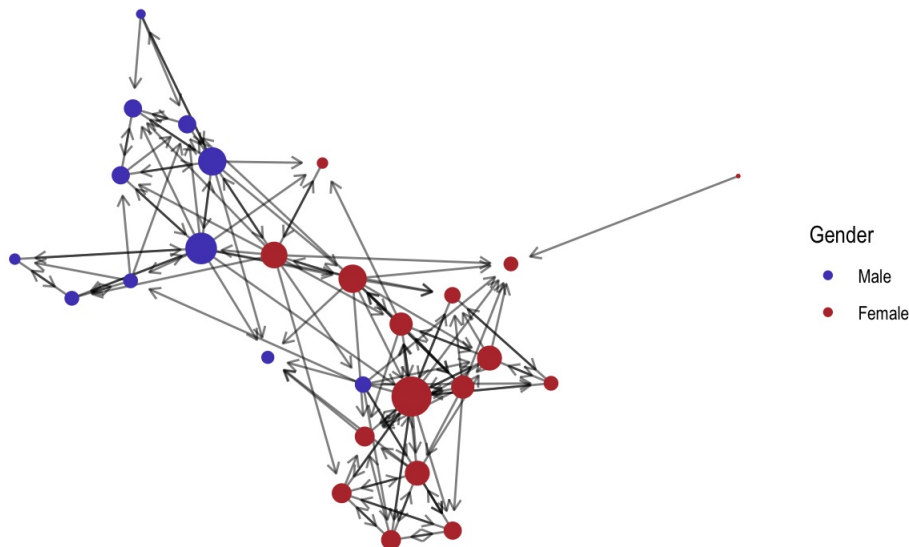
```
paste("Max Betweenness: ", max(igraph::betweenness(friendship.igraph)))
```

```
## [1] "Max Betweenness: 144.975"
```

1d)

```
node_gender_colour <- function() {  
  return(  
    scale_colour_manual(  
      breaks=1:2,  
      values=c('#5147bf', '#b83739'),  
      labels=c('Male', 'Female'))  
  )  
  
  students = gender  
  students$degree <- sna::degree(affective_network_mat, cmode = 'freeman')  
  
  my.graph <- create_layout(friendship.igraph,  
    layout = 'fr')  
  
  set.seed(52)  
  ggraph(my.graph)+  
    geom_edge_link(alpha = .5,  
      arrow = arrow(length = unit(2.0, 'mm')),  
      end_cap = circle(3.4, 'mm'))+  
    geom_node_point(  
      aes(colour = as.factor(gender$sex)),  
      size = (students$degree/2.7))+  
    scale_size_continuous(range = c(2,4)) +  
    node_gender_colour()+  
    labs(colour = "Gender")+  
    theme_graph()+  
    ggtitle("Friendship Network")
```

Friendship Network



1e)

```

trust <- read.csv('2400_trust_w1.csv')
trust <- trust[,-1]
trust[is.na(trust)] = 0

trust_mat <- data.matrix(trust)

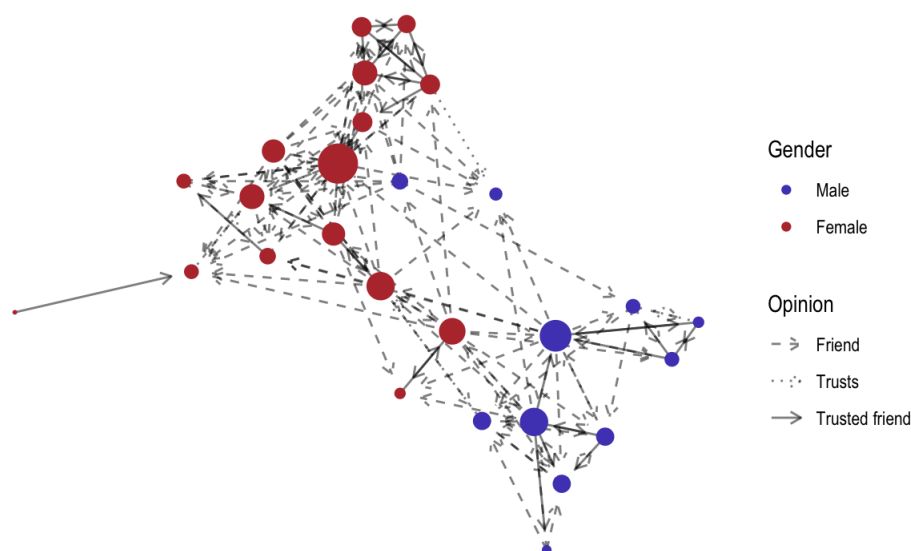
combined_friend_trust_mat <- affective_network_mat + 2*trust_mat

interpret_weight <- function(weight) {
  result <- rep('only_friend', length(weight))
  result[weight == 2] <- 'only_trust'
  result[weight == 3] <- 'trusted_friend'
  return(result)
}

set.seed(52)
ggraph(graph.adjacency(combined_friend_trust_mat, weighted = T),
  layout='fr')+
  geom_edge_link(alpha = .5,
    aes(
      lty=interpret_weight(weight),
    ),
    arrow = arrow(length = unit(2.0, 'mm')),
    end_cap = circle(3.4, 'mm'))+
  scale_edge_linetype_manual(
    breaks=c('only_friend', 'only_trust', 'trusted_friend'),
    values=c('dashed', 'dotted', 'solid'),
    labels=c('Friend', 'Trusts', 'Trusted friend'))+
  geom_node_point(
    aes(colour = as.factor(gender$sex)),
    size = (students$degree/2.7) )+
  scale_size_continuous(range = c(2,4))+
  node_gender_colour()+
  labs(colour = "Gender",
    edge_linetype = "Opinion")+
  theme_graph()+
  ggtitle("Opinion Network")

```

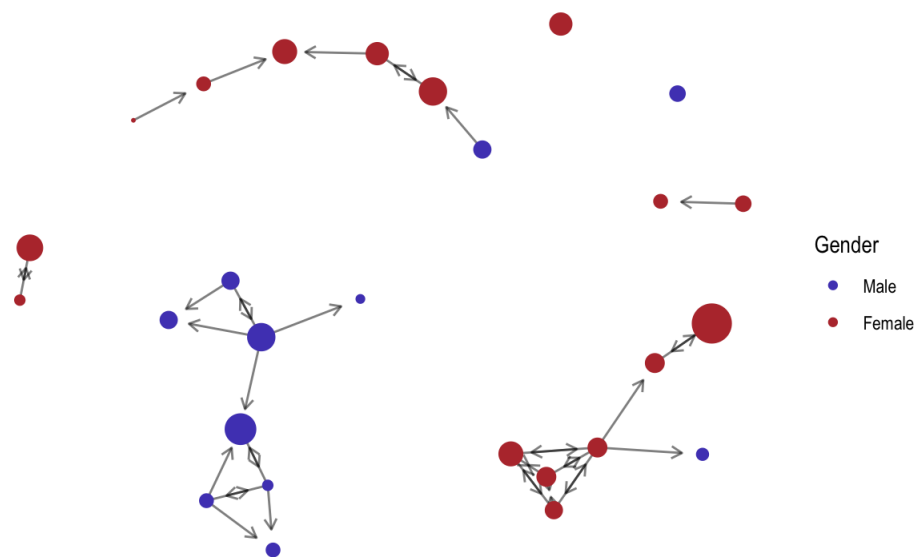
Opinion Network



```
# Part E (bonus): trust network only

set.seed(52)
ggraph(graph.adjacency(trust_mat),
  layout='fr')+
  geom_edge_link(alpha = .5,
    arrow = arrow(length = unit(2.0, 'mm')),
    end_cap = circle(3.4, 'mm'))+
  geom_node_point(
    aes(colour = as.factor(gender$sex)),
    size = (students$degree/2.7))+
  scale_size_continuous(range = c(2,4)) +
  node_gender_colour()+
  labs(colour = "Gender")+
  theme_graph()+
  ggtitle("Trust Network")
```

Trust Network



1f)

```
num_only_friend = sum(combined_friend_trust_mat == 1)
num_only_trust = sum(combined_friend_trust_mat == 2)
num_trusted_friend = sum(combined_friend_trust_mat == 3)
```

```
paste('Friend, no trust: ', num_only_friend)
```

```
## [1] "Friend, no trust: 98"
```

```
paste('Trust, not a friend: ', num_only_trust)
```

```
## [1] "Trust, not a friend: 4"
```

```
paste('Trusted friend: ', num_trusted_friend)
```

```
## [1] "Trusted friend: 34"
```

1g)

```
paste('Trust reciprocity: ', grecip(trust_mat, measure="dyadic.nonnull"))
```

```
## [1] "Trust reciprocity: 0.461538461538462"
```

It is quite uncommon to see trust without high level of friendship (only 4 occurrences out of 38 trust edges). Friendship, on the other hand, does not necessarily imply trust (only 34 of the 132 friendship edges are also trusted). Trust between genders is basically non-existent (only two instances). In general, the network is well clustered by gender. There is a visible center node in the female part, the male part is more decentralized. There are, interestingly, two nodes where in-degree is high, but out-degree is near zero. None of the connections to these nodes are trusted friendships though, which indicates a certain level of isolation. Both friendship and trust reciprocity is not high at 36% and 46% respectively.