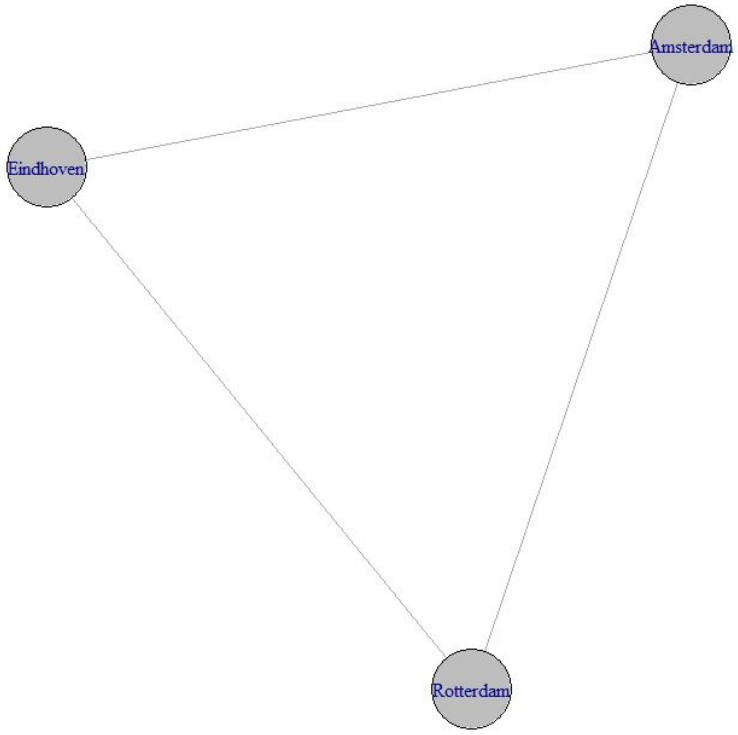
Team 5
Yifan Feng: 2671027
Yunxiang Li: 2674844

1a)

#net1: directed, unweighted, and singular
#net2: undirected, weighted, and singular

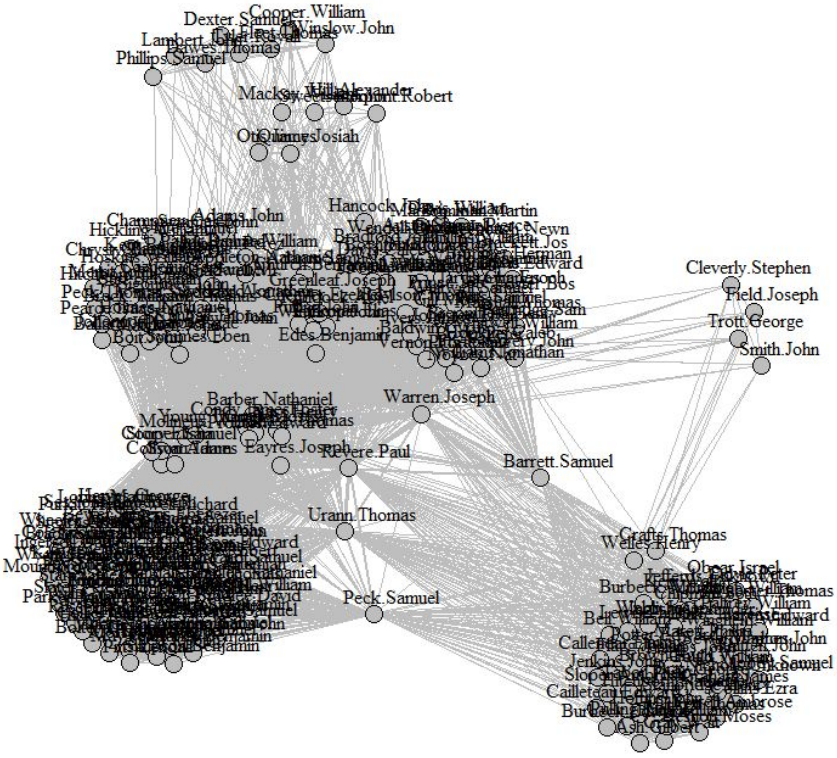
1b)

```
>options(repr.plot.width = 8, repr.plot.height = 4)
>net <- graph_from_literal(Rotterdam-Amsterdam-Eindhoven, Rotterdam-Eindhoven)
>plot(net, vertex.color = 'gray', vertex.size = 25)
```



1c)

```
>revere.group.net <- as.matrix(df) %*% t(as.matrix(df))
>diag(revere.group.net) <- NA
>revere.group.g <- graph.adjacency(revere.group.net, weighted = TRUE,
mode="undirected", diag=FALSE)
>plot(revere.group.g, vertex.color = "grey", vertex.size = 5, vertex.label.dist = 1,
edge.color = "grey", edge.width = E(revere.group.g)$weight, vertex.label.color =
"black")
```



Without applying the simplify(), the clusters tend to be me more concentrate because of the complex links.

1d)

#Differences: The direction of information transmission differs. Retweet creates a self-loop, directing information from one sender to many receivers. @Mention enables one-way communication, from oneself to the rest. #Commons: Retweet and @Mention both build connections from one user to another. The relations are one-directional, directed and singular.

1e)

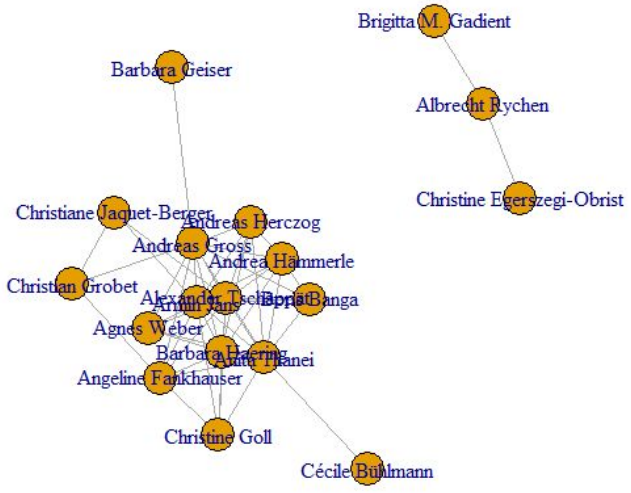
>data_conseil = read.csv('Desktop/Data Science VAR/net_ch_cn1995-1999.csv', header = TRUE, as.is = TRUE) >head(data_conseil)
V1 V2 1 Agnes Weber Alexander Tschäppät 2 Alexander Tschäppät Andrea Hämmerle

3	Agnes Weber	Andreas Gross
4	Alexander Tschäppät	Andreas Gross
5	Andrea Hämmerle	Andreas Gross
6	Alexander Tschäppät	Andreas Herczog

#The header V1 and V2 represent two kinds of parliament chambers (national and states) in Switzerland. Row 1 to 6 presents chamber names in both councils.

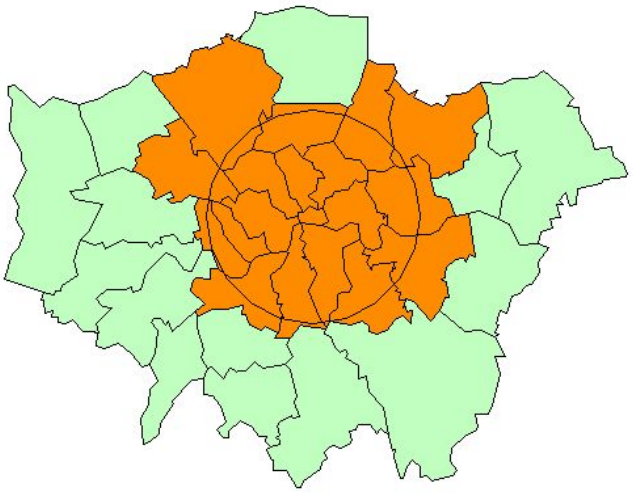
1f)

```
plot(graph_from_edgelist(as.matrix(data_conseil)[1:50,1:2], directed = FALSE))
```



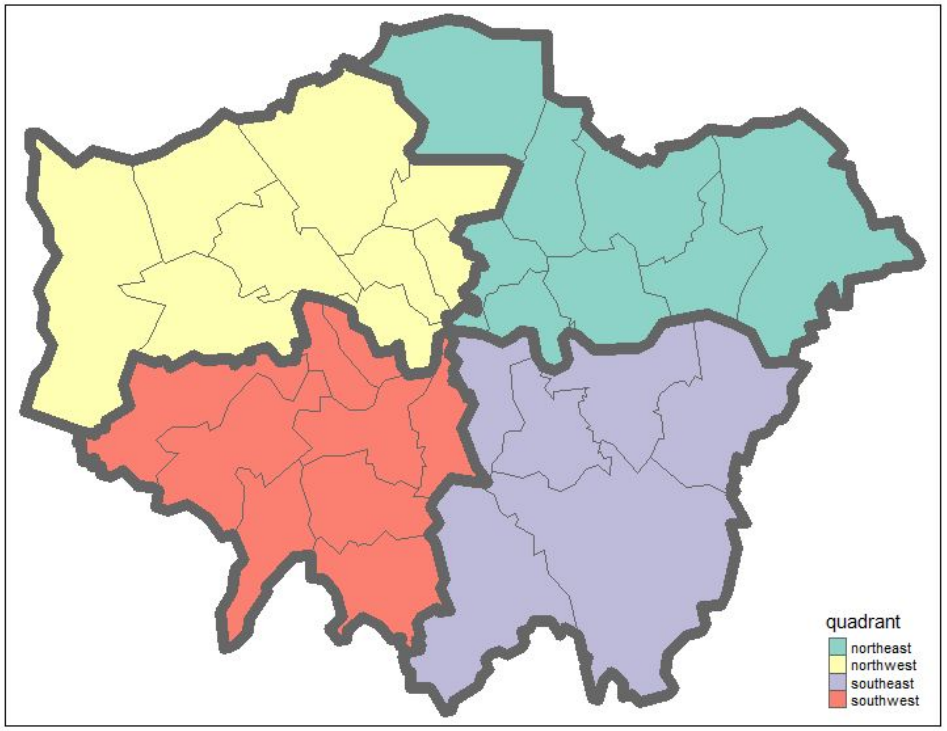
2a)

```
> plot(lnd, col = "darkseagreen1")
> cent_lnd = gCentroid(lnd[lnd$name == "City of London",])
> points(cent_lnd, cex = 3)
> lnd_buffer = gBuffer(spgeom = cent_lnd, width = 10000)
> plot(lnd_central, col = "darkorange", add = T)
> lnd_central = lnd[lnd_buffer,]
> plot(lnd_buffer, add = T)
```



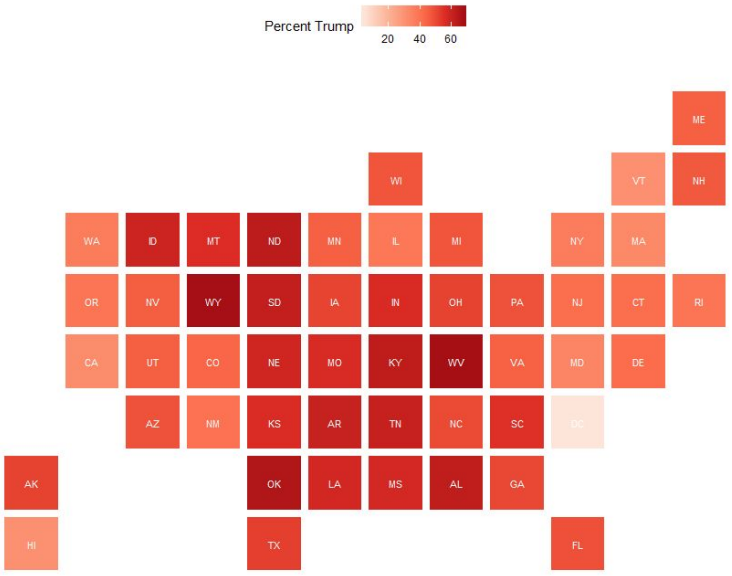
2b)

```
> easting_lnd <- coordinates(gCentroid(lnd))[[1]]
> northing_lnd <- coordinates(gCentroid(lnd))[[2]]
> east <- sapply(coordinates(lnd)[,1], function(x) x > easting_lnd)
> north <- sapply(coordinates(lnd)[,2], function(x) x > northing_lnd)
> lnd$quadrant <- "unknown"
> lnd$quadrant[east & north] <- "northeast"
> lnd$quadrant[!east & north] <- "northwest"
> lnd$quadrant[east & !north] <- "southeast"
> lnd$quadrant[!east & !north] <- "southwest"
> plot(lnd)
> plot(lnd[east & north,], add = TRUE, col = "red" )
> llgridlines(lnd, lty= 3, side ="EN", offset = -0.5)
> lnd_disolved = rgeos::gUnaryUnion(spgeom = lnd, id = lnd$quadrant)
> library(tmap)
> qtm(lnd, fill = "quadrant") + tm_shape(lnd_disolved) + tm_borders(lwd = 9)
> plot(lnd, col = "lightgrey")
> sel <- lnd$Partic_Per > 25
> plot(lnd[ sel, ], col = "turquoise", add = TRUE)
```



2c)

```
> statebins_continuous(state_data= election, state_col="state", text_color="white", value_col="pct_trump", brewer_pal="Reds", font_size =3, legend_title="Percent Trump")
```



```
> statebins_continuous(state_data = subset(election, st %nin%" DC"), state_col
="state", text_color ="black", value_col= "pct_clinton", brewer_pal="Blues", font_size
= 3, legend_title="Percent Clinton")
```