**Library Used:**

igraph

**Data Set:**

<https://snap.stanford.edu/data/gplus.tar.gz>

**Language Used:**

R

**Install Data:**

library(igraph)

folder\_path <- "C:\\Users\\Sherif Tarfa\\Desktop\\gplus"

file\_list <- list.files(path = folder\_path, full.names = TRUE)

**network:**

node\_count <- 0

for (file in file\_list) {

file\_extension <- tools::file\_ext(file)

if (file\_extension == "edges") {

edges\_data <- read.table(file)

graph <- graph\_from\_data\_frame(edges\_data, directed = FALSE)

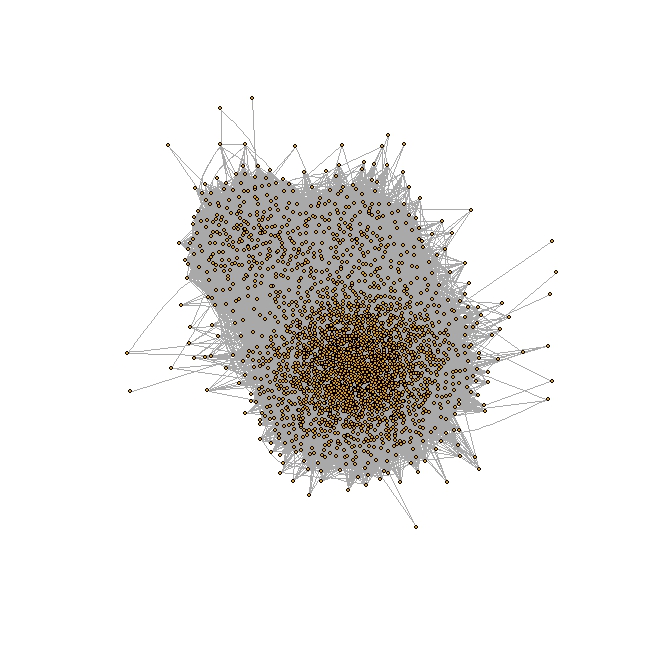
node\_count <- node\_count + vcount(graph)

plot(graph, edge.arrow.size = 0.2, vertex.size = 2, vertex.label = NA)

}

}

cat("Total number of nodes:", node\_count, "\n")



**Number of users in the network”Node”:**



**Top 20 influencers “top 20 degrees”:**

top\_nodes <- c()

top\_degrees <- c()

for (file in file\_list) {

file\_extension <- tools::file\_ext(file)

if (file\_extension == "edges") {

edges\_data <- read.table(file)

graph <- graph\_from\_data\_frame(edges\_data, directed = FALSE)

degrees <- degree(graph)

top\_indices <- order(degrees, decreasing = TRUE)[1:20]

top\_nodes <- c(top\_nodes, V(graph)[top\_indices])

top\_degrees <- c(top\_degrees, degrees[top\_indices])

}

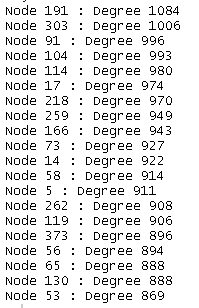
}

cat("Top 20 degrees:\n")

for (i in 1:20) {

cat("Node", top\_nodes[i], ": Degree", top\_degrees[i], "\n")

}



**Average degree in each node :**

total\_degrees <- 0

num\_nodes <- 0

for (file in file\_list) {

file\_extension <- tools::file\_ext(file)

if (file\_extension == "edges") {

edges\_data <- read.table(file)

graph <- graph\_from\_data\_frame(edges\_data, directed = FALSE)

degrees <- degree(graph)

total\_degrees <- total\_degrees + sum(degrees)

num\_nodes <- num\_nodes + vcount(graph)

}

}

average\_degree <- total\_degrees / num\_nodes

cat("Average Degree:", average\_degree, "\n")



**Top 20quantify nodes` importance in information flow:**

for (file in file\_list) {

file\_extension <- tools::file\_ext(file)

if (file\_extension == "edges") {

edges\_data <- read.table(file)

graph <- graph\_from\_data\_frame(edges\_data, directed = FALSE)

betweenness\_values <- rbind(betweenness\_values,

data.frame(Node = 1:vcount(graph),

Betweenness = betweenness(graph)))

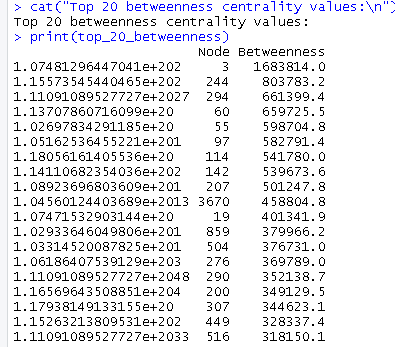
}

}

top\_20\_betweenness <- head(betweenness\_values[order(-betweenness\_values$Betweenness), ], 20)

cat("Top 20 betweenness centrality values:\n")

print(top\_20\_betweenness)



**Top 20 Closeness Centrality of top 20 influencers “higher Closeness Centrality means can reach to other nodes easily ”:**

top\_nodes <- c()

top\_degrees <- c()

closeness <- c()

for (file in file\_list) {

file\_extension <- tools::file\_ext(file)

if (file\_extension == "edges") {

edges\_data <- read.table(file)

graph <- graph\_from\_data\_frame(edges\_data, directed = FALSE)

degrees <- degree(graph)

closeness\_centrality <- closeness(graph)

top\_indices <- order(degrees, decreasing = TRUE)[1:20]

top\_nodes <- c(top\_nodes, V(graph)[top\_indices])

top\_degrees <- c(top\_degrees, degrees[top\_indices])

closeness <- c(closeness, closeness\_centrality[top\_indices])

}

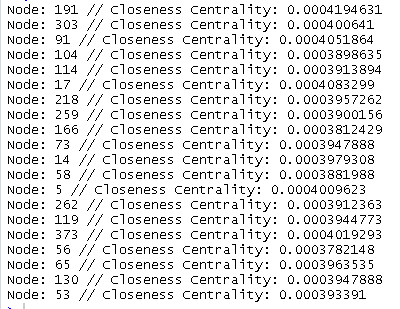
}

cat("Top 20 nodes, degrees, and closeness centrality:\n")

for (i in 1:20) {

cat("Node:", top\_nodes[i],"//" , "Closeness Centrality:", closeness[i], "\n")

}



**Top 20 Closeness Centrality “top 20 users can reach other nodes”:**

top\_nodes <- c()

closeness <- c()

for (file in file\_list) {

file\_extension <- tools::file\_ext(file)

if (file\_extension == "edges") {

edges\_data <- read.table(file)

graph <- graph\_from\_data\_frame(edges\_data, directed = FALSE)

closeness\_centrality <- closeness(graph)

top\_indices <- order(closeness\_centrality, decreasing = TRUE)[1:20]

top\_nodes <- c(top\_nodes, V(graph)[top\_indices])

closeness <- c(closeness, closeness\_centrality[top\_indices])

}

}

cat("Top 20 nodes and their closeness centrality:\n")

for (i in 1:20) {

cat("Node:", top\_nodes[i], "// Closeness Centrality:", closeness[i], "\n")

}

