exercise2

2024-03-26

```r
library(igraph)
```

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

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

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

```r
# Create the graph
g <- graph.empty(n = 10, directed = FALSE)

# Add nodes for each seat
V(g)$name <- c('1', '2', '3', '4', '5', '6', 'A', 'B', 'C', 'D')

# Add edges based on seat adjacency
edges <- c('A', '2', 'A', 'B', 'A', 'C',
           'B', 'A', 'B', 'C', 'B', 'D', 'B', '3', 'B', '6',
           'C', 'B', 'C', '3', 'C', '4',
           'D', '3', 'D', '5', 'D', '6',
           '1', '2', '2', '3', '3', '4', '4', '5', '5', '6', '6', '1',
           '1', '3', '2', '4', '3', '5', '4', '6', '5', '1', '6', '2')

# Add the edges to the graph
for (i in seq(1, length(edges), by = 2)) {
    g <- add_edges(g, c(edges[i], edges[i+1]))
}

# Compute centrality measures
degree <- degree(g) / (vcount(g) - 1)  # Normalize degree
closeness <- closeness(g)
betweenness <- betweenness(g)

# Create a dataframe to display the centralities
centrality_data <- data.frame(
  Node = V(g)$name,
  Degree = degree,
  Closeness = closeness,
  Betweenness = betweenness
```

```
)

# Display the dataframe
print(centrality_data)
```

```
##   Node    Degree  Closeness Betweenness
## 1    1 0.4444444 0.07142857   0.5000000
## 2    2 0.5555556 0.07692308   2.8333333
## 3    3 0.7777778 0.09090909   5.5000000
## 4    4 0.5555556 0.07692308   1.7500000
## 5    5 0.5555556 0.07142857   1.0833333
## 6    6 0.6666667 0.08333333   3.2500000
## A    A 0.4444444 0.06250000   0.8333333
## B    B 0.7777778 0.07692308   4.1666667
## C    C 0.5555556 0.07142857   1.4166667
## D    D 0.4444444 0.07142857   0.6666667
```

Opting for Seat B aligns with my objective to optimize network engagement during my commute. This seat's superior degree centrality indicates a strategic position for direct interactions with numerous colleagues. The leading closeness centrality measure signifies minimal communication paths to others, enhancing my potential for swift information exchange. Furthermore, the peak betweenness centrality underscores my role as a pivotal liaison within the communication network, facilitating broader connectivity. Hence, Seat B is the pragmatic choice for fostering extensive professional relationships.

```
# Plot the network
plot(g, vertex.size = degree*50, vertex.label = V(g)$name,
     vertex.label.cex = 0.8, vertex.label.dist = 0.5,
     edge.arrow.size = 0.5, main = "Bus Seat Network")
```

Bus Seat Network