

exercise2

Jingwen He

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```
# Load necessary libraries
library(igraph)

##
## Attaching package: 'igraph'
##
## The following objects are masked from 'package:stats':
##
##     decompose, spectrum
##
## The following object is masked from 'package:base':
##
##     union

# Create a graph
g <- graph.empty(directed = FALSE)

# Add nodes for the seats
nodes <- c('1', '2', '3', '4', '5', '6', 'A', 'B', 'C', 'D')
g <- add.vertices(g, nv=length(nodes), name=nodes)

## Warning: 'add.vertices()' was deprecated in igraph 2.0.0.
## i Please use 'add_vertices()' instead.
## This warning is displayed once every 8 hours.
## Call 'lifecycle::last_lifecycle_warnings()' to see where this warning was
## generated.

# Add edges between adjacent seats
edges <- c('1', '2', '2', 'A', '3', 'B', '3', 'C', '3', 'D', '3', '5', '3', '4',
           '4', 'C', '5', 'D', '5', '6', '6', 'B', '6', 'D', 'A', 'B', 'A', 'C',
           'B', 'C', 'B', 'D', 'C', 'D')
g <- add.edges(g, edges)

## Warning: 'add.edges()' was deprecated in igraph 2.0.0.
## i Please use 'add_edges()' instead.
## This warning is displayed once every 8 hours.
## Call 'lifecycle::last_lifecycle_warnings()' to see where this warning was
## generated.

# Calculate centrality measures for each open seat
degree_centrality <- degree(g) / (vcount(g) - 1)
closeness_centrality <- closeness(g)
betweenness_centrality <- betweenness(g)

# Extract centrality measures for open seats only
open_seats <- c('A', 'B', 'C', 'D')
```

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degree_centralty_open <- degree_centralty[open_seats]
closeness_centralty_open <- closeness_centralty[open_seats]
betweenness_centralty_open <- betweenness_centralty[open_seats]

# Print the centrality measures
print("Degree centrality:")

## [1] "Degree centrality:"
print(degree_centralty_open)

##           A           B           C           D
## 0.3333333 0.5555556 0.5555556 0.5555556
print("Closeness centrality:")

## [1] "Closeness centrality:"
print(closeness_centralty_open)

##           A           B           C           D
## 0.0625000 0.07142857 0.07142857 0.06250000
print("Betweenness centrality:")

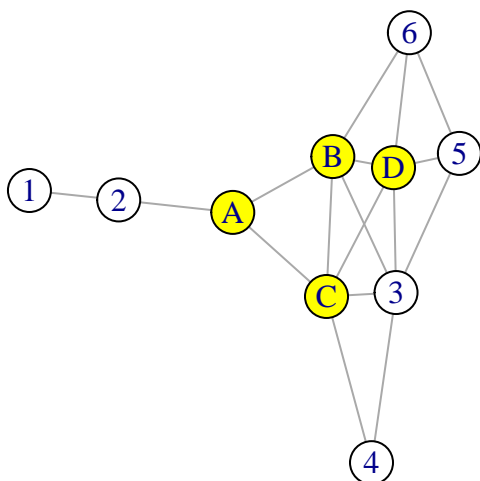
## [1] "Betweenness centrality:"
print(betweenness_centralty_open)

##           A           B           C           D
## 14.000000  9.033333  8.600000  3.266667
# Plot the network graph

plot(g, vertex.size=20, vertex.label=V(g)$name,
     vertex.color=c("white", "white", "white", "white", "white", "white", "yellow", "yellow", "yellow",
                    edge.arrow.size=0.5, main="Bus Seat Network Graph")

```

Bus Seat Network Graph



```
knitr::opts_chunk$set(echo = TRUE)
```

Seat A : It has the lowest closeness centrality, which means it is less central in the network, and it takes longer to reach others. It has high betweenness though.

Seat B: This seat has a relatively high degree of centrality, which could be beneficial for networking as we can directly communicate with more people. Its high closeness centrality also means we are relatively central to the network, allowing for quicker interactions.

Seat C: Like Seat B, it allows for robust direct connections and a central position in the network, facilitating quicker interactions with others.

Seat D: It has the lower betweenness centrality indicates that Seat D is not often on the shortest path between other pairs of seats, making it less strategic for controlling communication. Its closeness centrality is also lower, indicating that it's slightly less central than seats B and C.