

Practical 4: For a given network find the following: (i) Length of the shortest path from a given node to another node; (ii) the density of the graph

Code:

```
library(igraph)

# creating a matrix from a table
matt <- as.matrix(read.table(text=
      "node  R  S  T  U
      R  7  5  0  0
      S  7  0  0  2
      T  0  6  0  0
      U  4  0  1  0", header=T))

# storing the row names in nms and removing the first column
nms <- matt[,1]
matt <- matt[, -1]

# setting the column and row names to be the same
colnames(matt) <- rownames(matt) <- nms

# replacing NA values with 0
matt[is.na(matt)] <- 0

# creating a weighted graph from the matrix
g <- graph.adjacency(matt, weighted=TRUE)

# plotting the graph
plot(g)

# calculating the shortest paths between all pairs of nodes
s.paths <- shortest.paths(g, algorithm = "dijkstra")
print(s.paths)

# calculating the shortest path between R and S
shortest.paths(g, v="R", to="S")

# plotting the graph with edge weights as labels
plot(g, edge.label=E(g)$weight)

# calculating the density of the graph
dg <- graph.formula(1-+2, 1-+3, 2++3)
plot(dg)
graph.density(dg, loops=TRUE)
graph.density(simplify(dg), loops=FALSE)
```

OUTPUT



