HW10

Mike Lehman

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#1  
airports.df <- read.csv("airports.csv", row.names = 1)  
str(airports.df)

## 'data.frame': 29 obs. of 29 variables:  
## $ BOS: int 0 1 0 1 0 1 0 0 0 0 ...  
## $ ANC: int 1 0 0 12 3 3 8 0 0 8 ...  
## $ JFK: int 0 0 0 1 0 0 1 0 1 2 ...  
## $ LAS: int 2 14 1 0 9 10 0 0 0 12 ...  
## $ MIA: int 0 3 0 10 0 1 5 0 1 18 ...  
## $ EWR: int 1 2 0 8 1 0 8 1 1 5 ...  
## $ BJC: int 3 10 0 0 5 9 0 0 0 7 ...  
## $ TEB: int 0 0 0 0 0 1 0 0 0 0 ...  
## $ LAX: int 0 0 0 0 2 1 0 0 0 0 ...  
## $ AEX: int 0 7 1 12 20 4 8 0 0 0 ...  
## $ BFI: int 0 0 0 0 0 1 0 0 0 0 ...  
## $ ELM: int 0 0 0 0 0 0 0 0 0 0 ...  
## $ GEG: int 0 0 0 0 0 0 0 0 0 0 ...  
## $ ICT: int 0 0 0 0 2 0 0 0 0 0 ...  
## $ PBI: int 0 0 0 0 1 0 0 0 0 1 ...  
## $ PIT: int 0 2 0 2 1 0 6 0 0 0 ...  
## $ SFO: int 0 5 0 9 2 1 6 0 0 2 ...  
## $ VCT: int 0 6 0 11 14 3 9 0 0 16 ...  
## $ IAD: int 0 0 0 0 0 0 0 0 0 0 ...  
## $ ABE: int 0 10 0 7 3 3 11 0 0 10 ...  
## $ AGS: int 0 0 0 0 0 0 0 0 0 1 ...  
## $ AVL: int 0 0 0 0 0 0 0 0 0 0 ...  
## $ AVP: int 0 0 0 0 0 0 1 0 0 0 ...  
## $ BDL: int 0 0 0 0 0 0 1 0 0 0 ...  
## $ BHM: int 0 2 0 2 1 1 2 0 0 0 ...  
## $ BNA: int 0 0 0 0 2 1 0 0 0 0 ...  
## $ BTR: int 0 0 0 2 3 2 3 0 0 2 ...  
## $ BUF: int 0 0 0 0 0 0 0 0 0 0 ...  
## $ BWI: int 0 4 0 9 1 0 3 0 0 0 ...

#2  
airports.mat <- as.matrix(airports.df)  
str(airports.mat)

## int [1:29, 1:29] 0 1 0 1 0 1 0 0 0 0 ...  
## - attr(\*, "dimnames")=List of 2  
## ..$ : chr [1:29] "BOS" "ANC" "JFK" "LAS" ...  
## ..$ : chr [1:29] "BOS" "ANC" "JFK" "LAS" ...

#3  
library(igraph)

##   
## Attaching package: 'igraph'

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

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

g <- graph.adjacency(airports.mat, mode = "directed", weighted = TRUE)

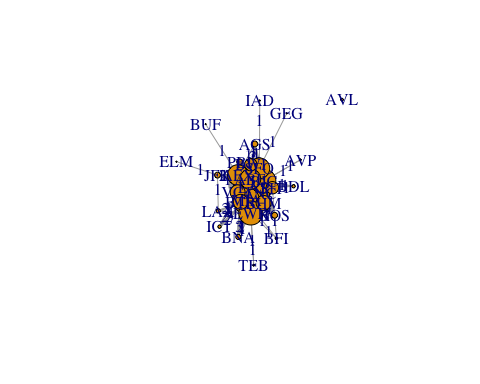
#4  
V(g)

## + 29/29 vertices, named:  
## [1] BOS ANC JFK LAS MIA EWR BJC TEB LAX AEX BFI ELM GEG ICT PBI PIT SFO  
## [18] VCT IAD ABE AGS AVL AVP BDL BHM BNA BTR BUF BWI

#5  
E(g)$weight

## [1] 1 2 1 3 1 14 3 2 10 7 2 5 6 10 2 4 1 1 1 12 1 10 8  
## [24] 12 2 9 11 7 2 2 9 3 9 1 5 2 20 2 1 1 2 14 3 1 2 3  
## [47] 1 1 3 10 1 9 1 1 4 1 1 3 3 1 1 2 8 1 5 8 8 6 6  
## [70] 9 11 1 1 2 3 3 1 1 1 1 8 2 12 18 5 7 1 2 16 10 1 2  
## [93] 1 1 1 3 1 1 1 1 2 2 6 1 1 1 1 2 4 10 3 1 4 2 1  
## [116] 2 1 8 3 2 6 11 13 3 9 19 2 2 9 9 8 3 3 13 9 9 8 2  
## [139] 5 4 3 1 2 1 1 1 1 1 3 1 1 1 5 2 2 7 2 1 1 3 2  
## [162] 2 2 2 1 2 3 3 3 1 1 4 9 1 2 1 1 3 1

#6  
plot(g, edge.label=round(E(g)$weight), edge.width = E(g)$weight, vertex.label = V(g)$name, vertex.size = degree(g), edge.arrow.size=0.01)



#7  
regions.df <- read.csv("region.csv")  
str(regions.df)

## 'data.frame': 29 obs. of 2 variables:  
## $ name : Factor w/ 29 levels "ABE","AEX","AGS",..: 1 2 3 4 5 6 7 8 9 10 ...  
## $ region: Factor w/ 3 levels "C","E","W": 2 3 3 3 1 2 2 3 1 1 ...

#8  
gnodes.attributes <- regions.df[match(V(g)$name, regions.df$name),]  
V(g)$region <- as.character(gnodes.attributes$region)

#9  
color.mat <- cbind(c("E","W","C"), c("red","blue","green"))  
V(g)$color <- color.mat[match(V(g)$region, color.mat[,1]), 2]  
color.mat <- cbind(c("E","W","C"), c("red","blue","green"))  
V(g)$color <- color.mat[match(V(g)$region, color.mat[,1]), 2]  
plot(g, edge.label=round(E(g)$weight), edge.width = E(g)$weight, vertex.label = V(g)$name, vertex.color = V(g)$color, vertex.size = degree(g), edge.arrow.size=0.01)

