GDAT 622 Investigation 4

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read.csv("C:/Users/pavan/Documents/Emotions.csv") -> emotions\_df

head(emotions\_df)

## id Hours Day Pride Love Hope Gratitude Joy Satisfaction Awe Amusement  
## 1 1 1 3 0 0 0 0 0 0 0 0  
## 2 1 14 1 0 0 0 0 0 0 0 0  
## 3 1 14 2 0 0 0 0 0 0 0 0  
## 4 1 14 4 0 0 0 0 0 0 0 0  
## 5 1 15 3 0 0 0 0 0 0 0 0  
## 6 1 15 3 0 0 0 0 0 0 0 0  
## Alertness Anxiety Disdain Ofense Guilt Disgust Fear Embarassment Sadness  
## 1 0 0 0 0 0 0 0 0 0  
## 2 0 0 0 0 0 0 0 0 0  
## 3 0 0 0 0 0 1 0 0 0  
## 4 1 0 0 0 0 0 0 1 0  
## 5 0 0 0 0 0 0 0 1 0  
## 6 1 1 0 0 0 0 0 0 1  
## Anger  
## 1 0  
## 2 0  
## 3 0  
## 4 0  
## 5 0  
## 6 0

str(emotions\_df)

## 'data.frame': 69544 obs. of 21 variables:  
## $ id : int 1 1 1 1 1 1 1 8 8 8 ...  
## $ Hours : int 1 14 14 14 15 15 19 8 9 10 ...  
## $ Day : int 3 1 2 4 3 3 1 5 2 7 ...  
## $ Pride : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ Love : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ Hope : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ Gratitude : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ Joy : int 0 0 0 0 0 0 0 1 1 0 ...  
## $ Satisfaction: int 0 0 0 0 0 0 0 0 0 0 ...  
## $ Awe : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ Amusement : int 0 0 0 0 0 0 0 1 0 0 ...  
## $ Alertness : int 0 0 0 1 0 1 0 0 1 1 ...  
## $ Anxiety : int 0 0 0 0 0 1 0 0 0 0 ...  
## $ Disdain : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ Ofense : int 0 0 0 0 0 0 1 0 0 0 ...  
## $ Guilt : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ Disgust : int 0 0 1 0 0 0 0 0 0 0 ...  
## $ Fear : int 0 0 0 0 0 0 0 0 0 0 ...  
## $ Embarassment: int 0 0 0 1 1 0 0 0 0 0 ...  
## $ Sadness : int 0 0 0 0 0 1 1 0 0 0 ...  
## $ Anger : int 0 0 0 0 0 0 0 0 0 0 ...

select(emotions\_df[1:10000,], 19, 1:18) -> emotions

colnames(emotions) -> emotions\_names  
matrix(0,  
 nrow = (20),  
 ncol = (20)  
 ) -> emotions\_mat  
emotions\_mat

## [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10] [,11] [,12] [,13]  
## [1,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [2,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [3,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [4,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [5,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [6,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [7,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [8,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [9,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [10,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [11,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [12,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [13,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [14,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [15,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [16,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [17,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [18,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [19,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [20,] 0 0 0 0 0 0 0 0 0 0 0 0 0  
## [,14] [,15] [,16] [,17] [,18] [,19] [,20]  
## [1,] 0 0 0 0 0 0 0  
## [2,] 0 0 0 0 0 0 0  
## [3,] 0 0 0 0 0 0 0  
## [4,] 0 0 0 0 0 0 0  
## [5,] 0 0 0 0 0 0 0  
## [6,] 0 0 0 0 0 0 0  
## [7,] 0 0 0 0 0 0 0  
## [8,] 0 0 0 0 0 0 0  
## [9,] 0 0 0 0 0 0 0  
## [10,] 0 0 0 0 0 0 0  
## [11,] 0 0 0 0 0 0 0  
## [12,] 0 0 0 0 0 0 0  
## [13,] 0 0 0 0 0 0 0  
## [14,] 0 0 0 0 0 0 0  
## [15,] 0 0 0 0 0 0 0  
## [16,] 0 0 0 0 0 0 0  
## [17,] 0 0 0 0 0 0 0  
## [18,] 0 0 0 0 0 0 0  
## [19,] 0 0 0 0 0 0 0  
## [20,] 0 0 0 0 0 0 0

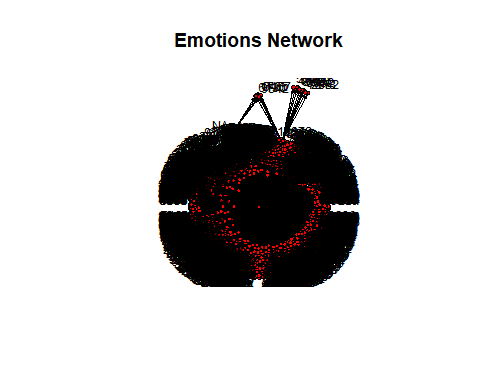
graph.data.frame(emotions) -> emotions\_graph

## Warning in graph.data.frame(emotions): In `d' `NA' elements were replaced  
## with string "NA"

emotions\_graph

## IGRAPH 559c012 DN-- 1670 10000 --   
## + attr: name (v/c), Hours (e/n), Day (e/n), Pride (e/n), Love  
## | (e/n), Hope (e/n), Gratitude (e/n), Joy (e/n), Satisfaction  
## | (e/n), Awe (e/n), Amusement (e/n), Alertness (e/n), Anxiety  
## | (e/n), Disdain (e/n), Ofense (e/n), Guilt (e/n), Disgust (e/n),  
## | Fear (e/n)  
## + edges from 559c012 (vertex names):  
## [1] 0->1 0->1 0->1 1->1 1->1 0->1 0->1 0->8 0->8 0->8 0->8   
## [12] 0->8 0->8 0->8 0->15 0->15 0->15 0->15 0->15 0->15 0->15 0->15  
## [23] 0->23 0->23 0->23 0->26 0->26 0->26 0->26 0->26 0->26 0->32 0->32  
## [34] 0->32 0->32 0->32 0->32 0->32 0->32 0->32 0->32 0->32 0->43 0->43  
## + ... omitted several edges

asNetwork(emotions\_graph) -> emotions\_net  
  
plot(emotions\_net, displaylabels = TRUE, boxed.labels = FALSE,  
 label.cex = 0.75, pad = 1, main = "Emotions Network")



centr\_betw(emotions\_graph)$centralization -> emotions\_graph\_betw  
emotions\_graph\_betw

## [1] 4.311e-06

centr\_degree(emotions\_graph)$centralization -> emotions\_graph\_deg  
emotions\_graph\_deg

## [1] 2.815

ergm(emotions\_net ~ edges) -> emotions\_ergm

## [1] "Warning: This network contains loops"  
## [1] "Warning: This network contains loops"

## Starting maximum pseudolikelihood estimation (MPLE):

## Evaluating the predictor and response matrix.

## Maximizing the pseudolikelihood.

## Finished MPLE.

## Stopping at the initial estimate.

## Evaluating log-likelihood at the estimate.

summary(emotions\_ergm)

##   
## ==========================  
## Summary of model fit  
## ==========================  
##   
## Formula: emotions\_net ~ edges  
##   
## Iterations: 9 out of 20   
##   
## Monte Carlo MLE Results:  
## Estimate Std. Error MCMC % z value Pr(>|z|)  
## edges -7.2286 0.0222 0 -325 <1e-04  
##   
## Null Deviance: 3866236 on 2788900 degrees of freedom  
## Residual Deviance: 33278 on 2788899 degrees of freedom  
##   
## AIC: 33280 BIC: 33293 (Smaller is better.)

anova(emotions\_ergm)

## Analysis of Variance Table  
##   
## Model 1: emotions\_net ~ edges  
## Df Deviance Resid. Df Resid. Dev Pr(>|Chisq|)  
## NULL 2788900 3866236   
## Model 1: 1 3832958 2788899 33278 <2e-16