Attrition Project

Joseph AKUM

16/03/2020

Importing the data set to R

library(readxl)

## Warning: package 'readxl' was built under R version 3.6.2

Attrition\_data <- read\_excel("C:/Users/Akum/Desktop/Capstone datasets/IBM attrition rates/WA\_Fn-UseC\_-HR-Employee-Attrition 2.xls",   
 col\_types = c("numeric", "text", "text",   
 "numeric", "text", "numeric", "numeric",   
 "text", "numeric", "numeric", "numeric",   
 "text", "numeric", "numeric", "numeric",   
 "text", "numeric", "text", "numeric",   
 "numeric", "text", "numeric", "numeric",   
 "numeric", "numeric", "numeric",   
 "numeric", "numeric", "numeric",   
 "numeric", "numeric", "numeric",   
 "numeric"))

#1. Checking the data set for missing values

sum(is.na(Attrition\_data))

## [1] 0

#2. Converting all categorical variables in the dataset into factor

Attrition\_data\_fac <- as.data.frame(unclass(Attrition\_data))

#3. Checking the structure of our data set

str(Attrition\_data\_fac)

## 'data.frame': 1470 obs. of 33 variables:  
## $ Age : num 41 49 37 33 27 32 59 30 38 36 ...  
## $ Attrition : Factor w/ 2 levels "No","Yes": 2 1 2 1 1 1 1 1 1 1 ...  
## $ BusinessTravel : Factor w/ 3 levels "Non-Travel","Travel\_Frequently",..: 3 2 3 2 3 2 3 3 2 3 ...  
## $ DailyRate : num 1102 279 1373 1392 591 ...  
## $ Department : Factor w/ 3 levels "Human Resources",..: 3 2 2 2 2 2 2 2 2 2 ...  
## $ DistanceFromHome : num 1 8 2 3 2 2 3 24 23 27 ...  
## $ Education : num 2 1 2 4 1 2 3 1 3 3 ...  
## $ EducationField : Factor w/ 6 levels "Human Resources",..: 2 2 5 2 4 2 4 2 2 4 ...  
## $ EmployeeCount : num 1 1 1 1 1 1 1 1 1 1 ...  
## $ EmployeeNumber : num 1 2 4 5 7 8 10 11 12 13 ...  
## $ EnvironmentSatisfaction : num 2 3 4 4 1 4 3 4 4 3 ...  
## $ Gender : Factor w/ 2 levels "Female","Male": 1 2 2 1 2 2 1 2 2 2 ...  
## $ HourlyRate : num 94 61 92 56 40 79 81 67 44 94 ...  
## $ JobInvolvement : num 3 2 2 3 3 3 4 3 2 3 ...  
## $ JobLevel : num 2 2 1 1 1 1 1 1 3 2 ...  
## $ JobRole : Factor w/ 9 levels "Healthcare Representative",..: 8 7 3 7 3 3 3 3 5 1 ...  
## $ JobSatisfaction : num 4 2 3 3 2 4 1 3 3 3 ...  
## $ MaritalStatus : Factor w/ 3 levels "Divorced","Married",..: 3 2 3 2 2 3 2 1 3 2 ...  
## $ MonthlyIncome : num 5993 5130 2090 2909 3468 ...  
## $ NumCompaniesWorked : num 8 1 6 1 9 0 4 1 0 6 ...  
## $ OverTime : Factor w/ 2 levels "No","Yes": 2 1 2 2 1 1 2 1 1 1 ...  
## $ PercentSalaryHike : num 11 23 15 11 12 13 20 22 21 13 ...  
## $ PerformanceRating : num 3 4 3 3 3 3 4 4 4 3 ...  
## $ RelationshipSatisfaction: num 1 4 2 3 4 3 1 2 2 2 ...  
## $ StandardHours : num 80 80 80 80 80 80 80 80 80 80 ...  
## $ StockOptionLevel : num 0 1 0 0 1 0 3 1 0 2 ...  
## $ TotalWorkingYears : num 8 10 7 8 6 8 12 1 10 17 ...  
## $ TrainingTimesLastYear : num 0 3 3 3 3 2 3 2 2 3 ...  
## $ WorkLifeBalance : num 1 3 3 3 3 2 2 3 3 2 ...  
## $ YearsAtCompany : num 6 10 0 8 2 7 1 1 9 7 ...  
## $ YearsInCurrentRole : num 4 7 0 7 2 7 0 0 7 7 ...  
## $ YearsSinceLastPromotion : num 0 1 0 3 2 3 0 0 1 7 ...  
## $ YearsWithCurrManager : num 5 7 0 0 2 6 0 0 8 7 ...

#4. Editing the content of the Attrition Data type

Attrition1<-ifelse(Attrition\_data\_fac$Attrition=="Yes","1","0")  
  
Attrition\_data\_fac$Attrition<-Attrition1  
  
Attrition\_data\_fac$Attrition<-as.factor(Attrition\_data\_fac$Attrition)

#5. Editing the content of the OverTime Data type

Overtime1<-ifelse(Attrition\_data\_fac$OverTime=="Yes","1","0")  
  
Attrition\_data\_fac$OverTime<-Overtime1  
  
Attrition\_data\_fac$OverTime<-as.factor(Attrition\_data\_fac$OverTime)

#6. reordering levels of Business travel

Attrition\_data\_fac$BusinessTravel<-factor(Attrition\_data\_fac$BusinessTravel, levels = c("Non-Travel","Travel\_Rarely","Travel\_Frequently"))

#7. Transforming the necessary numeric variables to factor variables

Attrition\_data\_fac$StockOptionLevel<- as.factor(Attrition\_data\_fac$StockOptionLevel)  
  
Attrition\_data\_fac$Education<-as.factor(Attrition\_data\_fac$Education)  
  
Attrition\_data\_fac$EnvironmentSatisfaction<-as.factor(Attrition\_data\_fac$EnvironmentSatisfaction)  
  
Attrition\_data\_fac$JobInvolvement<-as.factor(Attrition\_data\_fac$JobInvolvement)  
  
Attrition\_data\_fac$JobLevel<-as.factor(Attrition\_data\_fac$JobLevel)  
  
Attrition\_data\_fac$JobSatisfaction<-as.factor(Attrition\_data\_fac$JobSatisfaction)  
  
Attrition\_data\_fac$TrainingTimesLastYear<-as.factor(Attrition\_data\_fac$TrainingTimesLastYear)  
  
Attrition\_data\_fac$WorkLifeBalance<-as.factor(Attrition\_data\_fac$WorkLifeBalance)  
  
Attrition\_data\_fac$NumCompaniesWorked<-as.factor(Attrition\_data\_fac$NumCompaniesWorked)  
  
Attrition\_data\_fac$PerformanceRating<-as.factor(Attrition\_data\_fac$PerformanceRating)  
  
Attrition\_data\_fac$RelationshipSatisfaction<-as.factor(Attrition\_data\_fac$RelationshipSatisfaction)  
  
Attrition\_data\_fac$StockOptionLevel<-as.factor(Attrition\_data\_fac$StockOptionLevel)  
  
Attrition\_data\_fac$WorkLifeBalance<-as.factor(Attrition\_data\_fac$WorkLifeBalance)

#8. Checking the updated data structure of our dataset

str(Attrition\_data\_fac)

## 'data.frame': 1470 obs. of 33 variables:  
## $ Age : num 41 49 37 33 27 32 59 30 38 36 ...  
## $ Attrition : Factor w/ 2 levels "0","1": 2 1 2 1 1 1 1 1 1 1 ...  
## $ BusinessTravel : Factor w/ 3 levels "Non-Travel","Travel\_Rarely",..: 2 3 2 3 2 3 2 2 3 2 ...  
## $ DailyRate : num 1102 279 1373 1392 591 ...  
## $ Department : Factor w/ 3 levels "Human Resources",..: 3 2 2 2 2 2 2 2 2 2 ...  
## $ DistanceFromHome : num 1 8 2 3 2 2 3 24 23 27 ...  
## $ Education : Factor w/ 5 levels "1","2","3","4",..: 2 1 2 4 1 2 3 1 3 3 ...  
## $ EducationField : Factor w/ 6 levels "Human Resources",..: 2 2 5 2 4 2 4 2 2 4 ...  
## $ EmployeeCount : num 1 1 1 1 1 1 1 1 1 1 ...  
## $ EmployeeNumber : num 1 2 4 5 7 8 10 11 12 13 ...  
## $ EnvironmentSatisfaction : Factor w/ 4 levels "1","2","3","4": 2 3 4 4 1 4 3 4 4 3 ...  
## $ Gender : Factor w/ 2 levels "Female","Male": 1 2 2 1 2 2 1 2 2 2 ...  
## $ HourlyRate : num 94 61 92 56 40 79 81 67 44 94 ...  
## $ JobInvolvement : Factor w/ 4 levels "1","2","3","4": 3 2 2 3 3 3 4 3 2 3 ...  
## $ JobLevel : Factor w/ 5 levels "1","2","3","4",..: 2 2 1 1 1 1 1 1 3 2 ...  
## $ JobRole : Factor w/ 9 levels "Healthcare Representative",..: 8 7 3 7 3 3 3 3 5 1 ...  
## $ JobSatisfaction : Factor w/ 4 levels "1","2","3","4": 4 2 3 3 2 4 1 3 3 3 ...  
## $ MaritalStatus : Factor w/ 3 levels "Divorced","Married",..: 3 2 3 2 2 3 2 1 3 2 ...  
## $ MonthlyIncome : num 5993 5130 2090 2909 3468 ...  
## $ NumCompaniesWorked : Factor w/ 10 levels "0","1","2","3",..: 9 2 7 2 10 1 5 2 1 7 ...  
## $ OverTime : Factor w/ 2 levels "0","1": 2 1 2 2 1 1 2 1 1 1 ...  
## $ PercentSalaryHike : num 11 23 15 11 12 13 20 22 21 13 ...  
## $ PerformanceRating : Factor w/ 2 levels "3","4": 1 2 1 1 1 1 2 2 2 1 ...  
## $ RelationshipSatisfaction: Factor w/ 4 levels "1","2","3","4": 1 4 2 3 4 3 1 2 2 2 ...  
## $ StandardHours : num 80 80 80 80 80 80 80 80 80 80 ...  
## $ StockOptionLevel : Factor w/ 4 levels "0","1","2","3": 1 2 1 1 2 1 4 2 1 3 ...  
## $ TotalWorkingYears : num 8 10 7 8 6 8 12 1 10 17 ...  
## $ TrainingTimesLastYear : Factor w/ 7 levels "0","1","2","3",..: 1 4 4 4 4 3 4 3 3 4 ...  
## $ WorkLifeBalance : Factor w/ 4 levels "1","2","3","4": 1 3 3 3 3 2 2 3 3 2 ...  
## $ YearsAtCompany : num 6 10 0 8 2 7 1 1 9 7 ...  
## $ YearsInCurrentRole : num 4 7 0 7 2 7 0 0 7 7 ...  
## $ YearsSinceLastPromotion : num 0 1 0 3 2 3 0 0 1 7 ...  
## $ YearsWithCurrManager : num 5 7 0 0 2 6 0 0 8 7 ...

#9. An overview or summary of our data set

summary(Attrition\_data\_fac)

## Age Attrition BusinessTravel DailyRate   
## Min. :18.00 0:1233 Non-Travel : 150 Min. : 102.0   
## 1st Qu.:30.00 1: 237 Travel\_Rarely :1043 1st Qu.: 465.0   
## Median :36.00 Travel\_Frequently: 277 Median : 802.0   
## Mean :36.92 Mean : 802.5   
## 3rd Qu.:43.00 3rd Qu.:1157.0   
## Max. :60.00 Max. :1499.0   
##   
## Department DistanceFromHome Education  
## Human Resources : 63 Min. : 1.000 1:170   
## Research & Development:961 1st Qu.: 2.000 2:282   
## Sales :446 Median : 7.000 3:572   
## Mean : 9.193 4:398   
## 3rd Qu.:14.000 5: 48   
## Max. :29.000   
##   
## EducationField EmployeeCount EmployeeNumber   
## Human Resources : 27 Min. :1 Min. : 1.0   
## Life Sciences :606 1st Qu.:1 1st Qu.: 491.2   
## Marketing :159 Median :1 Median :1020.5   
## Medical :464 Mean :1 Mean :1024.9   
## Other : 82 3rd Qu.:1 3rd Qu.:1555.8   
## Technical Degree:132 Max. :1 Max. :2068.0   
##   
## EnvironmentSatisfaction Gender HourlyRate JobInvolvement  
## 1:284 Female:588 Min. : 30.00 1: 83   
## 2:287 Male :882 1st Qu.: 48.00 2:375   
## 3:453 Median : 66.00 3:868   
## 4:446 Mean : 65.89 4:144   
## 3rd Qu.: 83.75   
## Max. :100.00   
##   
## JobLevel JobRole JobSatisfaction MaritalStatus  
## 1:543 Sales Executive :326 1:289 Divorced:327   
## 2:534 Research Scientist :292 2:280 Married :673   
## 3:218 Laboratory Technician :259 3:442 Single :470   
## 4:106 Manufacturing Director :145 4:459   
## 5: 69 Healthcare Representative:131   
## Manager :102   
## (Other) :215   
## MonthlyIncome NumCompaniesWorked OverTime PercentSalaryHike  
## Min. : 1009 1 :521 0:1054 Min. :11.00   
## 1st Qu.: 2911 0 :197 1: 416 1st Qu.:12.00   
## Median : 4919 3 :159 Median :14.00   
## Mean : 6503 2 :146 Mean :15.21   
## 3rd Qu.: 8379 4 :139 3rd Qu.:18.00   
## Max. :19999 7 : 74 Max. :25.00   
## (Other):234   
## PerformanceRating RelationshipSatisfaction StandardHours StockOptionLevel  
## 3:1244 1:276 Min. :80 0:631   
## 4: 226 2:303 1st Qu.:80 1:596   
## 3:459 Median :80 2:158   
## 4:432 Mean :80 3: 85   
## 3rd Qu.:80   
## Max. :80   
##   
## TotalWorkingYears TrainingTimesLastYear WorkLifeBalance YearsAtCompany   
## Min. : 0.00 0: 54 1: 80 Min. : 0.000   
## 1st Qu.: 6.00 1: 71 2:344 1st Qu.: 3.000   
## Median :10.00 2:547 3:893 Median : 5.000   
## Mean :11.28 3:491 4:153 Mean : 7.008   
## 3rd Qu.:15.00 4:123 3rd Qu.: 9.000   
## Max. :40.00 5:119 Max. :40.000   
## 6: 65   
## YearsInCurrentRole YearsSinceLastPromotion YearsWithCurrManager  
## Min. : 0.000 Min. : 0.000 Min. : 0.000   
## 1st Qu.: 2.000 1st Qu.: 0.000 1st Qu.: 2.000   
## Median : 3.000 Median : 1.000 Median : 3.000   
## Mean : 4.229 Mean : 2.188 Mean : 4.123   
## 3rd Qu.: 7.000 3rd Qu.: 3.000 3rd Qu.: 7.000   
## Max. :18.000 Max. :15.000 Max. :17.000   
##

#10. A view of a the first six items in the data set

head(Attrition\_data\_fac)

## Age Attrition BusinessTravel DailyRate Department  
## 1 41 1 Travel\_Rarely 1102 Sales  
## 2 49 0 Travel\_Frequently 279 Research & Development  
## 3 37 1 Travel\_Rarely 1373 Research & Development  
## 4 33 0 Travel\_Frequently 1392 Research & Development  
## 5 27 0 Travel\_Rarely 591 Research & Development  
## 6 32 0 Travel\_Frequently 1005 Research & Development  
## DistanceFromHome Education EducationField EmployeeCount EmployeeNumber  
## 1 1 2 Life Sciences 1 1  
## 2 8 1 Life Sciences 1 2  
## 3 2 2 Other 1 4  
## 4 3 4 Life Sciences 1 5  
## 5 2 1 Medical 1 7  
## 6 2 2 Life Sciences 1 8  
## EnvironmentSatisfaction Gender HourlyRate JobInvolvement JobLevel  
## 1 2 Female 94 3 2  
## 2 3 Male 61 2 2  
## 3 4 Male 92 2 1  
## 4 4 Female 56 3 1  
## 5 1 Male 40 3 1  
## 6 4 Male 79 3 1  
## JobRole JobSatisfaction MaritalStatus MonthlyIncome  
## 1 Sales Executive 4 Single 5993  
## 2 Research Scientist 2 Married 5130  
## 3 Laboratory Technician 3 Single 2090  
## 4 Research Scientist 3 Married 2909  
## 5 Laboratory Technician 2 Married 3468  
## 6 Laboratory Technician 4 Single 3068  
## NumCompaniesWorked OverTime PercentSalaryHike PerformanceRating  
## 1 8 1 11 3  
## 2 1 0 23 4  
## 3 6 1 15 3  
## 4 1 1 11 3  
## 5 9 0 12 3  
## 6 0 0 13 3  
## RelationshipSatisfaction StandardHours StockOptionLevel  
## 1 1 80 0  
## 2 4 80 1  
## 3 2 80 0  
## 4 3 80 0  
## 5 4 80 1  
## 6 3 80 0  
## TotalWorkingYears TrainingTimesLastYear WorkLifeBalance YearsAtCompany  
## 1 8 0 1 6  
## 2 10 3 3 10  
## 3 7 3 3 0  
## 4 8 3 3 8  
## 5 6 3 3 2  
## 6 8 2 2 7  
## YearsInCurrentRole YearsSinceLastPromotion YearsWithCurrManager  
## 1 4 0 5  
## 2 7 1 7  
## 3 0 0 0  
## 4 7 3 0  
## 5 2 2 2  
## 6 7 3 6

#Exploratory Analysis

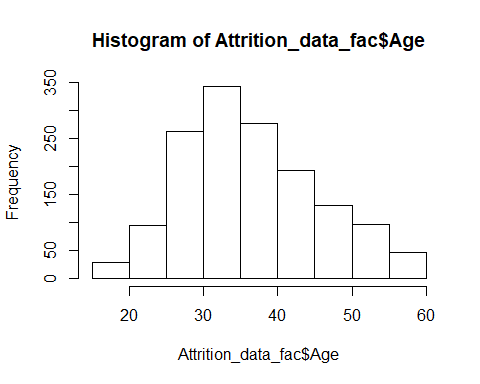
#I. Univarate analysis

#1. Age

summary(Attrition\_data\_fac$Age)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 18.00 30.00 36.00 36.92 43.00 60.00

hist(Attrition\_data\_fac$Age)

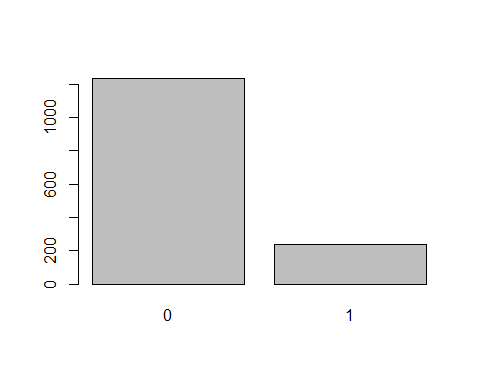


#2. Attrition or resignation

summary(Attrition\_data\_fac$Attrition)

## 0 1   
## 1233 237

plot(Attrition\_data\_fac$Attrition)

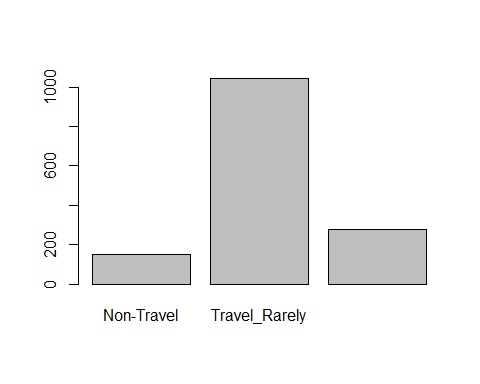


#3. Business Travel

summary(Attrition\_data\_fac$BusinessTravel)

## Non-Travel Travel\_Rarely Travel\_Frequently   
## 150 1043 277

plot(Attrition\_data\_fac$BusinessTravel)

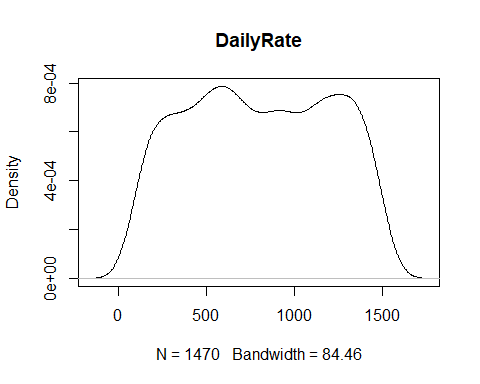


#4. Daily rate

summary(Attrition\_data\_fac$DailyRate)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 102.0 465.0 802.0 802.5 1157.0 1499.0

plot(density(Attrition\_data\_fac$DailyRate),main="DailyRate")



#5. Department

summary(Attrition\_data\_fac$Department)

## Human Resources Research & Development Sales   
## 63 961 446

plot(Attrition\_data\_fac$Department)

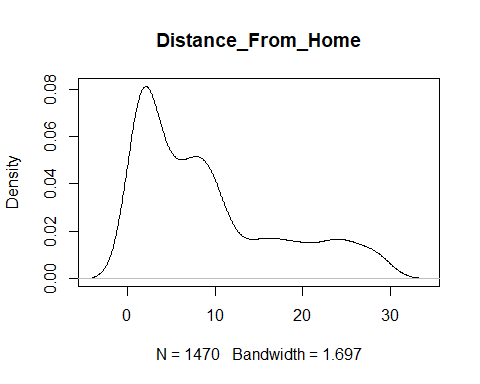


#6. Distance from home

summary(Attrition\_data\_fac$DistanceFromHome)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 1.000 2.000 7.000 9.193 14.000 29.000

plot(density(Attrition\_data\_fac$DistanceFromHome), main="Distance\_From\_Home")

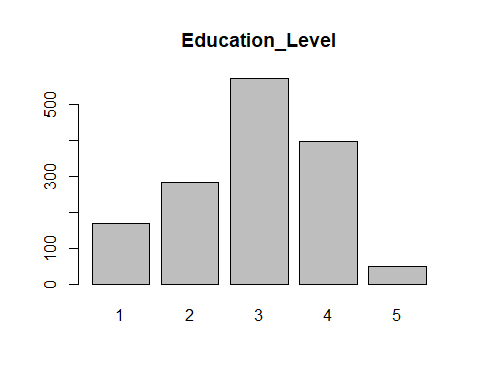


#7. Education Level

summary(Attrition\_data\_fac$Education)

## 1 2 3 4 5   
## 170 282 572 398 48

plot(Attrition\_data\_fac$Education, main ="Education\_Level")

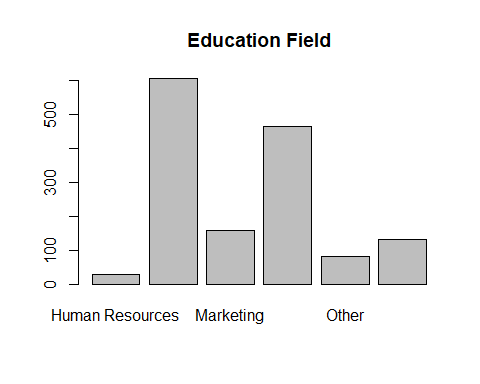


#8. Educationfield

summary(Attrition\_data\_fac$EducationField)

## Human Resources Life Sciences Marketing Medical   
## 27 606 159 464   
## Other Technical Degree   
## 82 132

plot(Attrition\_data\_fac$EducationField, main = "Education Field")

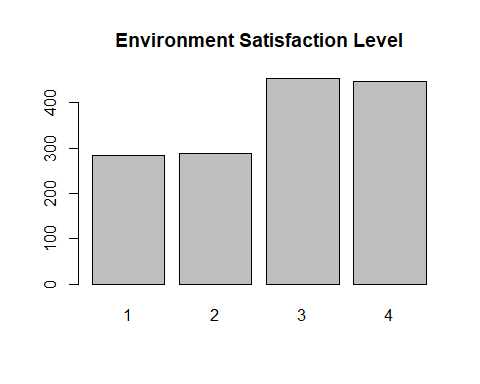


#9. Environment Satisfaction Level

summary(Attrition\_data\_fac$EnvironmentSatisfaction)

## 1 2 3 4   
## 284 287 453 446

plot(Attrition\_data\_fac$EnvironmentSatisfaction, main="Environment Satisfaction Level")

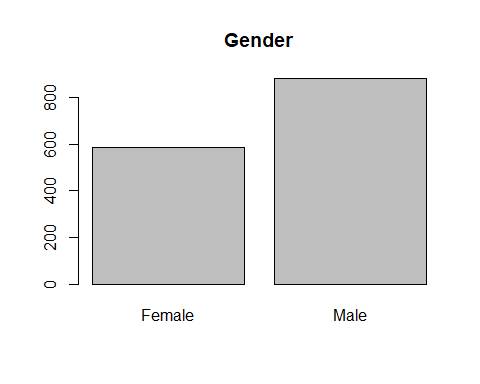


#10. Gender

summary(Attrition\_data\_fac$Gender)

## Female Male   
## 588 882

plot(Attrition\_data\_fac$Gender, main="Gender")

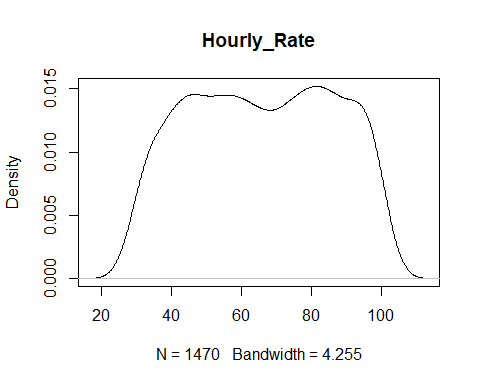


#11. Hourly Rate

summary(Attrition\_data\_fac$HourlyRate)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 30.00 48.00 66.00 65.89 83.75 100.00

plot(density(Attrition\_data\_fac$HourlyRate), main = "Hourly\_Rate")

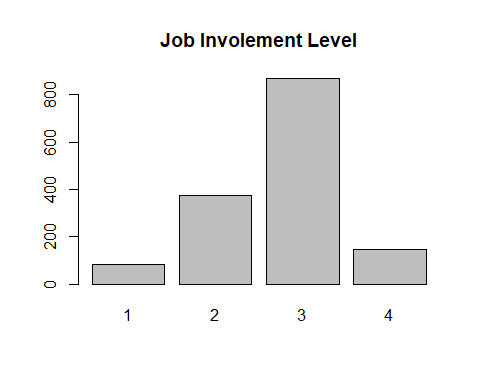


#12. Job involvement

summary(Attrition\_data\_fac$JobInvolvement)

## 1 2 3 4   
## 83 375 868 144

plot(Attrition\_data\_fac$JobInvolvement, main="Job Involement Level")

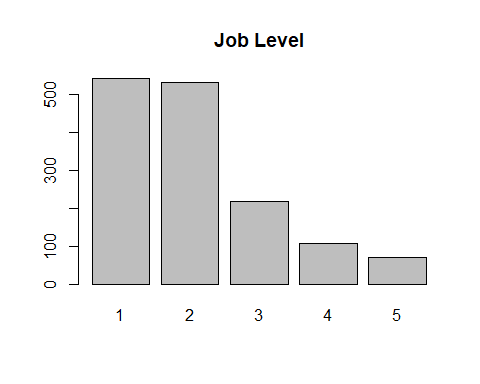


#13. Job Level

summary(Attrition\_data\_fac$JobLevel)

## 1 2 3 4 5   
## 543 534 218 106 69

plot(Attrition\_data\_fac$JobLevel, main="Job Level")

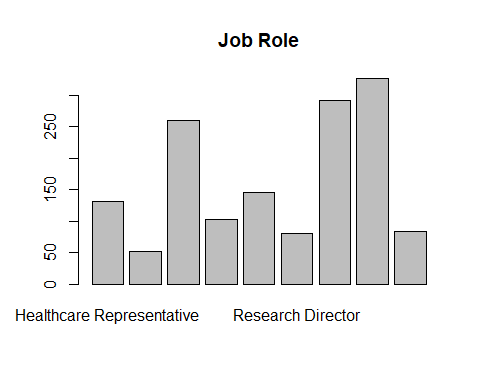


#14. Job Role

summary(Attrition\_data\_fac$JobRole)

## Healthcare Representative Human Resources   
## 131 52   
## Laboratory Technician Manager   
## 259 102   
## Manufacturing Director Research Director   
## 145 80   
## Research Scientist Sales Executive   
## 292 326   
## Sales Representative   
## 83

plot(Attrition\_data\_fac$JobRole, main="Job Role")



#15. Job Satisfaction

summary(Attrition\_data\_fac$JobSatisfaction)

## 1 2 3 4   
## 289 280 442 459

plot(Attrition\_data\_fac$JobSatisfaction, main= "Job Satisfaction")

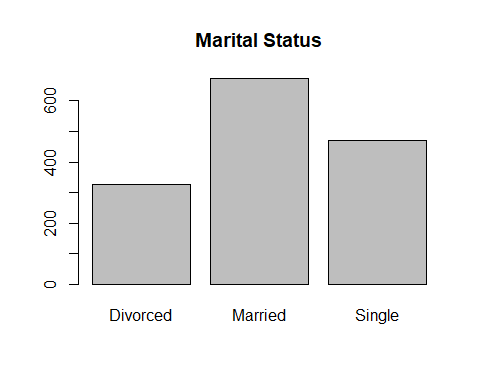


#16. Marital Status

summary(Attrition\_data\_fac$MaritalStatus)

## Divorced Married Single   
## 327 673 470

plot(Attrition\_data\_fac$MaritalStatus, main="Marital Status")

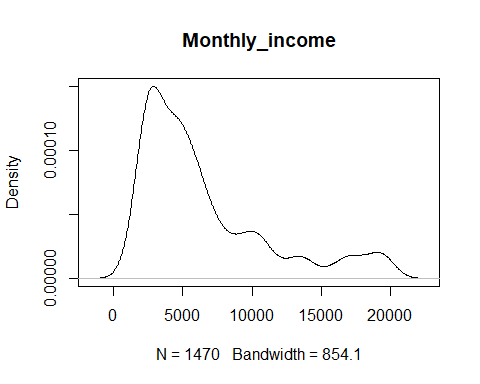


#17. MOnthly Income

summary(Attrition\_data\_fac$MonthlyIncome)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 1009 2911 4919 6503 8379 19999

plot(density(Attrition\_data\_fac$MonthlyIncome), main = "Monthly\_income")

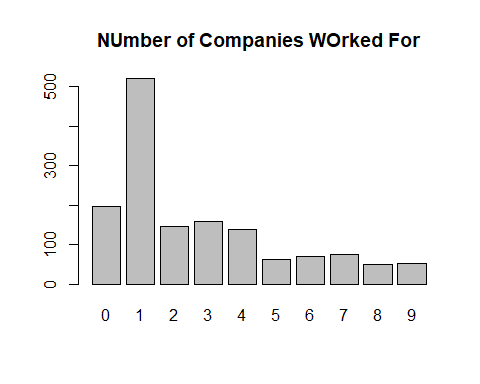


#18. NUmber of Companies WOrked For

summary(Attrition\_data\_fac$NumCompaniesWorked)

## 0 1 2 3 4 5 6 7 8 9   
## 197 521 146 159 139 63 70 74 49 52

plot(Attrition\_data\_fac$NumCompaniesWorked, main="NUmber of Companies WOrked For")

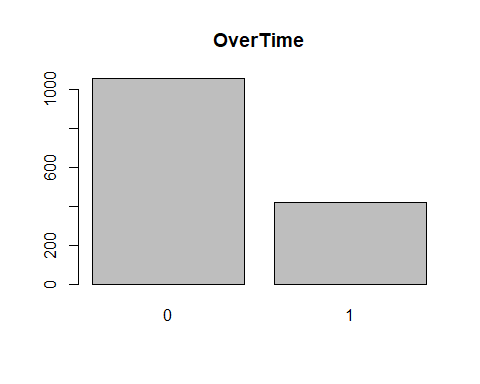


#19. Overtime

summary(Attrition\_data\_fac$OverTime)

## 0 1   
## 1054 416

plot(Attrition\_data\_fac$OverTime, main="OverTime")

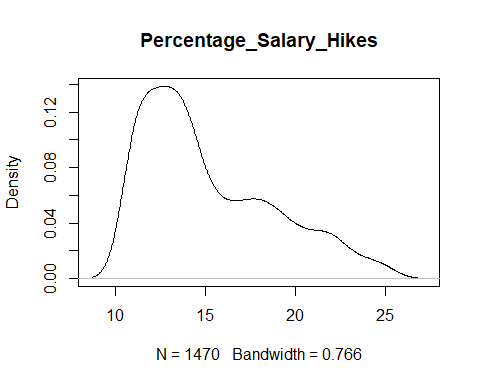


#20. Percentage salary hikes

summary(Attrition\_data\_fac$PercentSalaryHike)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 11.00 12.00 14.00 15.21 18.00 25.00

plot(density(Attrition\_data\_fac$PercentSalaryHike),main = "Percentage\_Salary\_Hikes")

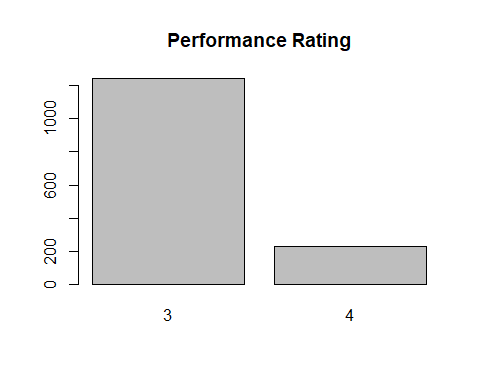


#21. Performance Rating

summary(Attrition\_data\_fac$PerformanceRating)

## 3 4   
## 1244 226

plot(Attrition\_data\_fac$PerformanceRating, main="Performance Rating")

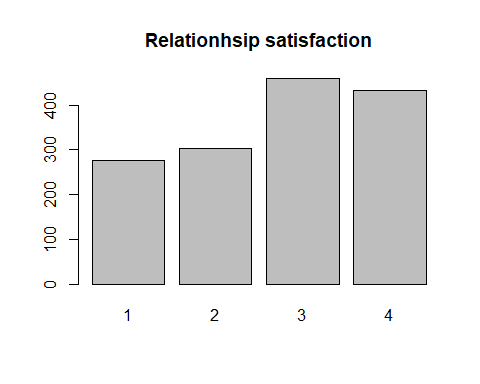


#22.Relationship Satisfaction

summary(Attrition\_data\_fac$RelationshipSatisfaction)

## 1 2 3 4   
## 276 303 459 432

plot(Attrition\_data\_fac$RelationshipSatisfaction, main="Relationhsip satisfaction")

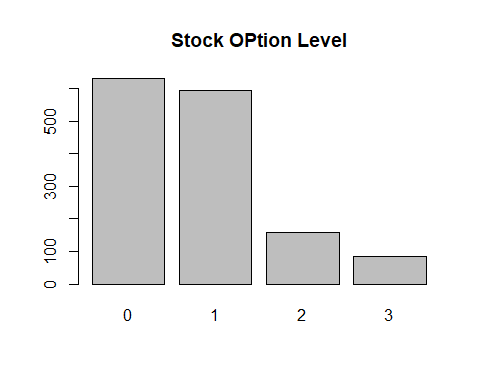


#23. Stock Option Level

summary(Attrition\_data\_fac$StockOptionLevel)

## 0 1 2 3   
## 631 596 158 85

plot(Attrition\_data\_fac$StockOptionLevel, main="Stock OPtion Level")

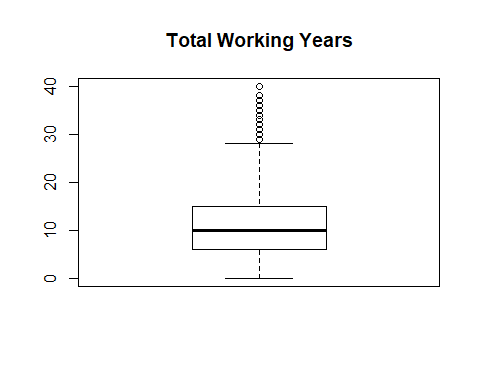


#24. Total Working Years

summary(Attrition\_data\_fac$TotalWorkingYears)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 0.00 6.00 10.00 11.28 15.00 40.00

boxplot(Attrition\_data\_fac$TotalWorkingYears, main="Total Working Years")

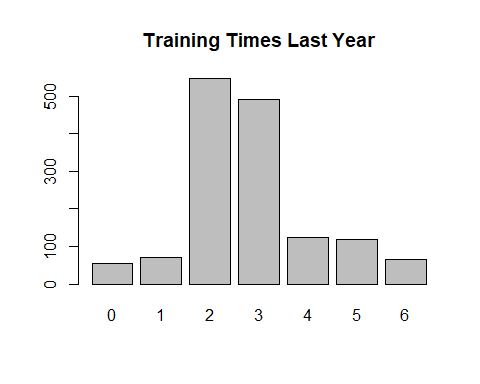


#25. Training Times Last Year

summary(Attrition\_data\_fac$TrainingTimesLastYear)

## 0 1 2 3 4 5 6   
## 54 71 547 491 123 119 65

plot(Attrition\_data\_fac$TrainingTimesLastYear, main = "Training Times Last Year")

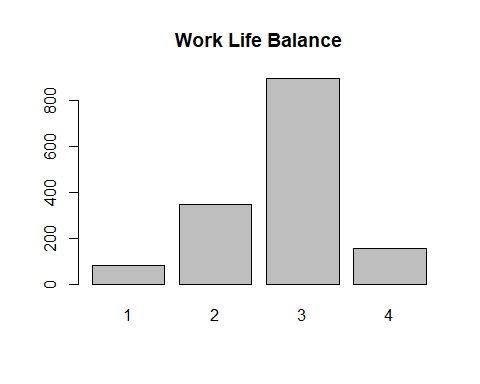


#26. Work Life Balance

summary(Attrition\_data\_fac$WorkLifeBalance)

## 1 2 3 4   
## 80 344 893 153

plot(Attrition\_data\_fac$WorkLifeBalance, main = "Work Life Balance")

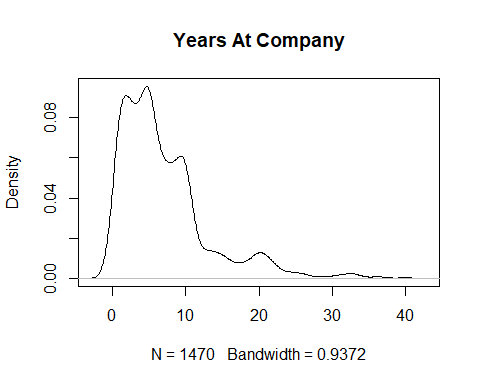


#28. Years at company

summary(Attrition\_data\_fac$YearsAtCompany)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 0.000 3.000 5.000 7.008 9.000 40.000

plot(density(Attrition\_data\_fac$YearsAtCompany), main = "Years At Company")

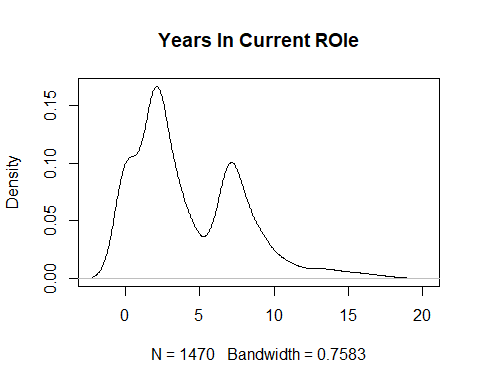


#29.Years in Current Role

summary(Attrition\_data\_fac$YearsInCurrentRole)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 0.000 2.000 3.000 4.229 7.000 18.000

plot(density(Attrition\_data\_fac$YearsInCurrentRole),main = "Years In Current ROle")

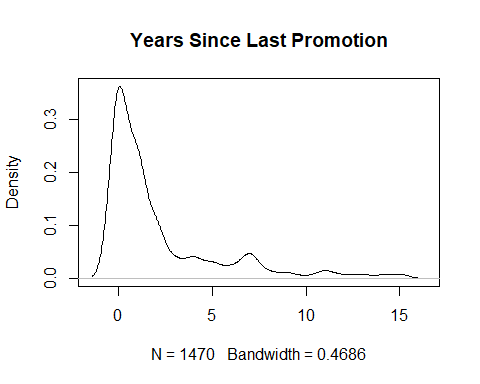


#30.Years Since Last Promotion

summary(Attrition\_data\_fac$YearsSinceLastPromotion)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 0.000 0.000 1.000 2.188 3.000 15.000

plot(density(Attrition\_data\_fac$YearsSinceLastPromotion),main="Years Since Last Promotion")

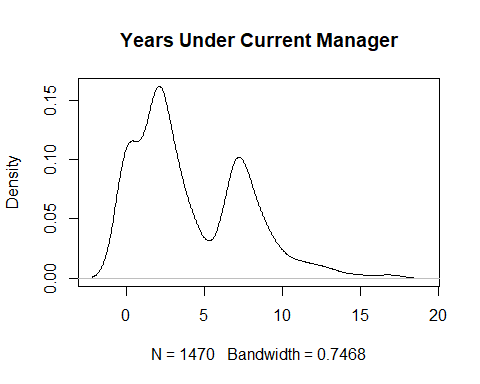


#31. Years with Current Manager

summary(Attrition\_data\_fac$YearsWithCurrManager)

## Min. 1st Qu. Median Mean 3rd Qu. Max.   
## 0.000 2.000 3.000 4.123 7.000 17.000

plot(density(Attrition\_data\_fac$YearsWithCurrManager),main = "Years Under Current Manager")



#II. Bi-Variate Analysis

#How each variable relates with the dependent variable

#Creating new variables to ease the analysis

#Setting age as a categorical variable

CatAge<-cut(Attrition\_data\_fac$Age, breaks = c(0,20,30,40,50,60), labels = c("20","30","40","50","60"))

#Setting monthly income as a categorical variable

CatMonthlyIncome<-cut(Attrition\_data\_fac$MonthlyIncome, breaks = c(0,2000,4000,6000,8000,10000,12000,14000,16000,18000,20000), labels = c("2000","4000","6000","8000","10000","12000","14000","16000","18000","20000"))

#Setting Percentage Salary hikes as a categorical variable

CatHikes<-cut(Attrition\_data\_fac$PercentSalaryHike, breaks = c(10,15,20,25), labels = c("10-15","16-20","21-25"))

require(gmodels)

## Loading required package: gmodels

#1. How does Age impact Attrition

CrossTable(CatAge,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## CatAge | 0 | 1 | Row Total |   
## -------------|-----------|-----------|-----------|  
## 20 | 12 | 16 | 28 |   
## | 5.617 | 29.223 | |   
## | 0.429 | 0.571 | 0.019 |   
## | 0.010 | 0.068 | |   
## | 0.008 | 0.011 | |   
## -------------|-----------|-----------|-----------|  
## 30 | 274 | 84 | 358 |   
## | 2.300 | 11.967 | |   
## | 0.765 | 0.235 | 0.244 |   
## | 0.222 | 0.354 | |   
## | 0.186 | 0.057 | |   
## -------------|-----------|-----------|-----------|  
## 40 | 534 | 85 | 619 |   
## | 0.422 | 2.194 | |   
## | 0.863 | 0.137 | 0.421 |   
## | 0.433 | 0.359 | |   
## | 0.363 | 0.058 | |   
## -------------|-----------|-----------|-----------|  
## 50 | 288 | 34 | 322 |   
## | 1.188 | 6.182 | |   
## | 0.894 | 0.106 | 0.219 |   
## | 0.234 | 0.143 | |   
## | 0.196 | 0.023 | |   
## -------------|-----------|-----------|-----------|  
## 60 | 125 | 18 | 143 |   
## | 0.213 | 1.108 | |   
## | 0.874 | 0.126 | 0.097 |   
## | 0.101 | 0.076 | |   
## | 0.085 | 0.012 | |   
## -------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## -------------|-----------|-----------|-----------|  
##   
##

#2. How does Business Travel Impact Attrition

CrossTable(Attrition\_data\_fac$BusinessTravel,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$BusinessTravel | 0 | 1 | Row Total |   
## ----------------------------------|-----------|-----------|-----------|  
## Non-Travel | 138 | 12 | 150 |   
## | 1.180 | 6.138 | |   
## | 0.920 | 0.080 | 0.102 |   
## | 0.112 | 0.051 | |   
## | 0.094 | 0.008 | |   
## ----------------------------------|-----------|-----------|-----------|  
## Travel\_Rarely | 887 | 156 | 1043 |   
## | 0.169 | 0.879 | |   
## | 0.850 | 0.150 | 0.710 |   
## | 0.719 | 0.658 | |   
## | 0.603 | 0.106 | |   
## ----------------------------------|-----------|-----------|-----------|  
## Travel\_Frequently | 208 | 69 | 277 |   
## | 2.550 | 13.267 | |   
## | 0.751 | 0.249 | 0.188 |   
## | 0.169 | 0.291 | |   
## | 0.141 | 0.047 | |   
## ----------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## ----------------------------------|-----------|-----------|-----------|  
##   
##

#3. How does Monthly Income Level impact Attrition?

CrossTable(CatMonthlyIncome,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## CatMonthlyIncome | 0 | 1 | Row Total |   
## -----------------|-----------|-----------|-----------|  
## 2000 | 15 | 18 | 33 |   
## | 5.808 | 30.218 | |   
## | 0.455 | 0.545 | 0.022 |   
## | 0.012 | 0.076 | |   
## | 0.010 | 0.012 | |   
## -----------------|-----------|-----------|-----------|  
## 4000 | 391 | 119 | 510 |   
## | 3.162 | 16.448 | |   
## | 0.767 | 0.233 | 0.347 |   
## | 0.317 | 0.502 | |   
## | 0.266 | 0.081 | |   
## -----------------|-----------|-----------|-----------|  
## 6000 | 329 | 42 | 371 |   
## | 1.020 | 5.306 | |   
## | 0.887 | 0.113 | 0.252 |   
## | 0.267 | 0.177 | |   
## | 0.224 | 0.029 | |   
## -----------------|-----------|-----------|-----------|  
## 8000 | 157 | 18 | 175 |   
## | 0.711 | 3.698 | |   
## | 0.897 | 0.103 | 0.119 |   
## | 0.127 | 0.076 | |   
## | 0.107 | 0.012 | |   
## -----------------|-----------|-----------|-----------|  
## 10000 | 85 | 15 | 100 |   
## | 0.015 | 0.078 | |   
## | 0.850 | 0.150 | 0.068 |   
## | 0.069 | 0.063 | |   
## | 0.058 | 0.010 | |   
## -----------------|-----------|-----------|-----------|  
## 12000 | 72 | 14 | 86 |   
## | 0.000 | 0.001 | |   
## | 0.837 | 0.163 | 0.059 |   
## | 0.058 | 0.059 | |   
## | 0.049 | 0.010 | |   
## -----------------|-----------|-----------|-----------|  
## 14000 | 47 | 6 | 53 |   
## | 0.146 | 0.758 | |   
## | 0.887 | 0.113 | 0.036 |   
## | 0.038 | 0.025 | |   
## | 0.032 | 0.004 | |   
## -----------------|-----------|-----------|-----------|  
## 16000 | 16 | 0 | 16 |   
## | 0.496 | 2.580 | |   
## | 1.000 | 0.000 | 0.011 |   
## | 0.013 | 0.000 | |   
## | 0.011 | 0.000 | |   
## -----------------|-----------|-----------|-----------|  
## 18000 | 57 | 0 | 57 |   
## | 1.766 | 9.190 | |   
## | 1.000 | 0.000 | 0.039 |   
## | 0.046 | 0.000 | |   
## | 0.039 | 0.000 | |   
## -----------------|-----------|-----------|-----------|  
## 20000 | 64 | 5 | 69 |   
## | 0.648 | 3.372 | |   
## | 0.928 | 0.072 | 0.047 |   
## | 0.052 | 0.021 | |   
## | 0.044 | 0.003 | |   
## -----------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## -----------------|-----------|-----------|-----------|  
##   
##

#4 How does department impact Attrition?

CrossTable(Attrition\_data\_fac$Department,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$Department | 0 | 1 | Row Total |   
## ------------------------------|-----------|-----------|-----------|  
## Human Resources | 51 | 12 | 63 |   
## | 0.064 | 0.334 | |   
## | 0.810 | 0.190 | 0.043 |   
## | 0.041 | 0.051 | |   
## | 0.035 | 0.008 | |   
## ------------------------------|-----------|-----------|-----------|  
## Research & Development | 828 | 133 | 961 |   
## | 0.597 | 3.106 | |   
## | 0.862 | 0.138 | 0.654 |   
## | 0.672 | 0.561 | |   
## | 0.563 | 0.090 | |   
## ------------------------------|-----------|-----------|-----------|  
## Sales | 354 | 92 | 446 |   
## | 1.079 | 5.615 | |   
## | 0.794 | 0.206 | 0.303 |   
## | 0.287 | 0.388 | |   
## | 0.241 | 0.063 | |   
## ------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## ------------------------------|-----------|-----------|-----------|  
##   
##

#5 How does distance from work impact Attrition

CrossTable(Attrition\_data\_fac$DistanceFromHome,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$DistanceFromHome | 0 | 1 | Row Total |   
## ------------------------------------|-----------|-----------|-----------|  
## 1 | 182 | 26 | 208 |   
## | 0.325 | 1.693 | |   
## | 0.875 | 0.125 | 0.141 |   
## | 0.148 | 0.110 | |   
## | 0.124 | 0.018 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 2 | 183 | 28 | 211 |   
## | 0.205 | 1.065 | |   
## | 0.867 | 0.133 | 0.144 |   
## | 0.148 | 0.118 | |   
## | 0.124 | 0.019 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 3 | 70 | 14 | 84 |   
## | 0.003 | 0.015 | |   
## | 0.833 | 0.167 | 0.057 |   
## | 0.057 | 0.059 | |   
## | 0.048 | 0.010 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 4 | 55 | 9 | 64 |   
## | 0.032 | 0.168 | |   
## | 0.859 | 0.141 | 0.044 |   
## | 0.045 | 0.038 | |   
## | 0.037 | 0.006 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 5 | 55 | 10 | 65 |   
## | 0.004 | 0.022 | |   
## | 0.846 | 0.154 | 0.044 |   
## | 0.045 | 0.042 | |   
## | 0.037 | 0.007 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 6 | 52 | 7 | 59 |   
## | 0.128 | 0.663 | |   
## | 0.881 | 0.119 | 0.040 |   
## | 0.042 | 0.030 | |   
## | 0.035 | 0.005 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 7 | 73 | 11 | 84 |   
## | 0.092 | 0.477 | |   
## | 0.869 | 0.131 | 0.057 |   
## | 0.059 | 0.046 | |   
## | 0.050 | 0.007 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 8 | 70 | 10 | 80 |   
## | 0.125 | 0.651 | |   
## | 0.875 | 0.125 | 0.054 |   
## | 0.057 | 0.042 | |   
## | 0.048 | 0.007 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 9 | 67 | 18 | 85 |   
## | 0.259 | 1.347 | |   
## | 0.788 | 0.212 | 0.058 |   
## | 0.054 | 0.076 | |   
## | 0.046 | 0.012 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 10 | 75 | 11 | 86 |   
## | 0.114 | 0.592 | |   
## | 0.872 | 0.128 | 0.059 |   
## | 0.061 | 0.046 | |   
## | 0.051 | 0.007 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 11 | 25 | 4 | 29 |   
## | 0.019 | 0.098 | |   
## | 0.862 | 0.138 | 0.020 |   
## | 0.020 | 0.017 | |   
## | 0.017 | 0.003 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 12 | 14 | 6 | 20 |   
## | 0.459 | 2.389 | |   
## | 0.700 | 0.300 | 0.014 |   
## | 0.011 | 0.025 | |   
## | 0.010 | 0.004 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 13 | 13 | 6 | 19 |   
## | 0.541 | 2.815 | |   
## | 0.684 | 0.316 | 0.013 |   
## | 0.011 | 0.025 | |   
## | 0.009 | 0.004 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 14 | 17 | 4 | 21 |   
## | 0.021 | 0.111 | |   
## | 0.810 | 0.190 | 0.014 |   
## | 0.014 | 0.017 | |   
## | 0.012 | 0.003 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 15 | 21 | 5 | 26 |   
## | 0.030 | 0.156 | |   
## | 0.808 | 0.192 | 0.018 |   
## | 0.017 | 0.021 | |   
## | 0.014 | 0.003 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 16 | 25 | 7 | 32 |   
## | 0.126 | 0.657 | |   
## | 0.781 | 0.219 | 0.022 |   
## | 0.020 | 0.030 | |   
## | 0.017 | 0.005 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 17 | 15 | 5 | 20 |   
## | 0.188 | 0.978 | |   
## | 0.750 | 0.250 | 0.014 |   
## | 0.012 | 0.021 | |   
## | 0.010 | 0.003 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 18 | 22 | 4 | 26 |   
## | 0.002 | 0.009 | |   
## | 0.846 | 0.154 | 0.018 |   
## | 0.018 | 0.017 | |   
## | 0.015 | 0.003 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 19 | 19 | 3 | 22 |   
## | 0.016 | 0.084 | |   
## | 0.864 | 0.136 | 0.015 |   
## | 0.015 | 0.013 | |   
## | 0.013 | 0.002 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 20 | 21 | 4 | 25 |   
## | 0.000 | 0.000 | |   
## | 0.840 | 0.160 | 0.017 |   
## | 0.017 | 0.017 | |   
## | 0.014 | 0.003 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 21 | 15 | 3 | 18 |   
## | 0.001 | 0.003 | |   
## | 0.833 | 0.167 | 0.012 |   
## | 0.012 | 0.013 | |   
## | 0.010 | 0.002 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 22 | 13 | 6 | 19 |   
## | 0.541 | 2.815 | |   
## | 0.684 | 0.316 | 0.013 |   
## | 0.011 | 0.025 | |   
## | 0.009 | 0.004 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 23 | 22 | 5 | 27 |   
## | 0.018 | 0.096 | |   
## | 0.815 | 0.185 | 0.018 |   
## | 0.018 | 0.021 | |   
## | 0.015 | 0.003 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 24 | 16 | 12 | 28 |   
## | 2.386 | 12.413 | |   
## | 0.571 | 0.429 | 0.019 |   
## | 0.013 | 0.051 | |   
## | 0.011 | 0.008 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 25 | 19 | 6 | 25 |   
## | 0.185 | 0.962 | |   
## | 0.760 | 0.240 | 0.017 |   
## | 0.015 | 0.025 | |   
## | 0.013 | 0.004 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 26 | 22 | 3 | 25 |   
## | 0.051 | 0.264 | |   
## | 0.880 | 0.120 | 0.017 |   
## | 0.018 | 0.013 | |   
## | 0.015 | 0.002 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 27 | 9 | 3 | 12 |   
## | 0.113 | 0.587 | |   
## | 0.750 | 0.250 | 0.008 |   
## | 0.007 | 0.013 | |   
## | 0.006 | 0.002 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 28 | 21 | 2 | 23 |   
## | 0.151 | 0.787 | |   
## | 0.913 | 0.087 | 0.016 |   
## | 0.017 | 0.008 | |   
## | 0.014 | 0.001 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 29 | 22 | 5 | 27 |   
## | 0.018 | 0.096 | |   
## | 0.815 | 0.185 | 0.018 |   
## | 0.018 | 0.021 | |   
## | 0.015 | 0.003 | |   
## ------------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## ------------------------------------|-----------|-----------|-----------|  
##   
##

#6 How does Education Level impact attrition?

CrossTable(Attrition\_data\_fac$Education,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$Education | 0 | 1 | Row Total |   
## -----------------------------|-----------|-----------|-----------|  
## 1 | 139 | 31 | 170 |   
## | 0.090 | 0.471 | |   
## | 0.818 | 0.182 | 0.116 |   
## | 0.113 | 0.131 | |   
## | 0.095 | 0.021 | |   
## -----------------------------|-----------|-----------|-----------|  
## 2 | 238 | 44 | 282 |   
## | 0.009 | 0.047 | |   
## | 0.844 | 0.156 | 0.192 |   
## | 0.193 | 0.186 | |   
## | 0.162 | 0.030 | |   
## -----------------------------|-----------|-----------|-----------|  
## 3 | 473 | 99 | 572 |   
## | 0.096 | 0.498 | |   
## | 0.827 | 0.173 | 0.389 |   
## | 0.384 | 0.418 | |   
## | 0.322 | 0.067 | |   
## -----------------------------|-----------|-----------|-----------|  
## 4 | 340 | 58 | 398 |   
## | 0.114 | 0.593 | |   
## | 0.854 | 0.146 | 0.271 |   
## | 0.276 | 0.245 | |   
## | 0.231 | 0.039 | |   
## -----------------------------|-----------|-----------|-----------|  
## 5 | 43 | 5 | 48 |   
## | 0.186 | 0.969 | |   
## | 0.896 | 0.104 | 0.033 |   
## | 0.035 | 0.021 | |   
## | 0.029 | 0.003 | |   
## -----------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## -----------------------------|-----------|-----------|-----------|  
##   
##

#7. How does education field affect attrition

CrossTable(Attrition\_data\_fac$EducationField,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$EducationField | 0 | 1 | Row Total |   
## ----------------------------------|-----------|-----------|-----------|  
## Human Resources | 20 | 7 | 27 |   
## | 0.309 | 1.610 | |   
## | 0.741 | 0.259 | 0.018 |   
## | 0.016 | 0.030 | |   
## | 0.014 | 0.005 | |   
## ----------------------------------|-----------|-----------|-----------|  
## Life Sciences | 517 | 89 | 606 |   
## | 0.149 | 0.775 | |   
## | 0.853 | 0.147 | 0.412 |   
## | 0.419 | 0.376 | |   
## | 0.352 | 0.061 | |   
## ----------------------------------|-----------|-----------|-----------|  
## Marketing | 124 | 35 | 159 |   
## | 0.658 | 3.421 | |   
## | 0.780 | 0.220 | 0.108 |   
## | 0.101 | 0.148 | |   
## | 0.084 | 0.024 | |   
## ----------------------------------|-----------|-----------|-----------|  
## Medical | 401 | 63 | 464 |   
## | 0.358 | 1.864 | |   
## | 0.864 | 0.136 | 0.316 |   
## | 0.325 | 0.266 | |   
## | 0.273 | 0.043 | |   
## ----------------------------------|-----------|-----------|-----------|  
## Other | 71 | 11 | 82 |   
## | 0.072 | 0.373 | |   
## | 0.866 | 0.134 | 0.056 |   
## | 0.058 | 0.046 | |   
## | 0.048 | 0.007 | |   
## ----------------------------------|-----------|-----------|-----------|  
## Technical Degree | 100 | 32 | 132 |   
## | 1.038 | 5.398 | |   
## | 0.758 | 0.242 | 0.090 |   
## | 0.081 | 0.135 | |   
## | 0.068 | 0.022 | |   
## ----------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## ----------------------------------|-----------|-----------|-----------|  
##   
##

#8 How does environment Satisfaction affect Attrition?

CrossTable(Attrition\_data\_fac$EnvironmentSatisfaction,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$EnvironmentSatisfaction | 0 | 1 | Row Total |   
## -------------------------------------------|-----------|-----------|-----------|  
## 1 | 212 | 72 | 284 |   
## | 2.884 | 15.006 | |   
## | 0.746 | 0.254 | 0.193 |   
## | 0.172 | 0.304 | |   
## | 0.144 | 0.049 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 2 | 244 | 43 | 287 |   
## | 0.044 | 0.231 | |   
## | 0.850 | 0.150 | 0.195 |   
## | 0.198 | 0.181 | |   
## | 0.166 | 0.029 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 3 | 391 | 62 | 453 |   
## | 0.320 | 1.667 | |   
## | 0.863 | 0.137 | 0.308 |   
## | 0.317 | 0.262 | |   
## | 0.266 | 0.042 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 4 | 386 | 60 | 446 |   
## | 0.379 | 1.971 | |   
## | 0.865 | 0.135 | 0.303 |   
## | 0.313 | 0.253 | |   
## | 0.263 | 0.041 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## -------------------------------------------|-----------|-----------|-----------|  
##   
##

#9 How does gender Affect Attrition?

CrossTable(Attrition\_data\_fac$Gender,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$Gender | 0 | 1 | Row Total |   
## --------------------------|-----------|-----------|-----------|  
## Female | 501 | 87 | 588 |   
## | 0.123 | 0.642 | |   
## | 0.852 | 0.148 | 0.400 |   
## | 0.406 | 0.367 | |   
## | 0.341 | 0.059 | |   
## --------------------------|-----------|-----------|-----------|  
## Male | 732 | 150 | 882 |   
## | 0.082 | 0.428 | |   
## | 0.830 | 0.170 | 0.600 |   
## | 0.594 | 0.633 | |   
## | 0.498 | 0.102 | |   
## --------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## --------------------------|-----------|-----------|-----------|  
##   
##

#10 How does JobInvolvement affect Attrition

CrossTable(Attrition\_data\_fac$JobInvolvement,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$JobInvolvement | 0 | 1 | Row Total |   
## ----------------------------------|-----------|-----------|-----------|  
## 1 | 55 | 28 | 83 |   
## | 3.070 | 15.969 | |   
## | 0.663 | 0.337 | 0.056 |   
## | 0.045 | 0.118 | |   
## | 0.037 | 0.019 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 2 | 304 | 71 | 375 |   
## | 0.353 | 1.838 | |   
## | 0.811 | 0.189 | 0.255 |   
## | 0.247 | 0.300 | |   
## | 0.207 | 0.048 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 3 | 743 | 125 | 868 |   
## | 0.307 | 1.596 | |   
## | 0.856 | 0.144 | 0.590 |   
## | 0.603 | 0.527 | |   
## | 0.505 | 0.085 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 4 | 131 | 13 | 144 |   
## | 0.864 | 4.496 | |   
## | 0.910 | 0.090 | 0.098 |   
## | 0.106 | 0.055 | |   
## | 0.089 | 0.009 | |   
## ----------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## ----------------------------------|-----------|-----------|-----------|  
##   
##

#11 How does Job level impact Attrition?

CrossTable(Attrition\_data\_fac$JobLevel,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$JobLevel | 0 | 1 | Row Total |   
## ----------------------------|-----------|-----------|-----------|  
## 1 | 400 | 143 | 543 |   
## | 6.752 | 35.128 | |   
## | 0.737 | 0.263 | 0.369 |   
## | 0.324 | 0.603 | |   
## | 0.272 | 0.097 | |   
## ----------------------------|-----------|-----------|-----------|  
## 2 | 482 | 52 | 534 |   
## | 2.595 | 13.501 | |   
## | 0.903 | 0.097 | 0.363 |   
## | 0.391 | 0.219 | |   
## | 0.328 | 0.035 | |   
## ----------------------------|-----------|-----------|-----------|  
## 3 | 186 | 32 | 218 |   
## | 0.054 | 0.282 | |   
## | 0.853 | 0.147 | 0.148 |   
## | 0.151 | 0.135 | |   
## | 0.127 | 0.022 | |   
## ----------------------------|-----------|-----------|-----------|  
## 4 | 101 | 5 | 106 |   
## | 1.644 | 8.553 | |   
## | 0.953 | 0.047 | 0.072 |   
## | 0.082 | 0.021 | |   
## | 0.069 | 0.003 | |   
## ----------------------------|-----------|-----------|-----------|  
## 5 | 64 | 5 | 69 |   
## | 0.648 | 3.372 | |   
## | 0.928 | 0.072 | 0.047 |   
## | 0.052 | 0.021 | |   
## | 0.044 | 0.003 | |   
## ----------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## ----------------------------|-----------|-----------|-----------|  
##   
##

#12 How does Percentage Job Role impact Attrition?

CrossTable(Attrition\_data\_fac$JobRole,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$JobRole | 0 | 1 | Row Total |   
## ---------------------------|-----------|-----------|-----------|  
## Healthcare Representative | 122 | 9 | 131 |   
## | 1.337 | 6.956 | |   
## | 0.931 | 0.069 | 0.089 |   
## | 0.099 | 0.038 | |   
## | 0.083 | 0.006 | |   
## ---------------------------|-----------|-----------|-----------|  
## Human Resources | 40 | 12 | 52 |   
## | 0.300 | 1.560 | |   
## | 0.769 | 0.231 | 0.035 |   
## | 0.032 | 0.051 | |   
## | 0.027 | 0.008 | |   
## ---------------------------|-----------|-----------|-----------|  
## Laboratory Technician | 197 | 62 | 259 |   
## | 1.886 | 9.813 | |   
## | 0.761 | 0.239 | 0.176 |   
## | 0.160 | 0.262 | |   
## | 0.134 | 0.042 | |   
## ---------------------------|-----------|-----------|-----------|  
## Manager | 97 | 5 | 102 |   
## | 1.531 | 7.965 | |   
## | 0.951 | 0.049 | 0.069 |   
## | 0.079 | 0.021 | |   
## | 0.066 | 0.003 | |   
## ---------------------------|-----------|-----------|-----------|  
## Manufacturing Director | 135 | 10 | 145 |   
## | 1.471 | 7.655 | |   
## | 0.931 | 0.069 | 0.099 |   
## | 0.109 | 0.042 | |   
## | 0.092 | 0.007 | |   
## ---------------------------|-----------|-----------|-----------|  
## Research Director | 78 | 2 | 80 |   
## | 1.770 | 9.208 | |   
## | 0.975 | 0.025 | 0.054 |   
## | 0.063 | 0.008 | |   
## | 0.053 | 0.001 | |   
## ---------------------------|-----------|-----------|-----------|  
## Research Scientist | 245 | 47 | 292 |   
## | 0.000 | 0.000 | |   
## | 0.839 | 0.161 | 0.199 |   
## | 0.199 | 0.198 | |   
## | 0.167 | 0.032 | |   
## ---------------------------|-----------|-----------|-----------|  
## Sales Executive | 269 | 57 | 326 |   
## | 0.072 | 0.375 | |   
## | 0.825 | 0.175 | 0.222 |   
## | 0.218 | 0.241 | |   
## | 0.183 | 0.039 | |   
## ---------------------------|-----------|-----------|-----------|  
## Sales Representative | 50 | 33 | 83 |   
## | 5.528 | 28.762 | |   
## | 0.602 | 0.398 | 0.056 |   
## | 0.041 | 0.139 | |   
## | 0.034 | 0.022 | |   
## ---------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## ---------------------------|-----------|-----------|-----------|  
##   
##

#13 How does Job satisfaction affect Attrition?

CrossTable(Attrition\_data\_fac$JobSatisfaction,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$JobSatisfaction | 0 | 1 | Row Total |   
## -----------------------------------|-----------|-----------|-----------|  
## 1 | 223 | 66 | 289 |   
## | 1.554 | 8.083 | |   
## | 0.772 | 0.228 | 0.197 |   
## | 0.181 | 0.278 | |   
## | 0.152 | 0.045 | |   
## -----------------------------------|-----------|-----------|-----------|  
## 2 | 234 | 46 | 280 |   
## | 0.003 | 0.016 | |   
## | 0.836 | 0.164 | 0.190 |   
## | 0.190 | 0.194 | |   
## | 0.159 | 0.031 | |   
## -----------------------------------|-----------|-----------|-----------|  
## 3 | 369 | 73 | 442 |   
## | 0.008 | 0.042 | |   
## | 0.835 | 0.165 | 0.301 |   
## | 0.299 | 0.308 | |   
## | 0.251 | 0.050 | |   
## -----------------------------------|-----------|-----------|-----------|  
## 4 | 407 | 52 | 459 |   
## | 1.257 | 6.542 | |   
## | 0.887 | 0.113 | 0.312 |   
## | 0.330 | 0.219 | |   
## | 0.277 | 0.035 | |   
## -----------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## -----------------------------------|-----------|-----------|-----------|  
##   
##

#14 How dooes marital status impact Attrition?

CrossTable(Attrition\_data\_fac$MaritalStatus,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$MaritalStatus | 0 | 1 | Row Total |   
## ---------------------------------|-----------|-----------|-----------|  
## Divorced | 294 | 33 | 327 |   
## | 1.418 | 7.377 | |   
## | 0.899 | 0.101 | 0.222 |   
## | 0.238 | 0.139 | |   
## | 0.200 | 0.022 | |   
## ---------------------------------|-----------|-----------|-----------|  
## Married | 589 | 84 | 673 |   
## | 1.064 | 5.534 | |   
## | 0.875 | 0.125 | 0.458 |   
## | 0.478 | 0.354 | |   
## | 0.401 | 0.057 | |   
## ---------------------------------|-----------|-----------|-----------|  
## Single | 350 | 120 | 470 |   
## | 4.961 | 25.811 | |   
## | 0.745 | 0.255 | 0.320 |   
## | 0.284 | 0.506 | |   
## | 0.238 | 0.082 | |   
## ---------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## ---------------------------------|-----------|-----------|-----------|  
##   
##

#15 How does number of companies worked for impact Attrition?

CrossTable(Attrition\_data\_fac$NumCompaniesWorked,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$NumCompaniesWorked | 0 | 1 | Row Total |   
## --------------------------------------|-----------|-----------|-----------|  
## 0 | 174 | 23 | 197 |   
## | 0.465 | 2.417 | |   
## | 0.883 | 0.117 | 0.134 |   
## | 0.141 | 0.097 | |   
## | 0.118 | 0.016 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 1 | 423 | 98 | 521 |   
## | 0.449 | 2.334 | |   
## | 0.812 | 0.188 | 0.354 |   
## | 0.343 | 0.414 | |   
## | 0.288 | 0.067 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 2 | 130 | 16 | 146 |   
## | 0.464 | 2.414 | |   
## | 0.890 | 0.110 | 0.099 |   
## | 0.105 | 0.068 | |   
## | 0.088 | 0.011 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 3 | 143 | 16 | 159 |   
## | 0.696 | 3.621 | |   
## | 0.899 | 0.101 | 0.108 |   
## | 0.116 | 0.068 | |   
## | 0.097 | 0.011 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 4 | 122 | 17 | 139 |   
## | 0.251 | 1.306 | |   
## | 0.878 | 0.122 | 0.095 |   
## | 0.099 | 0.072 | |   
## | 0.083 | 0.012 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 5 | 47 | 16 | 63 |   
## | 0.646 | 3.361 | |   
## | 0.746 | 0.254 | 0.043 |   
## | 0.038 | 0.068 | |   
## | 0.032 | 0.011 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 6 | 54 | 16 | 70 |   
## | 0.379 | 1.969 | |   
## | 0.771 | 0.229 | 0.048 |   
## | 0.044 | 0.068 | |   
## | 0.037 | 0.011 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 7 | 57 | 17 | 74 |   
## | 0.414 | 2.154 | |   
## | 0.770 | 0.230 | 0.050 |   
## | 0.046 | 0.072 | |   
## | 0.039 | 0.012 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 8 | 43 | 6 | 49 |   
## | 0.088 | 0.457 | |   
## | 0.878 | 0.122 | 0.033 |   
## | 0.035 | 0.025 | |   
## | 0.029 | 0.004 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 9 | 40 | 12 | 52 |   
## | 0.300 | 1.560 | |   
## | 0.769 | 0.231 | 0.035 |   
## | 0.032 | 0.051 | |   
## | 0.027 | 0.008 | |   
## --------------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## --------------------------------------|-----------|-----------|-----------|  
##   
##

#16 How overtime impacts Attrition

CrossTable(Attrition\_data\_fac$OverTime,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$OverTime | 0 | 1 | Row Total |   
## ----------------------------|-----------|-----------|-----------|  
## 0 | 944 | 110 | 1054 |   
## | 4.063 | 21.136 | |   
## | 0.896 | 0.104 | 0.717 |   
## | 0.766 | 0.464 | |   
## | 0.642 | 0.075 | |   
## ----------------------------|-----------|-----------|-----------|  
## 1 | 289 | 127 | 416 |   
## | 10.293 | 53.552 | |   
## | 0.695 | 0.305 | 0.283 |   
## | 0.234 | 0.536 | |   
## | 0.197 | 0.086 | |   
## ----------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## ----------------------------|-----------|-----------|-----------|  
##   
##

# 17 How does each category of salary hikes impact Attrition?

CrossTable(CatHikes,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## CatHikes | 0 | 1 | Row Total |   
## -------------|-----------|-----------|-----------|  
## 10-15 | 769 | 150 | 919 |   
## | 0.004 | 0.023 | |   
## | 0.837 | 0.163 | 0.625 |   
## | 0.624 | 0.633 | |   
## | 0.523 | 0.102 | |   
## -------------|-----------|-----------|-----------|  
## 16-20 | 323 | 57 | 380 |   
## | 0.057 | 0.297 | |   
## | 0.850 | 0.150 | 0.259 |   
## | 0.262 | 0.241 | |   
## | 0.220 | 0.039 | |   
## -------------|-----------|-----------|-----------|  
## 21-25 | 141 | 30 | 171 |   
## | 0.041 | 0.214 | |   
## | 0.825 | 0.175 | 0.116 |   
## | 0.114 | 0.127 | |   
## | 0.096 | 0.020 | |   
## -------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## -------------|-----------|-----------|-----------|  
##   
##

#18. How does Performance rating impact Attrition?

CrossTable(Attrition\_data\_fac$PerformanceRating,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$PerformanceRating | 0 | 1 | Row Total |   
## -------------------------------------|-----------|-----------|-----------|  
## 3 | 1044 | 200 | 1244 |   
## | 0.000 | 0.002 | |   
## | 0.839 | 0.161 | 0.846 |   
## | 0.847 | 0.844 | |   
## | 0.710 | 0.136 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 4 | 189 | 37 | 226 |   
## | 0.002 | 0.009 | |   
## | 0.836 | 0.164 | 0.154 |   
## | 0.153 | 0.156 | |   
## | 0.129 | 0.025 | |   
## -------------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## -------------------------------------|-----------|-----------|-----------|  
##   
##

#19. How does Relationship satisfactoin impact Attrition?

CrossTable(Attrition\_data\_fac$RelationshipSatisfaction,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$RelationshipSatisfaction | 0 | 1 | Row Total |   
## --------------------------------------------|-----------|-----------|-----------|  
## 1 | 219 | 57 | 276 |   
## | 0.675 | 3.513 | |   
## | 0.793 | 0.207 | 0.188 |   
## | 0.178 | 0.241 | |   
## | 0.149 | 0.039 | |   
## --------------------------------------------|-----------|-----------|-----------|  
## 2 | 258 | 45 | 303 |   
## | 0.058 | 0.304 | |   
## | 0.851 | 0.149 | 0.206 |   
## | 0.209 | 0.190 | |   
## | 0.176 | 0.031 | |   
## --------------------------------------------|-----------|-----------|-----------|  
## 3 | 388 | 71 | 459 |   
## | 0.023 | 0.122 | |   
## | 0.845 | 0.155 | 0.312 |   
## | 0.315 | 0.300 | |   
## | 0.264 | 0.048 | |   
## --------------------------------------------|-----------|-----------|-----------|  
## 4 | 368 | 64 | 432 |   
## | 0.088 | 0.458 | |   
## | 0.852 | 0.148 | 0.294 |   
## | 0.298 | 0.270 | |   
## | 0.250 | 0.044 | |   
## --------------------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## --------------------------------------------|-----------|-----------|-----------|  
##   
##

#20 How does stockoption Leve impact Attrition

CrossTable(Attrition\_data\_fac$StockOptionLevel,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$StockOptionLevel | 0 | 1 | Row Total |   
## ------------------------------------|-----------|-----------|-----------|  
## 0 | 477 | 154 | 631 |   
## | 5.162 | 26.853 | |   
## | 0.756 | 0.244 | 0.429 |   
## | 0.387 | 0.650 | |   
## | 0.324 | 0.105 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 1 | 540 | 56 | 596 |   
## | 3.215 | 16.726 | |   
## | 0.906 | 0.094 | 0.405 |   
## | 0.438 | 0.236 | |   
## | 0.367 | 0.038 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 2 | 146 | 12 | 158 |   
## | 1.370 | 7.126 | |   
## | 0.924 | 0.076 | 0.107 |   
## | 0.118 | 0.051 | |   
## | 0.099 | 0.008 | |   
## ------------------------------------|-----------|-----------|-----------|  
## 3 | 70 | 15 | 85 |   
## | 0.024 | 0.123 | |   
## | 0.824 | 0.176 | 0.058 |   
## | 0.057 | 0.063 | |   
## | 0.048 | 0.010 | |   
## ------------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## ------------------------------------|-----------|-----------|-----------|  
##   
##

#21. How does total working years impact Attrition?

CrossTable(Attrition\_data\_fac$TotalWorkingYears,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$TotalWorkingYears | 0 | 1 | Row Total |   
## -------------------------------------|-----------|-----------|-----------|  
## 0 | 6 | 5 | 11 |   
## | 1.128 | 5.870 | |   
## | 0.545 | 0.455 | 0.007 |   
## | 0.005 | 0.021 | |   
## | 0.004 | 0.003 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 1 | 41 | 40 | 81 |   
## | 10.683 | 55.578 | |   
## | 0.506 | 0.494 | 0.055 |   
## | 0.033 | 0.169 | |   
## | 0.028 | 0.027 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 2 | 22 | 9 | 31 |   
## | 0.616 | 3.205 | |   
## | 0.710 | 0.290 | 0.021 |   
## | 0.018 | 0.038 | |   
## | 0.015 | 0.006 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 3 | 33 | 9 | 42 |   
## | 0.141 | 0.733 | |   
## | 0.786 | 0.214 | 0.029 |   
## | 0.027 | 0.038 | |   
## | 0.022 | 0.006 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 4 | 51 | 12 | 63 |   
## | 0.064 | 0.334 | |   
## | 0.810 | 0.190 | 0.043 |   
## | 0.041 | 0.051 | |   
## | 0.035 | 0.008 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 5 | 72 | 16 | 88 |   
## | 0.044 | 0.231 | |   
## | 0.818 | 0.182 | 0.060 |   
## | 0.058 | 0.068 | |   
## | 0.049 | 0.011 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 6 | 103 | 22 | 125 |   
## | 0.033 | 0.169 | |   
## | 0.824 | 0.176 | 0.085 |   
## | 0.084 | 0.093 | |   
## | 0.070 | 0.015 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 7 | 63 | 18 | 81 |   
## | 0.359 | 1.869 | |   
## | 0.778 | 0.222 | 0.055 |   
## | 0.051 | 0.076 | |   
## | 0.043 | 0.012 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 8 | 87 | 16 | 103 |   
## | 0.004 | 0.022 | |   
## | 0.845 | 0.155 | 0.070 |   
## | 0.071 | 0.068 | |   
## | 0.059 | 0.011 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 9 | 86 | 10 | 96 |   
## | 0.373 | 1.939 | |   
## | 0.896 | 0.104 | 0.065 |   
## | 0.070 | 0.042 | |   
## | 0.059 | 0.007 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 10 | 177 | 25 | 202 |   
## | 0.338 | 1.758 | |   
## | 0.876 | 0.124 | 0.137 |   
## | 0.144 | 0.105 | |   
## | 0.120 | 0.017 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 11 | 29 | 7 | 36 |   
## | 0.047 | 0.246 | |   
## | 0.806 | 0.194 | 0.024 |   
## | 0.024 | 0.030 | |   
## | 0.020 | 0.005 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 12 | 43 | 5 | 48 |   
## | 0.186 | 0.969 | |   
## | 0.896 | 0.104 | 0.033 |   
## | 0.035 | 0.021 | |   
## | 0.029 | 0.003 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 13 | 33 | 3 | 36 |   
## | 0.260 | 1.355 | |   
## | 0.917 | 0.083 | 0.024 |   
## | 0.027 | 0.013 | |   
## | 0.022 | 0.002 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 14 | 27 | 4 | 31 |   
## | 0.038 | 0.199 | |   
## | 0.871 | 0.129 | 0.021 |   
## | 0.022 | 0.017 | |   
## | 0.018 | 0.003 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 15 | 35 | 5 | 40 |   
## | 0.063 | 0.326 | |   
## | 0.875 | 0.125 | 0.027 |   
## | 0.028 | 0.021 | |   
## | 0.024 | 0.003 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 16 | 34 | 3 | 37 |   
## | 0.283 | 1.474 | |   
## | 0.919 | 0.081 | 0.025 |   
## | 0.028 | 0.013 | |   
## | 0.023 | 0.002 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 17 | 30 | 3 | 33 |   
## | 0.195 | 1.012 | |   
## | 0.909 | 0.091 | 0.022 |   
## | 0.024 | 0.013 | |   
## | 0.020 | 0.002 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 18 | 23 | 4 | 27 |   
## | 0.006 | 0.029 | |   
## | 0.852 | 0.148 | 0.018 |   
## | 0.019 | 0.017 | |   
## | 0.016 | 0.003 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 19 | 19 | 3 | 22 |   
## | 0.016 | 0.084 | |   
## | 0.864 | 0.136 | 0.015 |   
## | 0.015 | 0.013 | |   
## | 0.013 | 0.002 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 20 | 28 | 2 | 30 |   
## | 0.320 | 1.664 | |   
## | 0.933 | 0.067 | 0.020 |   
## | 0.023 | 0.008 | |   
## | 0.019 | 0.001 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 21 | 33 | 1 | 34 |   
## | 0.704 | 3.664 | |   
## | 0.971 | 0.029 | 0.023 |   
## | 0.027 | 0.004 | |   
## | 0.022 | 0.001 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 22 | 19 | 2 | 21 |   
## | 0.109 | 0.567 | |   
## | 0.905 | 0.095 | 0.014 |   
## | 0.015 | 0.008 | |   
## | 0.013 | 0.001 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 23 | 20 | 2 | 22 |   
## | 0.130 | 0.675 | |   
## | 0.909 | 0.091 | 0.015 |   
## | 0.016 | 0.008 | |   
## | 0.014 | 0.001 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 24 | 15 | 3 | 18 |   
## | 0.001 | 0.003 | |   
## | 0.833 | 0.167 | 0.012 |   
## | 0.012 | 0.013 | |   
## | 0.010 | 0.002 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 25 | 13 | 1 | 14 |   
## | 0.135 | 0.700 | |   
## | 0.929 | 0.071 | 0.010 |   
## | 0.011 | 0.004 | |   
## | 0.009 | 0.001 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 26 | 13 | 1 | 14 |   
## | 0.135 | 0.700 | |   
## | 0.929 | 0.071 | 0.010 |   
## | 0.011 | 0.004 | |   
## | 0.009 | 0.001 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 27 | 7 | 0 | 7 |   
## | 0.217 | 1.129 | |   
## | 1.000 | 0.000 | 0.005 |   
## | 0.006 | 0.000 | |   
## | 0.005 | 0.000 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 28 | 13 | 1 | 14 |   
## | 0.135 | 0.700 | |   
## | 0.929 | 0.071 | 0.010 |   
## | 0.011 | 0.004 | |   
## | 0.009 | 0.001 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 29 | 10 | 0 | 10 |   
## | 0.310 | 1.612 | |   
## | 1.000 | 0.000 | 0.007 |   
## | 0.008 | 0.000 | |   
## | 0.007 | 0.000 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 30 | 7 | 0 | 7 |   
## | 0.217 | 1.129 | |   
## | 1.000 | 0.000 | 0.005 |   
## | 0.006 | 0.000 | |   
## | 0.005 | 0.000 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 31 | 8 | 1 | 9 |   
## | 0.027 | 0.140 | |   
## | 0.889 | 0.111 | 0.006 |   
## | 0.006 | 0.004 | |   
## | 0.005 | 0.001 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 32 | 9 | 0 | 9 |   
## | 0.279 | 1.451 | |   
## | 1.000 | 0.000 | 0.006 |   
## | 0.007 | 0.000 | |   
## | 0.006 | 0.000 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 33 | 6 | 1 | 7 |   
## | 0.003 | 0.015 | |   
## | 0.857 | 0.143 | 0.005 |   
## | 0.005 | 0.004 | |   
## | 0.004 | 0.001 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 34 | 4 | 1 | 5 |   
## | 0.009 | 0.047 | |   
## | 0.800 | 0.200 | 0.003 |   
## | 0.003 | 0.004 | |   
## | 0.003 | 0.001 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 35 | 3 | 0 | 3 |   
## | 0.093 | 0.484 | |   
## | 1.000 | 0.000 | 0.002 |   
## | 0.002 | 0.000 | |   
## | 0.002 | 0.000 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 36 | 6 | 0 | 6 |   
## | 0.186 | 0.967 | |   
## | 1.000 | 0.000 | 0.004 |   
## | 0.005 | 0.000 | |   
## | 0.004 | 0.000 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 37 | 4 | 0 | 4 |   
## | 0.124 | 0.645 | |   
## | 1.000 | 0.000 | 0.003 |   
## | 0.003 | 0.000 | |   
## | 0.003 | 0.000 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 38 | 1 | 0 | 1 |   
## | 0.031 | 0.161 | |   
## | 1.000 | 0.000 | 0.001 |   
## | 0.001 | 0.000 | |   
## | 0.001 | 0.000 | |   
## -------------------------------------|-----------|-----------|-----------|  
## 40 | 0 | 2 | 2 |   
## | 1.678 | 8.728 | |   
## | 0.000 | 1.000 | 0.001 |   
## | 0.000 | 0.008 | |   
## | 0.000 | 0.001 | |   
## -------------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## -------------------------------------|-----------|-----------|-----------|  
##   
##

#22 How Education impacts attrition

CrossTable(Attrition\_data\_fac$TrainingTimesLastYear,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$TrainingTimesLastYear | 0 | 1 | Row Total |   
## -----------------------------------------|-----------|-----------|-----------|  
## 0 | 39 | 15 | 54 |   
## | 0.875 | 4.550 | |   
## | 0.722 | 0.278 | 0.037 |   
## | 0.032 | 0.063 | |   
## | 0.027 | 0.010 | |   
## -----------------------------------------|-----------|-----------|-----------|  
## 1 | 62 | 9 | 71 |   
## | 0.101 | 0.523 | |   
## | 0.873 | 0.127 | 0.048 |   
## | 0.050 | 0.038 | |   
## | 0.042 | 0.006 | |   
## -----------------------------------------|-----------|-----------|-----------|  
## 2 | 449 | 98 | 547 |   
## | 0.210 | 1.091 | |   
## | 0.821 | 0.179 | 0.372 |   
## | 0.364 | 0.414 | |   
## | 0.305 | 0.067 | |   
## -----------------------------------------|-----------|-----------|-----------|  
## 3 | 422 | 69 | 491 |   
## | 0.251 | 1.304 | |   
## | 0.859 | 0.141 | 0.334 |   
## | 0.342 | 0.291 | |   
## | 0.287 | 0.047 | |   
## -----------------------------------------|-----------|-----------|-----------|  
## 4 | 97 | 26 | 123 |   
## | 0.369 | 1.919 | |   
## | 0.789 | 0.211 | 0.084 |   
## | 0.079 | 0.110 | |   
## | 0.066 | 0.018 | |   
## -----------------------------------------|-----------|-----------|-----------|  
## 5 | 105 | 14 | 119 |   
## | 0.269 | 1.402 | |   
## | 0.882 | 0.118 | 0.081 |   
## | 0.085 | 0.059 | |   
## | 0.071 | 0.010 | |   
## -----------------------------------------|-----------|-----------|-----------|  
## 6 | 59 | 6 | 65 |   
## | 0.368 | 1.915 | |   
## | 0.908 | 0.092 | 0.044 |   
## | 0.048 | 0.025 | |   
## | 0.040 | 0.004 | |   
## -----------------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## -----------------------------------------|-----------|-----------|-----------|  
##   
##

#23. How does WorkLife balance affect Attrition

CrossTable(Attrition\_data\_fac$WorkLifeBalance,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$WorkLifeBalance | 0 | 1 | Row Total |   
## -----------------------------------|-----------|-----------|-----------|  
## 1 | 55 | 25 | 80 |   
## | 2.183 | 11.355 | |   
## | 0.688 | 0.312 | 0.054 |   
## | 0.045 | 0.105 | |   
## | 0.037 | 0.017 | |   
## -----------------------------------|-----------|-----------|-----------|  
## 2 | 286 | 58 | 344 |   
## | 0.022 | 0.116 | |   
## | 0.831 | 0.169 | 0.234 |   
## | 0.232 | 0.245 | |   
## | 0.195 | 0.039 | |   
## -----------------------------------|-----------|-----------|-----------|  
## 3 | 766 | 127 | 893 |   
## | 0.385 | 2.001 | |   
## | 0.858 | 0.142 | 0.607 |   
## | 0.621 | 0.536 | |   
## | 0.521 | 0.086 | |   
## -----------------------------------|-----------|-----------|-----------|  
## 4 | 126 | 27 | 153 |   
## | 0.042 | 0.221 | |   
## | 0.824 | 0.176 | 0.104 |   
## | 0.102 | 0.114 | |   
## | 0.086 | 0.018 | |   
## -----------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## -----------------------------------|-----------|-----------|-----------|  
##   
##

#24. How does the number of years at the company impact attrition?

CrossTable(Attrition\_data\_fac$YearsAtCompany,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$YearsAtCompany | 0 | 1 | Row Total |   
## ----------------------------------|-----------|-----------|-----------|  
## 0 | 28 | 16 | 44 |   
## | 2.149 | 11.181 | |   
## | 0.636 | 0.364 | 0.030 |   
## | 0.023 | 0.068 | |   
## | 0.019 | 0.011 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 1 | 112 | 59 | 171 |   
## | 6.888 | 35.833 | |   
## | 0.655 | 0.345 | 0.116 |   
## | 0.091 | 0.249 | |   
## | 0.076 | 0.040 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 2 | 100 | 27 | 127 |   
## | 0.400 | 2.079 | |   
## | 0.787 | 0.213 | 0.086 |   
## | 0.081 | 0.114 | |   
## | 0.068 | 0.018 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 3 | 108 | 20 | 128 |   
## | 0.004 | 0.020 | |   
## | 0.844 | 0.156 | 0.087 |   
## | 0.088 | 0.084 | |   
## | 0.073 | 0.014 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 4 | 91 | 19 | 110 |   
## | 0.017 | 0.090 | |   
## | 0.827 | 0.173 | 0.075 |   
## | 0.074 | 0.080 | |   
## | 0.062 | 0.013 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 5 | 175 | 21 | 196 |   
## | 0.683 | 3.556 | |   
## | 0.893 | 0.107 | 0.133 |   
## | 0.142 | 0.089 | |   
## | 0.119 | 0.014 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 6 | 67 | 9 | 76 |   
## | 0.166 | 0.864 | |   
## | 0.882 | 0.118 | 0.052 |   
## | 0.054 | 0.038 | |   
## | 0.046 | 0.006 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 7 | 79 | 11 | 90 |   
## | 0.163 | 0.849 | |   
## | 0.878 | 0.122 | 0.061 |   
## | 0.064 | 0.046 | |   
## | 0.054 | 0.007 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 8 | 71 | 9 | 80 |   
## | 0.226 | 1.178 | |   
## | 0.887 | 0.112 | 0.054 |   
## | 0.058 | 0.038 | |   
## | 0.048 | 0.006 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 9 | 74 | 8 | 82 |   
## | 0.396 | 2.061 | |   
## | 0.902 | 0.098 | 0.056 |   
## | 0.060 | 0.034 | |   
## | 0.050 | 0.005 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 10 | 102 | 18 | 120 |   
## | 0.018 | 0.094 | |   
## | 0.850 | 0.150 | 0.082 |   
## | 0.083 | 0.076 | |   
## | 0.069 | 0.012 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 11 | 30 | 2 | 32 |   
## | 0.372 | 1.935 | |   
## | 0.938 | 0.062 | 0.022 |   
## | 0.024 | 0.008 | |   
## | 0.020 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 12 | 14 | 0 | 14 |   
## | 0.434 | 2.257 | |   
## | 1.000 | 0.000 | 0.010 |   
## | 0.011 | 0.000 | |   
## | 0.010 | 0.000 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 13 | 22 | 2 | 24 |   
## | 0.174 | 0.903 | |   
## | 0.917 | 0.083 | 0.016 |   
## | 0.018 | 0.008 | |   
## | 0.015 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 14 | 16 | 2 | 18 |   
## | 0.054 | 0.280 | |   
## | 0.889 | 0.111 | 0.012 |   
## | 0.013 | 0.008 | |   
## | 0.011 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 15 | 19 | 1 | 20 |   
## | 0.295 | 1.535 | |   
## | 0.950 | 0.050 | 0.014 |   
## | 0.015 | 0.004 | |   
## | 0.013 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 16 | 11 | 1 | 12 |   
## | 0.087 | 0.452 | |   
## | 0.917 | 0.083 | 0.008 |   
## | 0.009 | 0.004 | |   
## | 0.007 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 17 | 8 | 1 | 9 |   
## | 0.027 | 0.140 | |   
## | 0.889 | 0.111 | 0.006 |   
## | 0.006 | 0.004 | |   
## | 0.005 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 18 | 12 | 1 | 13 |   
## | 0.110 | 0.573 | |   
## | 0.923 | 0.077 | 0.009 |   
## | 0.010 | 0.004 | |   
## | 0.008 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 19 | 10 | 1 | 11 |   
## | 0.065 | 0.337 | |   
## | 0.909 | 0.091 | 0.007 |   
## | 0.008 | 0.004 | |   
## | 0.007 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 20 | 26 | 1 | 27 |   
## | 0.496 | 2.583 | |   
## | 0.963 | 0.037 | 0.018 |   
## | 0.021 | 0.004 | |   
## | 0.018 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 21 | 13 | 1 | 14 |   
## | 0.135 | 0.700 | |   
## | 0.929 | 0.071 | 0.010 |   
## | 0.011 | 0.004 | |   
## | 0.009 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 22 | 14 | 1 | 15 |   
## | 0.160 | 0.832 | |   
## | 0.933 | 0.067 | 0.010 |   
## | 0.011 | 0.004 | |   
## | 0.010 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 23 | 1 | 1 | 2 |   
## | 0.274 | 1.424 | |   
## | 0.500 | 0.500 | 0.001 |   
## | 0.001 | 0.004 | |   
## | 0.001 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 24 | 5 | 1 | 6 |   
## | 0.000 | 0.001 | |   
## | 0.833 | 0.167 | 0.004 |   
## | 0.004 | 0.004 | |   
## | 0.003 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 25 | 4 | 0 | 4 |   
## | 0.124 | 0.645 | |   
## | 1.000 | 0.000 | 0.003 |   
## | 0.003 | 0.000 | |   
## | 0.003 | 0.000 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 26 | 4 | 0 | 4 |   
## | 0.124 | 0.645 | |   
## | 1.000 | 0.000 | 0.003 |   
## | 0.003 | 0.000 | |   
## | 0.003 | 0.000 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 27 | 2 | 0 | 2 |   
## | 0.062 | 0.322 | |   
## | 1.000 | 0.000 | 0.001 |   
## | 0.002 | 0.000 | |   
## | 0.001 | 0.000 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 29 | 2 | 0 | 2 |   
## | 0.062 | 0.322 | |   
## | 1.000 | 0.000 | 0.001 |   
## | 0.002 | 0.000 | |   
## | 0.001 | 0.000 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 30 | 1 | 0 | 1 |   
## | 0.031 | 0.161 | |   
## | 1.000 | 0.000 | 0.001 |   
## | 0.001 | 0.000 | |   
## | 0.001 | 0.000 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 31 | 2 | 1 | 3 |   
## | 0.106 | 0.551 | |   
## | 0.667 | 0.333 | 0.002 |   
## | 0.002 | 0.004 | |   
## | 0.001 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 32 | 2 | 1 | 3 |   
## | 0.106 | 0.551 | |   
## | 0.667 | 0.333 | 0.002 |   
## | 0.002 | 0.004 | |   
## | 0.001 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 33 | 4 | 1 | 5 |   
## | 0.009 | 0.047 | |   
## | 0.800 | 0.200 | 0.003 |   
## | 0.003 | 0.004 | |   
## | 0.003 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 34 | 1 | 0 | 1 |   
## | 0.031 | 0.161 | |   
## | 1.000 | 0.000 | 0.001 |   
## | 0.001 | 0.000 | |   
## | 0.001 | 0.000 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 36 | 2 | 0 | 2 |   
## | 0.062 | 0.322 | |   
## | 1.000 | 0.000 | 0.001 |   
## | 0.002 | 0.000 | |   
## | 0.001 | 0.000 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 37 | 1 | 0 | 1 |   
## | 0.031 | 0.161 | |   
## | 1.000 | 0.000 | 0.001 |   
## | 0.001 | 0.000 | |   
## | 0.001 | 0.000 | |   
## ----------------------------------|-----------|-----------|-----------|  
## 40 | 0 | 1 | 1 |   
## | 0.839 | 4.364 | |   
## | 0.000 | 1.000 | 0.001 |   
## | 0.000 | 0.004 | |   
## | 0.000 | 0.001 | |   
## ----------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## ----------------------------------|-----------|-----------|-----------|  
##   
##

#25. How does the number of years in current role impact attrition?

CrossTable(Attrition\_data\_fac$YearsInCurrentRole,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$YearsInCurrentRole | 0 | 1 | Row Total |   
## --------------------------------------|-----------|-----------|-----------|  
## 0 | 171 | 73 | 244 |   
## | 5.536 | 28.803 | |   
## | 0.701 | 0.299 | 0.166 |   
## | 0.139 | 0.308 | |   
## | 0.116 | 0.050 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 1 | 46 | 11 | 57 |   
## | 0.069 | 0.357 | |   
## | 0.807 | 0.193 | 0.039 |   
## | 0.037 | 0.046 | |   
## | 0.031 | 0.007 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 2 | 304 | 68 | 372 |   
## | 0.206 | 1.074 | |   
## | 0.817 | 0.183 | 0.253 |   
## | 0.247 | 0.287 | |   
## | 0.207 | 0.046 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 3 | 119 | 16 | 135 |   
## | 0.294 | 1.527 | |   
## | 0.881 | 0.119 | 0.092 |   
## | 0.097 | 0.068 | |   
## | 0.081 | 0.011 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 4 | 89 | 15 | 104 |   
## | 0.036 | 0.186 | |   
## | 0.856 | 0.144 | 0.071 |   
## | 0.072 | 0.063 | |   
## | 0.061 | 0.010 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 5 | 35 | 1 | 36 |   
## | 0.764 | 3.976 | |   
## | 0.972 | 0.028 | 0.024 |   
## | 0.028 | 0.004 | |   
## | 0.024 | 0.001 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 6 | 35 | 2 | 37 |   
## | 0.507 | 2.636 | |   
## | 0.946 | 0.054 | 0.025 |   
## | 0.028 | 0.008 | |   
## | 0.024 | 0.001 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 7 | 191 | 31 | 222 |   
## | 0.123 | 0.642 | |   
## | 0.860 | 0.140 | 0.151 |   
## | 0.155 | 0.131 | |   
## | 0.130 | 0.021 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 8 | 82 | 7 | 89 |   
## | 0.723 | 3.764 | |   
## | 0.921 | 0.079 | 0.061 |   
## | 0.067 | 0.030 | |   
## | 0.056 | 0.005 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 9 | 61 | 6 | 67 |   
## | 0.410 | 2.135 | |   
## | 0.910 | 0.090 | 0.046 |   
## | 0.049 | 0.025 | |   
## | 0.041 | 0.004 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 10 | 27 | 2 | 29 |   
## | 0.294 | 1.531 | |   
## | 0.931 | 0.069 | 0.020 |   
## | 0.022 | 0.008 | |   
## | 0.018 | 0.001 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 11 | 22 | 0 | 22 |   
## | 0.682 | 3.547 | |   
## | 1.000 | 0.000 | 0.015 |   
## | 0.018 | 0.000 | |   
## | 0.015 | 0.000 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 12 | 9 | 1 | 10 |   
## | 0.045 | 0.232 | |   
## | 0.900 | 0.100 | 0.007 |   
## | 0.007 | 0.004 | |   
## | 0.006 | 0.001 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 13 | 13 | 1 | 14 |   
## | 0.135 | 0.700 | |   
## | 0.929 | 0.071 | 0.010 |   
## | 0.011 | 0.004 | |   
## | 0.009 | 0.001 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 14 | 10 | 1 | 11 |   
## | 0.065 | 0.337 | |   
## | 0.909 | 0.091 | 0.007 |   
## | 0.008 | 0.004 | |   
## | 0.007 | 0.001 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 15 | 6 | 2 | 8 |   
## | 0.075 | 0.391 | |   
## | 0.750 | 0.250 | 0.005 |   
## | 0.005 | 0.008 | |   
## | 0.004 | 0.001 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 16 | 7 | 0 | 7 |   
## | 0.217 | 1.129 | |   
## | 1.000 | 0.000 | 0.005 |   
## | 0.006 | 0.000 | |   
## | 0.005 | 0.000 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 17 | 4 | 0 | 4 |   
## | 0.124 | 0.645 | |   
## | 1.000 | 0.000 | 0.003 |   
## | 0.003 | 0.000 | |   
## | 0.003 | 0.000 | |   
## --------------------------------------|-----------|-----------|-----------|  
## 18 | 2 | 0 | 2 |   
## | 0.062 | 0.322 | |   
## | 1.000 | 0.000 | 0.001 |   
## | 0.002 | 0.000 | |   
## | 0.001 | 0.000 | |   
## --------------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## --------------------------------------|-----------|-----------|-----------|  
##   
##

#26. How does the number of years since last promotion impact Attrition?

CrossTable(Attrition\_data\_fac$YearsSinceLastPromotion,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$YearsSinceLastPromotion | 0 | 1 | Row Total |   
## -------------------------------------------|-----------|-----------|-----------|  
## 0 | 471 | 110 | 581 |   
## | 0.547 | 2.846 | |   
## | 0.811 | 0.189 | 0.395 |   
## | 0.382 | 0.464 | |   
## | 0.320 | 0.075 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 1 | 308 | 49 | 357 |   
## | 0.245 | 1.272 | |   
## | 0.863 | 0.137 | 0.243 |   
## | 0.250 | 0.207 | |   
## | 0.210 | 0.033 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 2 | 132 | 27 | 159 |   
## | 0.014 | 0.073 | |   
## | 0.830 | 0.170 | 0.108 |   
## | 0.107 | 0.114 | |   
## | 0.090 | 0.018 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 3 | 43 | 9 | 52 |   
## | 0.009 | 0.045 | |   
## | 0.827 | 0.173 | 0.035 |   
## | 0.035 | 0.038 | |   
## | 0.029 | 0.006 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 4 | 56 | 5 | 61 |   
## | 0.457 | 2.377 | |   
## | 0.918 | 0.082 | 0.041 |   
## | 0.045 | 0.021 | |   
## | 0.038 | 0.003 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 5 | 43 | 2 | 45 |   
## | 0.732 | 3.806 | |   
## | 0.956 | 0.044 | 0.031 |   
## | 0.035 | 0.008 | |   
## | 0.029 | 0.001 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 6 | 26 | 6 | 32 |   
## | 0.026 | 0.137 | |   
## | 0.812 | 0.188 | 0.022 |   
## | 0.021 | 0.025 | |   
## | 0.018 | 0.004 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 7 | 60 | 16 | 76 |   
## | 0.220 | 1.146 | |   
## | 0.789 | 0.211 | 0.052 |   
## | 0.049 | 0.068 | |   
## | 0.041 | 0.011 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 8 | 18 | 0 | 18 |   
## | 0.558 | 2.902 | |   
## | 1.000 | 0.000 | 0.012 |   
## | 0.015 | 0.000 | |   
## | 0.012 | 0.000 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 9 | 13 | 4 | 17 |   
## | 0.111 | 0.578 | |   
## | 0.765 | 0.235 | 0.012 |   
## | 0.011 | 0.017 | |   
## | 0.009 | 0.003 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 10 | 5 | 1 | 6 |   
## | 0.000 | 0.001 | |   
## | 0.833 | 0.167 | 0.004 |   
## | 0.004 | 0.004 | |   
## | 0.003 | 0.001 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 11 | 22 | 2 | 24 |   
## | 0.174 | 0.903 | |   
## | 0.917 | 0.083 | 0.016 |   
## | 0.018 | 0.008 | |   
## | 0.015 | 0.001 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 12 | 10 | 0 | 10 |   
## | 0.310 | 1.612 | |   
## | 1.000 | 0.000 | 0.007 |   
## | 0.008 | 0.000 | |   
## | 0.007 | 0.000 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 13 | 8 | 2 | 10 |   
## | 0.018 | 0.093 | |   
## | 0.800 | 0.200 | 0.007 |   
## | 0.006 | 0.008 | |   
## | 0.005 | 0.001 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 14 | 8 | 1 | 9 |   
## | 0.027 | 0.140 | |   
## | 0.889 | 0.111 | 0.006 |   
## | 0.006 | 0.004 | |   
## | 0.005 | 0.001 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## 15 | 10 | 3 | 13 |   
## | 0.075 | 0.390 | |   
## | 0.769 | 0.231 | 0.009 |   
## | 0.008 | 0.013 | |   
## | 0.007 | 0.002 | |   
## -------------------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## -------------------------------------------|-----------|-----------|-----------|  
##   
##

#27 How does the number of years with current manager impact Attrition

CrossTable(Attrition\_data\_fac$YearsWithCurrManager,Attrition\_data\_fac$Attrition)

##   
##   
## Cell Contents  
## |-------------------------|  
## | N |  
## | Chi-square contribution |  
## | N / Row Total |  
## | N / Col Total |  
## | N / Table Total |  
## |-------------------------|  
##   
##   
## Total Observations in Table: 1470   
##   
##   
## | Attrition\_data\_fac$Attrition   
## Attrition\_data\_fac$YearsWithCurrManager | 0 | 1 | Row Total |   
## ----------------------------------------|-----------|-----------|-----------|  
## 0 | 178 | 85 | 263 |   
## | 8.226 | 42.795 | |   
## | 0.677 | 0.323 | 0.179 |   
## | 0.144 | 0.359 | |   
## | 0.121 | 0.058 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 1 | 65 | 11 | 76 |   
## | 0.025 | 0.128 | |   
## | 0.855 | 0.145 | 0.052 |   
## | 0.053 | 0.046 | |   
## | 0.044 | 0.007 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 2 | 294 | 50 | 344 |   
## | 0.103 | 0.538 | |   
## | 0.855 | 0.145 | 0.234 |   
## | 0.238 | 0.211 | |   
## | 0.200 | 0.034 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 3 | 123 | 19 | 142 |   
## | 0.127 | 0.662 | |   
## | 0.866 | 0.134 | 0.097 |   
## | 0.100 | 0.080 | |   
## | 0.084 | 0.013 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 4 | 87 | 11 | 98 |   
## | 0.280 | 1.458 | |   
## | 0.888 | 0.112 | 0.067 |   
## | 0.071 | 0.046 | |   
## | 0.059 | 0.007 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 5 | 27 | 4 | 31 |   
## | 0.038 | 0.199 | |   
## | 0.871 | 0.129 | 0.021 |   
## | 0.022 | 0.017 | |   
## | 0.018 | 0.003 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 6 | 25 | 4 | 29 |   
## | 0.019 | 0.098 | |   
## | 0.862 | 0.138 | 0.020 |   
## | 0.020 | 0.017 | |   
## | 0.017 | 0.003 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 7 | 185 | 31 | 216 |   
## | 0.081 | 0.420 | |   
## | 0.856 | 0.144 | 0.147 |   
## | 0.150 | 0.131 | |   
## | 0.126 | 0.021 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 8 | 97 | 10 | 107 |   
## | 0.586 | 3.048 | |   
## | 0.907 | 0.093 | 0.073 |   
## | 0.079 | 0.042 | |   
## | 0.066 | 0.007 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 9 | 58 | 6 | 64 |   
## | 0.347 | 1.807 | |   
## | 0.906 | 0.094 | 0.044 |   
## | 0.047 | 0.025 | |   
## | 0.039 | 0.004 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 10 | 24 | 3 | 27 |   
## | 0.081 | 0.421 | |   
## | 0.889 | 0.111 | 0.018 |   
## | 0.019 | 0.013 | |   
## | 0.016 | 0.002 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 11 | 21 | 1 | 22 |   
## | 0.352 | 1.829 | |   
## | 0.955 | 0.045 | 0.015 |   
## | 0.017 | 0.004 | |   
## | 0.014 | 0.001 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 12 | 18 | 0 | 18 |   
## | 0.558 | 2.902 | |   
## | 1.000 | 0.000 | 0.012 |   
## | 0.015 | 0.000 | |   
## | 0.012 | 0.000 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 13 | 14 | 0 | 14 |   
## | 0.434 | 2.257 | |   
## | 1.000 | 0.000 | 0.010 |   
## | 0.011 | 0.000 | |   
## | 0.010 | 0.000 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 14 | 3 | 2 | 5 |   
## | 0.340 | 1.768 | |   
## | 0.600 | 0.400 | 0.003 |   
## | 0.002 | 0.008 | |   
## | 0.002 | 0.001 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 15 | 5 | 0 | 5 |   
## | 0.155 | 0.806 | |   
## | 1.000 | 0.000 | 0.003 |   
## | 0.004 | 0.000 | |   
## | 0.003 | 0.000 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 16 | 2 | 0 | 2 |   
## | 0.062 | 0.322 | |   
## | 1.000 | 0.000 | 0.001 |   
## | 0.002 | 0.000 | |   
## | 0.001 | 0.000 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## 17 | 7 | 0 | 7 |   
## | 0.217 | 1.129 | |   
## | 1.000 | 0.000 | 0.005 |   
## | 0.006 | 0.000 | |   
## | 0.005 | 0.000 | |   
## ----------------------------------------|-----------|-----------|-----------|  
## Column Total | 1233 | 237 | 1470 |   
## | 0.839 | 0.161 | |   
## ----------------------------------------|-----------|-----------|-----------|  
##   
##

#III. Logistic Regressoin Model

#Which variables most significantly impact Attrition?

#1. Partitionning the Data set into a Training (70%) and Test (30%) set to guide the prediction of Attrition

set.seed(1234)  
  
ind <- sample(2, nrow(Attrition\_data\_fac), replace = T, prob = c(0.7, 0.3))  
  
train <- Attrition\_data\_fac[ind==1,]  
test <- Attrition\_data\_fac[ind==2,]

#2. Setting up our Logistic Regression Model

mymodel <- glm(Attrition ~ Age+BusinessTravel+DailyRate+Department+DistanceFromHome+Education+EducationField+EnvironmentSatisfaction+Gender+HourlyRate+JobInvolvement+JobLevel+JobRole+JobSatisfaction+MaritalStatus+MonthlyIncome+NumCompaniesWorked+OverTime+PercentSalaryHike+PerformanceRating+RelationshipSatisfaction+StockOptionLevel+TotalWorkingYears+WorkLifeBalance+YearsAtCompany+YearsInCurrentRole+YearsSinceLastPromotion+YearsWithCurrManager, data = train, family = 'binomial')  
summary(mymodel)

##   
## Call:  
## glm(formula = Attrition ~ Age + BusinessTravel + DailyRate +   
## Department + DistanceFromHome + Education + EducationField +   
## EnvironmentSatisfaction + Gender + HourlyRate + JobInvolvement +   
## JobLevel + JobRole + JobSatisfaction + MaritalStatus + MonthlyIncome +   
## NumCompaniesWorked + OverTime + PercentSalaryHike + PerformanceRating +   
## RelationshipSatisfaction + StockOptionLevel + TotalWorkingYears +   
## WorkLifeBalance + YearsAtCompany + YearsInCurrentRole + YearsSinceLastPromotion +   
## YearsWithCurrManager, family = "binomial", data = train)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -2.0094 -0.4468 -0.2024 -0.0472 3.5653   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)  
## (Intercept) -9.790e+00 5.014e+02 -0.020 0.984422  
## Age -4.279e-02 1.788e-02 -2.392 0.016735  
## BusinessTravelTravel\_Rarely 8.900e-01 4.709e-01 1.890 0.058763  
## BusinessTravelTravel\_Frequently 1.875e+00 5.159e-01 3.635 0.000278  
## DailyRate -4.845e-04 2.873e-04 -1.686 0.091718  
## DepartmentResearch & Development 1.394e+01 5.014e+02 0.028 0.977813  
## DepartmentSales 1.345e+01 5.014e+02 0.027 0.978606  
## DistanceFromHome 4.593e-02 1.414e-02 3.247 0.001165  
## Education2 -1.679e-02 4.010e-01 -0.042 0.966606  
## Education3 1.632e-01 3.578e-01 0.456 0.648373  
## Education4 2.422e-01 3.851e-01 0.629 0.529436  
## Education5 -5.435e-01 9.552e-01 -0.569 0.569335  
## EducationFieldLife Sciences -1.425e+00 1.049e+00 -1.358 0.174586  
## EducationFieldMarketing -7.077e-01 1.110e+00 -0.637 0.523890  
## EducationFieldMedical -1.199e+00 1.047e+00 -1.145 0.252181  
## EducationFieldOther -1.208e+00 1.124e+00 -1.075 0.282299  
## EducationFieldTechnical Degree -2.082e-01 1.047e+00 -0.199 0.842402  
## EnvironmentSatisfaction2 -1.121e+00 3.473e-01 -3.228 0.001245  
## EnvironmentSatisfaction3 -1.380e+00 3.349e-01 -4.119 3.81e-05  
## EnvironmentSatisfaction4 -1.349e+00 3.295e-01 -4.095 4.22e-05  
## GenderMale 4.480e-01 2.379e-01 1.883 0.059687  
## HourlyRate 2.023e-03 5.715e-03 0.354 0.723342  
## JobInvolvement2 -1.302e+00 4.387e-01 -2.967 0.003010  
## JobInvolvement3 -1.470e+00 4.137e-01 -3.553 0.000380  
## JobInvolvement4 -2.422e+00 6.186e-01 -3.916 8.99e-05  
## JobLevel2 -1.362e+00 5.246e-01 -2.595 0.009449  
## JobLevel3 -3.076e-01 8.649e-01 -0.356 0.722156  
## JobLevel4 -1.072e+00 1.465e+00 -0.732 0.464066  
## JobLevel5 2.359e+00 2.045e+00 1.153 0.248794  
## JobRoleHuman Resources 1.456e+01 5.014e+02 0.029 0.976833  
## JobRoleLaboratory Technician 9.783e-01 7.107e-01 1.376 0.168689  
## JobRoleManager -2.257e+00 1.433e+00 -1.575 0.115309  
## JobRoleManufacturing Director 4.548e-01 6.958e-01 0.654 0.513355  
## JobRoleResearch Director -3.796e+00 1.501e+00 -2.530 0.011414  
## JobRoleResearch Scientist -8.719e-02 7.178e-01 -0.121 0.903324  
## JobRoleSales Executive 1.812e+00 1.483e+00 1.222 0.221742  
## JobRoleSales Representative 1.986e+00 1.569e+00 1.266 0.205620  
## JobSatisfaction2 -8.548e-01 3.547e-01 -2.410 0.015942  
## JobSatisfaction3 -8.349e-01 3.075e-01 -2.716 0.006617  
## JobSatisfaction4 -1.325e+00 3.221e-01 -4.112 3.93e-05  
## MaritalStatusMarried 4.024e-01 3.424e-01 1.175 0.239826  
## MaritalStatusSingle 3.725e-01 4.897e-01 0.761 0.446789  
## MonthlyIncome 7.364e-06 1.130e-04 0.065 0.948022  
## NumCompaniesWorked1 5.255e-01 3.844e-01 1.367 0.171651  
## NumCompaniesWorked2 4.623e-01 5.456e-01 0.847 0.396820  
## NumCompaniesWorked3 5.395e-01 5.659e-01 0.953 0.340497  
## NumCompaniesWorked4 9.697e-01 5.763e-01 1.683 0.092462  
## NumCompaniesWorked5 1.831e+00 6.183e-01 2.961 0.003066  
## NumCompaniesWorked6 1.672e+00 5.815e-01 2.875 0.004046  
## NumCompaniesWorked7 2.421e+00 6.010e-01 4.029 5.60e-05  
## NumCompaniesWorked8 1.281e+00 7.493e-01 1.710 0.087287  
## NumCompaniesWorked9 2.200e+00 6.801e-01 3.235 0.001218  
## OverTime1 2.385e+00 2.569e-01 9.284 < 2e-16  
## PercentSalaryHike -5.046e-02 4.938e-02 -1.022 0.306833  
## PerformanceRating4 4.639e-01 5.107e-01 0.908 0.363668  
## RelationshipSatisfaction2 -7.133e-01 3.551e-01 -2.009 0.044567  
## RelationshipSatisfaction3 -7.603e-01 3.226e-01 -2.357 0.018432  
## RelationshipSatisfaction4 -9.672e-01 3.321e-01 -2.912 0.003590  
## StockOptionLevel1 -1.285e+00 4.006e-01 -3.207 0.001340  
## StockOptionLevel2 -1.234e+00 5.109e-01 -2.414 0.015763  
## StockOptionLevel3 -8.521e-01 5.966e-01 -1.428 0.153241  
## TotalWorkingYears -3.767e-02 3.780e-02 -0.997 0.318943  
## WorkLifeBalance2 -1.243e+00 4.991e-01 -2.491 0.012756  
## WorkLifeBalance3 -1.668e+00 4.732e-01 -3.525 0.000423  
## WorkLifeBalance4 -1.366e+00 5.723e-01 -2.388 0.016958  
## YearsAtCompany 1.430e-01 4.851e-02 2.947 0.003207  
## YearsInCurrentRole -1.803e-01 6.251e-02 -2.884 0.003926  
## YearsSinceLastPromotion 1.713e-01 5.482e-02 3.124 0.001783  
## YearsWithCurrManager -1.959e-01 5.919e-02 -3.310 0.000932  
##   
## (Intercept)   
## Age \*   
## BusinessTravelTravel\_Rarely .   
## BusinessTravelTravel\_Frequently \*\*\*  
## DailyRate .   
## DepartmentResearch & Development   
## DepartmentSales   
## DistanceFromHome \*\*   
## Education2   
## Education3   
## Education4   
## Education5   
## EducationFieldLife Sciences   
## EducationFieldMarketing   
## EducationFieldMedical   
## EducationFieldOther   
## EducationFieldTechnical Degree   
## EnvironmentSatisfaction2 \*\*   
## EnvironmentSatisfaction3 \*\*\*  
## EnvironmentSatisfaction4 \*\*\*  
## GenderMale .   
## HourlyRate   
## JobInvolvement2 \*\*   
## JobInvolvement3 \*\*\*  
## JobInvolvement4 \*\*\*  
## JobLevel2 \*\*   
## JobLevel3   
## JobLevel4   
## JobLevel5   
## JobRoleHuman Resources   
## JobRoleLaboratory Technician   
## JobRoleManager   
## JobRoleManufacturing Director   
## JobRoleResearch Director \*   
## JobRoleResearch Scientist   
## JobRoleSales Executive   
## JobRoleSales Representative   
## JobSatisfaction2 \*   
## JobSatisfaction3 \*\*   
## JobSatisfaction4 \*\*\*  
## MaritalStatusMarried   
## MaritalStatusSingle   
## MonthlyIncome   
## NumCompaniesWorked1   
## NumCompaniesWorked2   
## NumCompaniesWorked3   
## NumCompaniesWorked4 .   
## NumCompaniesWorked5 \*\*   
## NumCompaniesWorked6 \*\*   
## NumCompaniesWorked7 \*\*\*  
## NumCompaniesWorked8 .   
## NumCompaniesWorked9 \*\*   
## OverTime1 \*\*\*  
## PercentSalaryHike   
## PerformanceRating4   
## RelationshipSatisfaction2 \*   
## RelationshipSatisfaction3 \*   
## RelationshipSatisfaction4 \*\*   
## StockOptionLevel1 \*\*   
## StockOptionLevel2 \*   
## StockOptionLevel3   
## TotalWorkingYears   
## WorkLifeBalance2 \*   
## WorkLifeBalance3 \*\*\*  
## WorkLifeBalance4 \*   
## YearsAtCompany \*\*   
## YearsInCurrentRole \*\*   
## YearsSinceLastPromotion \*\*   
## YearsWithCurrManager \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 965.32 on 1041 degrees of freedom  
## Residual deviance: 564.82 on 973 degrees of freedom  
## AIC: 702.82  
##   
## Number of Fisher Scoring iterations: 14

#Selecting the most significant variables (with p < 0.05):

#Age(-) #Business Travel (+) #Distance From Home (+) #Environment Satisfaction (-) #Job involvement(-) #Job Level (-) #Job ROle #Job Satisfaction (-) #Number of companies worked for (+) #Relationship satisfaction (-) #StockoptionLevel (-) #Worklife Balance (-) #Years at company (-) #Years in current Role (-) #Years Since Last promotion (+) #Years under current manager (-)

#3 While maintaining the more statistically significant variables

mymodel <- glm(Attrition ~ Age+BusinessTravel+DistanceFromHome+EnvironmentSatisfaction+JobInvolvement+JobLevel+JobRole+JobSatisfaction+NumCompaniesWorked+OverTime+RelationshipSatisfaction+StockOptionLevel+WorkLifeBalance+YearsAtCompany+YearsInCurrentRole+YearsSinceLastPromotion+YearsWithCurrManager, data = train, family = 'binomial')  
summary(mymodel)

##   
## Call:  
## glm(formula = Attrition ~ Age + BusinessTravel + DistanceFromHome +   
## EnvironmentSatisfaction + JobInvolvement + JobLevel + JobRole +   
## JobSatisfaction + NumCompaniesWorked + OverTime + RelationshipSatisfaction +   
## StockOptionLevel + WorkLifeBalance + YearsAtCompany + YearsInCurrentRole +   
## YearsSinceLastPromotion + YearsWithCurrManager, family = "binomial",   
## data = train)  
##   
## Deviance Residuals:   
## Min 1Q Median 3Q Max   
## -1.9634 -0.4605 -0.2251 -0.0667 3.4878   
##   
## Coefficients:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) 2.87199 1.13707 2.526 0.011544 \*   
## Age -0.05516 0.01605 -3.437 0.000589 \*\*\*  
## BusinessTravelTravel\_Rarely 0.93626 0.44817 2.089 0.036699 \*   
## BusinessTravelTravel\_Frequently 1.87303 0.48791 3.839 0.000124 \*\*\*  
## DistanceFromHome 0.03935 0.01351 2.913 0.003578 \*\*   
## EnvironmentSatisfaction2 -1.03210 0.33038 -3.124 0.001784 \*\*   
## EnvironmentSatisfaction3 -1.18340 0.31206 -3.792 0.000149 \*\*\*  
## EnvironmentSatisfaction4 -1.17292 0.30854 -3.801 0.000144 \*\*\*  
## JobInvolvement2 -1.26975 0.41614 -3.051 0.002279 \*\*   
## JobInvolvement3 -1.46453 0.39158 -3.740 0.000184 \*\*\*  
## JobInvolvement4 -2.32429 0.58397 -3.980 6.89e-05 \*\*\*  
## JobLevel2 -1.41667 0.46964 -3.016 0.002557 \*\*   
## JobLevel3 -0.48716 0.59121 -0.824 0.409934   
## JobLevel4 -1.09975 0.97496 -1.128 0.259322   
## JobLevel5 2.07255 1.48456 1.396 0.162694   
## JobRoleHuman Resources 1.06807 0.77468 1.379 0.167983   
## JobRoleLaboratory Technician 0.85313 0.67929 1.256 0.209142   
## JobRoleManager -2.42607 1.32285 -1.834 0.066658 .   
## JobRoleManufacturing Director 0.40462 0.66768 0.606 0.544510   
## JobRoleResearch Director -3.86723 1.37053 -2.822 0.004777 \*\*   
## JobRoleResearch Scientist -0.12954 0.68208 -0.190 0.849370   
## JobRoleSales Executive 1.38834 0.54202 2.561 0.010424 \*   
## JobRoleSales Representative 1.53576 0.73450 2.091 0.036537 \*   
## JobSatisfaction2 -0.81683 0.34093 -2.396 0.016580 \*   
## JobSatisfaction3 -0.80298 0.29304 -2.740 0.006141 \*\*   
## JobSatisfaction4 -1.26441 0.30575 -4.135 3.54e-05 \*\*\*  
## NumCompaniesWorked1 0.48123 0.37153 1.295 0.195224   
## NumCompaniesWorked2 0.45447 0.51184 0.888 0.374589   
## NumCompaniesWorked3 0.49750 0.52095 0.955 0.339587   
## NumCompaniesWorked4 0.88082 0.54262 1.623 0.104535   
## NumCompaniesWorked5 1.70565 0.57010 2.992 0.002773 \*\*   
## NumCompaniesWorked6 1.56968 0.53878 2.913 0.003575 \*\*   
## NumCompaniesWorked7 2.25332 0.57134 3.944 8.02e-05 \*\*\*  
## NumCompaniesWorked8 1.10838 0.70989 1.561 0.118447   
## NumCompaniesWorked9 2.02827 0.63774 3.180 0.001471 \*\*   
## OverTime1 2.18701 0.23994 9.115 < 2e-16 \*\*\*  
## RelationshipSatisfaction2 -0.57526 0.34051 -1.689 0.091140 .   
## RelationshipSatisfaction3 -0.57523 0.30788 -1.868 0.061715 .   
## RelationshipSatisfaction4 -0.84977 0.32147 -2.643 0.008207 \*\*   
## StockOptionLevel1 -1.31806 0.25107 -5.250 1.52e-07 \*\*\*  
## StockOptionLevel2 -1.26911 0.39362 -3.224 0.001263 \*\*   
## StockOptionLevel3 -0.97094 0.48819 -1.989 0.046720 \*   
## WorkLifeBalance2 -1.23363 0.48571 -2.540 0.011090 \*   
## WorkLifeBalance3 -1.53361 0.45899 -3.341 0.000834 \*\*\*  
## WorkLifeBalance4 -1.14309 0.55317 -2.066 0.038788 \*   
## YearsAtCompany 0.10574 0.04242 2.492 0.012690 \*   
## YearsInCurrentRole -0.14631 0.05897 -2.481 0.013100 \*   
## YearsSinceLastPromotion 0.16849 0.05169 3.259 0.001117 \*\*   
## YearsWithCurrManager -0.18701 0.05749 -3.253 0.001143 \*\*   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## (Dispersion parameter for binomial family taken to be 1)  
##   
## Null deviance: 965.32 on 1041 degrees of freedom  
## Residual deviance: 590.60 on 993 degrees of freedom  
## AIC: 688.6  
##   
## Number of Fisher Scoring iterations: 7

#Predictions: Predicting the probability of each eomployee leaving the company

p1 <- predict (mymodel, train, type = 'response')  
head(p1)

## 1 2 3 4 6 7   
## 0.551320543 0.001127055 0.750483345 0.588867808 0.062987992 0.266209730

#Predicting attrition of each employee in the training set

head(train)

## Age Attrition BusinessTravel DailyRate Department  
## 1 41 1 Travel\_Rarely 1102 Sales  
## 2 49 0 Travel\_Frequently 279 Research & Development  
## 3 37 1 Travel\_Rarely 1373 Research & Development  
## 4 33 0 Travel\_Frequently 1392 Research & Development  
## 6 32 0 Travel\_Frequently 1005 Research & Development  
## 7 59 0 Travel\_Rarely 1324 Research & Development  
## DistanceFromHome Education EducationField EmployeeCount EmployeeNumber  
## 1 1 2 Life Sciences 1 1  
## 2 8 1 Life Sciences 1 2  
## 3 2 2 Other 1 4  
## 4 3 4 Life Sciences 1 5  
## 6 2 2 Life Sciences 1 8  
## 7 3 3 Medical 1 10  
## EnvironmentSatisfaction Gender HourlyRate JobInvolvement JobLevel  
## 1 2 Female 94 3 2  
## 2 3 Male 61 2 2  
## 3 4 Male 92 2 1  
## 4 4 Female 56 3 1  
## 6 4 Male 79 3 1  
## 7 3 Female 81 4 1  
## JobRole JobSatisfaction MaritalStatus MonthlyIncome  
## 1 Sales Executive 4 Single 5993  
## 2 Research Scientist 2 Married 5130  
## 3 Laboratory Technician 3 Single 2090  
## 4 Research Scientist 3 Married 2909  
## 6 Laboratory Technician 4 Single 3068  
## 7 Laboratory Technician 1 Married 2670  
## NumCompaniesWorked OverTime PercentSalaryHike PerformanceRating  
## 1 8 1 11 3  
## 2 1 0 23 4  
## 3 6 1 15 3  
## 4 1 1 11 3  
## 6 0 0 13 3  
## 7 4 1 20 4  
## RelationshipSatisfaction StandardHours StockOptionLevel  
## 1 1 80 0  
## 2 4 80 1  
## 3 2 80 0  
## 4 3 80 0  
## 6 3 80 0  
## 7 1 80 3  
## TotalWorkingYears TrainingTimesLastYear WorkLifeBalance YearsAtCompany  
## 1 8 0 1 6  
## 2 10 3 3 10  
## 3 7 3 3 0  
## 4 8 3 3 8  
## 6 8 2 2 7  
## 7 12 3 2 1  
## YearsInCurrentRole YearsSinceLastPromotion YearsWithCurrManager  
## 1 4 0 5  
## 2 7 1 7  
## 3 0 0 0  
## 4 7 3 0  
## 6 7 3 6  
## 7 0 0 0

#Measuring Misclassification Error in the training data #1 Setting up a confusion Matrix

pred1 <- ifelse(p1>0.5, 1, 0)  
tab1<-table(Predicted = pred1, Actual = train$Attrition)  
tab1

## Actual  
## Predicted 0 1  
## 0 834 84  
## 1 26 98

834 employees were predicted to not resign and actually did not 98 employees were predicted to resign and actually resigned

26 employees were predicted to resign but did not 84 employees were predicted to not resign, but they did

#2. Percentage Misclassification of the training data

1-sum(diag(tab1))/sum(tab1)

## [1] 0.1055662

That is 10.56%

#Measuring Misclassification for Test Data

p2 <- predict(mymodel, test, type = 'response')  
pred2 <- ifelse(p2>0.5, 1, 0)  
tab2 <- table(Predicted = pred2, Actual = test$Attrition)  
tab2

## Actual  
## Predicted 0 1  
## 0 353 31  
## 1 20 24

#3 Percentage Misclassification of the test data

1-sum(diag(tab2))/sum(tab2)

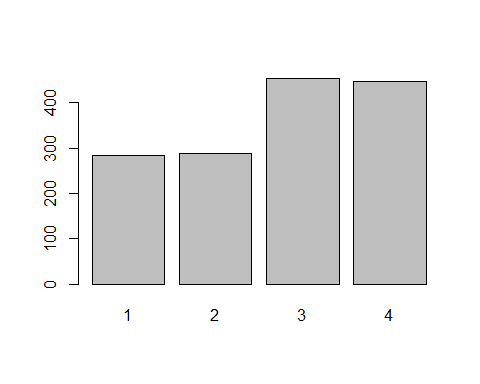
## [1] 0.1191589

That is 11.9%

#How satisfied are the company’s staff?

#Environmental Satisfaction

plot(Attrition\_data\_fac$EnvironmentSatisfaction)



median(as.numeric(Attrition\_data\_fac$EnvironmentSatisfaction))

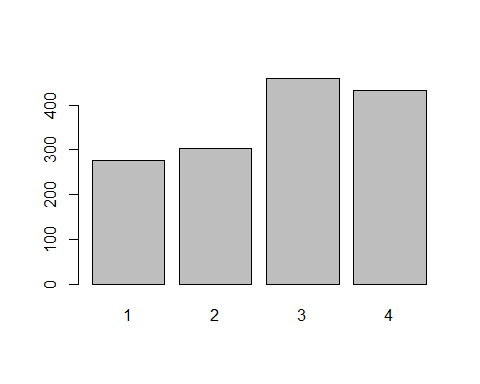
## [1] 3

mean(as.numeric(Attrition\_data\_fac$EnvironmentSatisfaction))

## [1] 2.721769

#Relationship Satisfaction

plot(Attrition\_data\_fac$RelationshipSatisfaction)



median(as.numeric(Attrition\_data\_fac$RelationshipSatisfaction))

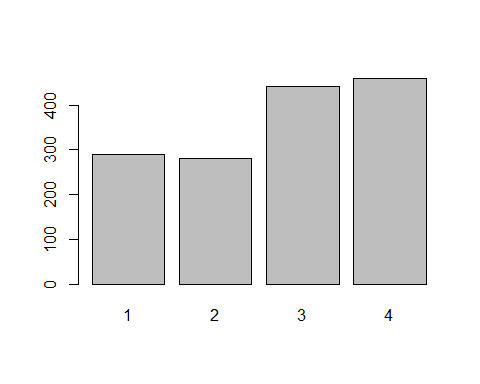
## [1] 3

mean(as.numeric(Attrition\_data\_fac$RelationshipSatisfaction))

## [1] 2.712245

#Job Satisfaction

plot(Attrition\_data\_fac$JobSatisfaction)



median(as.numeric(Attrition\_data\_fac$JobSatisfaction))

## [1] 3

mean(as.numeric(Attrition\_data\_fac$JobSatisfaction))

## [1] 2.728571

Since the median (3 on 4) is greater than the mean(2.7 on 4), all three forms of employee satisfaction can be said to be left skewed.

So, more than half of the company’s staff can be said to experience above average (2.7) levels of job satisfaction.

Thus general satisfaction levels can be said to be high

## R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this: