```
> ##Importing Data and inital analyses
> #Importing csv file from a location
> attr<- read.csv(file="MVA/Attrition Dataset.csv", header=TRUE, sep=",")</pre>
> attr <- as.data.frame(attr)</pre>
> glimpse(attr)
Observations: 1,470
Variables: 35
                          <int> 41, 49, 37, 33, 27, 32, 59, 30, 38, 36, 35,
$ Age
29, 31, 34, 28, 29, 32, 22, 5...
                          $ Attrition
 No, No, No, Yes, No, No, No...
                          <fct> Travel_Rarely, Travel_Frequently, Travel_Rar
$ BusinessTravel
ely, Travel_Frequently, Trave...
$ DailyRate
                          <int> 1102, 279, 1373, 1392, 591, 1005, 1324, 1358
  216, 1299, 809, 153, 670, 1...
$ Department
                          <fct> Sales, Research & Development, Research & De
velopment, Research & Develop...
$ DistanceFromHome
                          <int> 1, 8, 2, 3, 2, 2, 3, 24, 23, 27, 16, 15, 26,
19, 24, 21, 5, 16, 2, 2, 11,...
$ Education
                          <int> 2, 1, 2, 4, 1, 2, 3, 1, 3, 3, 3, 2, 1, 2, 3,
4, 2, 2, 4, 3, 2, 4, 4, 2,
                          1..
                          <fct> Life Sciences, Life Sciences, Other, Life Sc
$ EducationField
iences, Medical, Life Science...
$ EmployeeCount
                          1, 1, 1, 1, 1, 1, 1, 1, 1,
                          1...
                          <int> 1, 2, 4, 5, 7, 8, 10, 11, 12, 13, 14, 15, 16
$ EmployeeNumber
  18, 19, 20, 21, 22, 23,
                         24,..
$ EnvironmentSatisfaction
                          <int> 2, 3, 4, 4, 1, 4, 3, 4, 4, 3, 1, 4, 1, 2, 3,
2, 1, 4, 1, 4, 1, 3, 1, 3, 2.
                          <fct> Female, Male, Male, Female, Male, Male, Fema
$ Gender
le, Male, Male, Male, F...
$ HourlyRate
                          <int> 94, 61, 92, 56, 40, 79, 81, 67, 44, 94, 84,
49, 31, 93, 50, 51, 80, 96, 7...
$ JobInvolvement
                          <int> 3, 2, 2, 3, 3, 3, 4, 3, 2, 3, 4, 2, 3, 3, 2,
4, 4, 4, 2, 3, 4, 2, 3, 3, $ JobLevel
                          <int> 2, 2, 1, 1, 1, 1, 1, 1, 3, 2, 1, 2, 1, 1, 1,
3, 1, 1, 4, 1, 2, 1, 3, 1, 1...
$ JobRole
                          <fct> Sales Executive, Research Scientist, Laborat
ory Technician, Research Scie...
$ JobSatisfaction
                          <int> 4, 2, 3, 3, 2, 4, 1, 3, 3, 3, 2, 3, 3, 4, 3,
1, 2, 4, 4, 4, 3, 1, 2, 4,
                          1.
                          <fct> Single, Married, Single, Married, Married, S
$ MaritalStatus
ingle, Married, Divorced, Sin...
$ MonthlyIncome
                          <int> 5993, 5130, 2090, 2909, 3468, 3068, 2670, 26
93, 9526, 5237, 2426, 4193, 2...
$ MonthlyRate
                          <int> 19479, 24907, 2396, 23159, 16632, 11864, 996
4, 13335, 8787, 16577, 16479,...
$ NumCompaniesWorked
                          <int> 8, 1, 6, 1, 9, 0, 4, 1, 0, 6, 0, 0, 1, 0, 5,
1, 0, 1, 2, 5, 0, 7, 0, 1, 2...
$ over18
                          Y, Y, Y, Y, Y, Y, Y, Y, Y.
$ OverTime
                          <fct> Yes, No, Yes, Yes, No, No, Yes, No, No, No,
No, Yes, No, No, Yes, No, Yes...
$ PercentSalaryHike
                          <int> 11, 23, 15, 11, 12, 13, 20, 22, 21, 13, 13,
12, 17, 11, 14, 11, 12, 13, 1...
$ PerformanceRating
                          <int> 3, 4, 3, 3, 3, 4, 4, 4, 3, 3, 3, 3, 3,
                   3, 3,
3, 3, 3, 3, 3, 3, 4,
                          3...
$ RelationshipSatisfaction <int> 1, 4, 2, 3, 4, 3, 1, 2, 2, 2, 3, 4, 4, 3, 2,
3, 4, 2, 3, 3, 4, 2, 3, 4, 3...
$ StandardHours
                          80, 80, 80, 80, 80, 80, 80, 8...
$ StockOptionLevel
                          <int> 0, 1, 0, 0, 1, 0, 3, 1, 0, 2, 1, 0, 1, 1, 0,
1, 2, 2, 0, 0, 1, 0, 0, 0, 0...
```

```
$ TotalWorkingYears
                             <int> 8, 10, 7, 8, 6, 8, 12, 1, 10, 17, 6, 10, 5,
3, 6, 10, 7, 1, 31, 6, 5, 10, \dots
$ TrainingTimesLastYear
                             <int> 0, 3, 3, 3, 3, 2, 3, 2, 2, 3, 5, 3, 1, 2, 4,
  5, 2, 3, 3, 5, 4, 4, 6,
                             2...
$ WorkLifeBalance
                             <int> 1, 3, 3, 3, 3, 2, 2, 3, 3, 2, 3, 3, 2, 3, 3,
  2, 2, 3, 3, 2, 3, 3, 3,
                             3...
 YearsAtCompany
10, 6, 1, 25, 3,
                             <int> 6, 10, 0, 8, 2, 7, 1, 1, 9, 7, 5, 9, 5, 2, 4
                   4, 5, 12,
 YearsInCurrentRole
                             <int> 4, 7, 0, 7, 2, 7, 0, 0, 7, 7, 4, 5, 2, 2, 2,
9, 2, 0, 8, 2, 2, 3, 6, 0, 2...
                             <int> 0, 1, 0, 3, 2, 3, 0, 0, 1, 7, 0, 0, 4, 1, 0,
$ YearsSinceLastPromotion
8, 0, 0, 3, 1, 1, 0, 2, 0, 1...
$ YearsWithCurrManager
                             <int> 5, 7, 0, 0, 2, 6, 0, 0, 8, 7, 3, 8, 3, 2, 3,
8, 5, 0, 7, 2, 3, 3, 11, 0,
> #Dimension of the dataset
> dim(attr)
[1] 1470
> #View the first 5 rows of the dataset
> head(attr)
                                                            Department DistanceFr
  Age Attrition
                    BusinessTravel DailyRate
omHome Education EducationField
                                          1102
                                                                 sales
   41
            Yes
                     Travel_Rarely
             Life Sciences
1
2
8
3
2
4
   49
              No Travel_Frequently
                                           279 Research & Development
          1
             Life Sciences
                     Travel_Rarely
   37
                                          1373 Research & Development
             Yes
          2
                      Other
   33
              No Travel_Frequently
                                          1392 Research & Development
3
5
2
          4
             Life Sciences
   27
                     Travel_Rarely
                                           591 Research & Development
              NO
          1
                    Medical
6
   32
              No Travel_Frequently
                                          1005 Research & Development
             Life Sciences
  EmployeeCount EmployeeNumber EnvironmentSatisfaction Gender HourlyRate JobI
nvolvement JobLevel
                               1
                                                         2 Female
                                                                           94
3
         2
2
2
3
2
4
                               2
                                                         3
               1
                                                             Male
                                                                           61
         2
               1
                                                             Male
                                                                           92
         1
                                                         4 Female
                               5
               1
                                                                           56
3
         1
5
                               7
                                                             Male
                                                                           40
               1
                                                         1
         1
6
               1
                               8
                                                                           79
                                                         4
                                                             Male
         1
                 JobRole JobSatisfaction MaritalStatus MonthlyIncome MonthlyRa
te NumCompaniesWorked Over18
1
        Sales Executive
                                         4
                                                  Single
                                                                    5993
                                                                                194
79
                             Υ
                                                 Married
                                                                    5130
                                                                                249
2
     Research Scientist
                                         2
07
                             Υ
3 Laboratory Technician
                                         3
                                                  Single
                                                                    2090
                                                                                 23
96
                                         3
                                                 Married
4
     Research Scientist
                                                                    2909
                                                                                231
59
                             Υ
                                         2
                                                 Married
                                                                    3468
                                                                                166
5 Laboratory Technician
                     9
                             Υ
```

4

Υ

6 Laboratory Technician

64

Single

118

3068

```
OverTime PercentSalaryHike PerformanceRating RelationshipSatisfaction Stand
ardHours StockOptionLevel
       Yes
                             11
                                                  3
                                                                              1
80
                    0
2
                             23
                                                  4
                                                                              4
         No
80
                    1
                                                                              2
3
                             15
                                                  3
        Yes
80
                    0
                                                                              3
4
                             11
                                                  3
       Yes
80
                    0
5
                             12
                                                  3
                                                                              4
         No
80
                    1
                             13
                                                  3
                                                                              3
6
         No
                    0
80
  TotalWorkingYears TrainingTimesLastYear WorkLifeBalance YearsAtCompany Year
sInCurrentRole
                    8
                                            0
                                                              1
                                                                               6
1
4
7
3
0
                   10
                                            3
                                                              3
                                                                              10
                    7
                                            3
                                                              3
                                                                               0
4
7
5
2
                    8
                                            3
                                                              3
                                                                               8
                                             3
                                                              3
                                                                               2
                    6
6
                    8
                                            2
                                                              2
                                                                               7
  YearsSinceLastPromotion YearsWithCurrManager
                                                  5
7
2
                          1
                          0
                                                  0
4
                                                  0
                          3 2 3
5
                                                  2
6
                                                  6
  summary(attr)
                                                             DailyRate
                                          BusinessTravel
                   Attrition
      Age
Department
 Min.
         :18.00
                  No :1233
                               Non-Travel
                                                  : 150
                                                           Min.
                                                                   : 102.0
                                                                              Human R
esources
                : 63
 1st Qu.:30.00
                               Travel_Frequently: 277
                  Yes: 237
                                                           1st Qu.: 465.0
                                                                              Researc
h & Development:961
                               Travel_Rarely
Median :36.00
                                                  :1043
                                                           Median : 802.0
                                                                              sales
:446
                                                                   : 802.5
 Mean
         :36.92
 3rd Qu.:43.00
                                                           3rd Qu.:1157.0
         :60.00
                                                                   :1499.0
                                                           Max.
 Max.
                      Education
                                                EducationField EmployeeCount Emplo
 DistanceFromHome
yeeNumber
         : 1.000
                    Min.
                            :1.000
                                     Human Resources: 27
                                                                Min.
                                                                                Min.
 Min.
                                                                        :1
    1.0
                    1st Qu.:2.000
                                      Life Sciences
 1st Qu.: 2.000
                                                        :606
                                                                1st Qu.:1
                                                                                1st Q
u.: 491.2
Median : 7.000
n :1020.5
                    Median :3.000
                                     Marketing
                                                                Median:1
                                                        :159
                                                                                Media
         : 9.193
 Mean
                    Mean
                            :2.913
                                     Medical
                                                        :464
                                                                Mean
                                                                        :1
                                                                                Mean
:1024.9
 3rd Qu.:14.000
                    3rd Qu.:4.000
                                     Other
                                                        : 82
                                                                3rd Qu.:1
                                                                                3rd Q
u.:1555.8
         :29.000
                                     Technical Degree:132
                                                                        :1
                    Max.
                            :5.000
                                                                Max.
                                                                                Max.
 Max.
:2068.0
```

EnvironmentSatisfaction	Gende	r	HourlyR	ate	JobInvol	vement	JobL	
evel Min. :1.000 :1.000	Female:5	88 M	in. :	30.00	Min. :	1.00	Min.	
1st Qu.:2.000	Male :8	82 1	st Qu.:	48.00	1st Qu.:	2.00	1st Qu.	
:1.000 Median :3.000 :2.000		Me	edian :	66.00	Median :	3.00	Median	
Mean :2.722 :2.064		Me	ean :	65.89	Mean :	2.73	Mean	
3rd Qu.:4.000 :3.000		31	rd Qu.:	83.75	3rd Qu.:	3.00	3rd Qu.	
Max. :4.000 :5.000		Ма	ax. :1	.00.00	Max. :	4.00	Max.	
JobRole JobSatisfaction MaritalStatus MonthlyIncome								
MonthlyRate Sales Executive	:326	Min.	:1.000	Divor	ced:327	Min.	: 1009	
Min. : 2094 Research Scientist	:292	1st Qu	.:2.000	Marrie	ed :673	1st Qu	ı.: 2911	
1st Qu.: 8047 Laboratory Technician	:259	Median	:3.000	Single	e :470	Mediar	ı : 4919	
Median :14236 Manufacturing Director	:145	Mean	:2.729			Mean	: 6503	
Mean :14313 Healthcare Representati	ve:131	3rd Qu	.:4.000			3rd Qu	ı.: 8379	
3rd Qu.:20462 Manager	:102	Max.	:4.000			Max.	:19999	
Max. :26999 (Other)	:215			0.7	:			
NumCompaniesWorked Over elationshipSatisfaction		Time			ike Perfo			
Min. :0.000 Y:14 in. :1.000			Min.	:11.00	Min.	:3.00		
1st Qu.:1.000 st Qu.:2.000	Yes:	416	1st Qu.			Qu.:3.00		
Median :2.000 edian :3.000			Median			an :3.00		
Mean :2.693 ean :2.712			Mean	:15.21	Mean	:3.15		
3rd Qu.:4.000 rd Qu.:4.000			3rd Qu.			Qu.:3.00		
Max. :9.000 ax. :4.000			Max.	:25.00	Max.	:4.00	00 м	
StandardHours StockOpti ifeBalance YearsAtCompan	onLevel T	otalwo	rkingYea	ırs Trair	ningTimes	sLastYea	ır WorkL	
Min. :80 Min. :0 :1.000 Min. :0.000	.0000 м	in.	: 0.00	Min.	:0.000)	Min.	
1st Qu.:80		st Qu.	: 6.00	1st (Qu.:2.000)	1st Q	
Median :80 Median :1 n :3.000 Median : 5.00	.0000 M	edian	:10.00	Media	an :3.000)	Media	
		ean	:11.28	Mean	:2.799)	Mean	
3rd Qu.:80 3rd Qu.:1 u.:3.000 3rd Qu.: 9.00		rd Qu.	:15.00	3rd C	Qu.:3.000)	3rd Q	
		ax.	:40.00	Max.	:6.000)	Max.	
	sSinceLas : 0.00 Qu.: 0.00 an : 1.00	0 0	Mir 1st		.000 .000	er		

 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

<pre>> #Rename the Age column > colnames(attr)[1] <- "Age" > #Calculating the number of null values in each of the columns > colsums(sapply(attr,is.na))</pre>							
Age	Attrition	BusinessTravel					
DailyRate 0	0	0					
0 Department	DistanceFromHome	Education					
EducationField .	0	0					
0	•	Ç					
EmployeeCount Gender	EmployeeNumber	EnvironmentSatisfaction					
0	0	0					
HourlyRate JobRole	JobInvolvement	JobLevel					
0	0	0					
0 JobSatisfaction	MaritalStatus	MonthlyIncome					
MonthlyRate 0	0	0					
0 NumCompaniesWorked	0ver18	OverTime					
PercentSalaryHike		-					
0	0	0					
PerformanceRating StockOptionLevel	RelationshipSatisfaction	StandardHours					
0	0	0					
TotalWorkingYears	TrainingTimesLastYear	WorkLifeBalance					
YearsAtCompany 0	0	0					
0 YearsInCurrentRole	YearsSinceLastPromotion	YearsWithCurrManager					
0	0						
<pre>> missmap(attr,main="Missing Values VS Observed")</pre>							

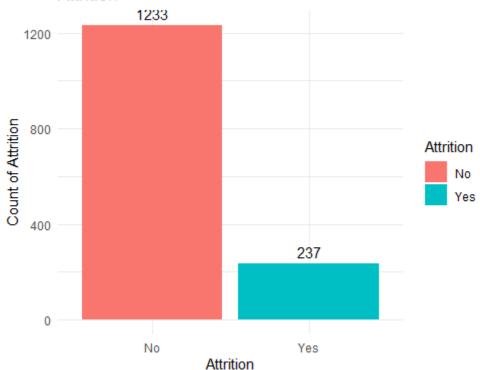
Missing Values VS Observed

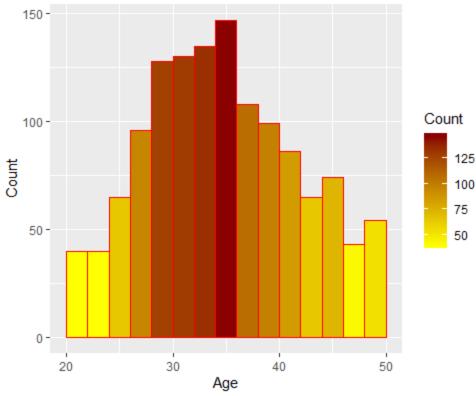
ger')

```
1455
            1365
            1275
            1185
            1095
            1005
             915
             825
             735
             645
                                                                         Missing (09
             555
                                                                         Observed (
             465
             375
             285
             195
             105
              15
                      NorkLifeBalance
talWorkingYears
StandardHours
rformanceRating
OverTime
                                          JobSatisfaction
JobLevel
HourlyRate
                                    mpaniesWorked
MonthlyIncome
                                                     EmployeeCount
Education
                                                   nentSatisfaction
> #Removing redundant columns
  attr$EmployeeNumber<- NULL
  attr$StandardHours <- NULL
  attr$Over18 <- NULL
> attr$EmployeeCount <- NULL</pre>
> #Converting data type of categorical column
> attr$Education <- factor(attr$Education)</pre>
> attr$EnvironmentSatisfaction <- factor(attr$EnvironmentSatisfaction)</pre>
> attr$JobInvolvement <- factor(attr$JobInvolvement)</pre>
> attr$JobLevel <- factor(attr$JobLevel)</pre>
  attr$JobSatisfaction <- factor(attr$JobSatisfaction)
attr$PerformanceRating <- factor(attr$PerformanceRating)</pre>
> attr$RelationshipSatisfaction <- factor(attr$RelationshipSatisfaction)</pre>
> attr$StockOptionLevel <- factor(attr$StockOptionLevel)
> attr$WorkLifeBalance <- factor(attr$WorkLifeBalance)</pre>
> #Assigning categorical and numerical variable to temporary variable
> catvar<-c('BusinessTravel','Department','Education','EducationField','Envir
onmentSatisfaction','Gender',
+ 'JobRole','JobInvolvement','JobLevel','JobSatisfaction',
+ 'MaritalStatus','PerformanceRating','RelationshipSatisfaction','S
Hike', 'TotalWorkingYears',
                  'TrainingTimesLastYear','YearsAtCompany',
                  'YearsInCurrentRole','YearsSinceLastPromotion','YearsWithCurrMana
  ##Exploratory Data Analysis
> #Vizualization of Attrition
> attr %>%
      group_by(Attrition) %>%
```

```
+ tally() %>%
+ ggplot(aes(x = Attrition, y = n, fill=Attrition)) +
+ geom_bar(stat = "identity") +
+ theme_minimal()+
+ labs(x="Attrition", y="Count of Attrition")+
+ ggtitle("Attrition")+
+ geom_text(aes(label = n), vjust = -0.5, position = position_dodge(0.9))
```

Attrition





```
> par(mfrow = c(1,2))
> hist(attr$DailyRate,xlab='',main = 'Histogram of DailyRate',freq = FALSE)
> lines(density(attr$DailyRate,na.rm = T))
> rug(jitter(attr$DailyRate,main='Normal QQ plot of DailyRate')
[1] 650 15
> par(mfrow=c(1,1))
nistogram of DailyRate',freq = FALSE)

// Comparison of DailyRate'
//
```

```
> par(mfrow = c(1,2))
> hist(attr$DistanceFromHome,xlab='',main = 'Histogram of DistanceFromHome',f
req = FALSE)
> lines(density(attr$DistanceFromHome,na.rm = T))
> rug(jitter(attr$DistanceFromHome))
> qqPlot(attr$DistanceFromHome,main='Normal QQ plot of DistanceFromHome')
[1] 62 142
> par(mfrow=c(1,1))
> ygen(of DistanceFromHome,na.rm = T))
> of DistanceFromHome')
```

```
> par(mfrow = c(1,2))
> hist(attr$HourlyRate,xlab='',main = 'Histogram of HourlyRate',freq = FALSE)
> lines(density(attr$HourlyRate,na.rm = T))
```

```
> rug(jitter(attr$HourlyRate))
> qqPlot(attr$HourlyRate,main='Normal QQ plot of HourlyRate')
[1] 58 79
> par(mfrow=c(1,1))
nistuyiani vi nouniyRate
```

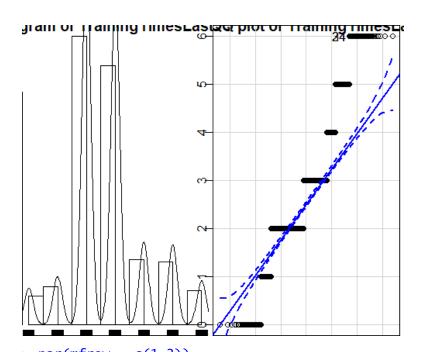
> par(mfrow = c(1,2))

```
> par(mfrow = c(1,2))
> hist(attr$NumCompaniesWorked,xlab='',main = 'Histogram of NumCompaniesWorke
d',freq = FALSE)
> lines(density(attr$NumCompaniesWorked,na.rm = T))
> rug(jitter(attr$NumCompaniesWorked))
```

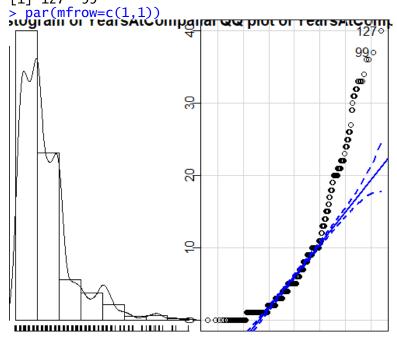
```
> qqPlot(attr$NumCompaniesWorked,main='Normal QQ plot of NumCompaniesWorked')
[1] 5 39
> par (mfrow=c(1,1))
yı dını vi nume vin pamies vi qua prot or nume vin pamies vi
                                                                                                             ω
                                                                                                             ဖ
                                                                                                             4
                                                                                                                          -\cos m
> par(mfrow = c(1,2))
> hist(attr$PercentSalaryHike,xlab='',main = 'Histogram of PercentSalaryHike'
  , freq = FALSE)
> lines(density(attr$PercentSalaryHike,na.rm = T))
> rug(jitter(attr$PercentSalaryHike))
 > qqPlot(attr$PercentSalaryHike,main='Normal QQ plot of PercentSalaryHike')
 [1] 121 179
> par(mfrow=c(1,1))
togram of reference and ynian war profor or yn
                                                                                                                     4
                                                                                                                     42
                                                                                                                     8
                                                                                                                      <u>___</u>
                                                                                                                      <u>6</u>
                                                                                                                      4
   _____
```

```
> par(mfrow = c(1,2))
> hist(attr$TrainingTimesLastYear,xlab='',main = 'Histogram of TrainingTimesLastYear',freq = FALSE)
> lines(density(attr$TrainingTimesLastYear,na.rm = T))
> rug(jitter(attr$TrainingTimesLastYear))
```

```
> qqPlot(attr$TrainingTimesLastYear,main='Normal QQ plot of TrainingTimesLast
Year')
[1] 24 34
> par(mfrow=c(1,1))
```



```
> par(mfrow = c(1,2))
> hist(attr$YearsAtCompany,xlab='',main = 'Histogram of YearsAtCompany',freq
= FALSE)
> lines(density(attr$YearsAtCompany,na.rm = T))
> rug(jitter(attr$YearsAtCompany))
> qqPlot(attr$YearsAtCompany,main='Normal QQ plot of YearsAtCompany')
[1] 127 99
```



> par(mfrow = c(1,2))

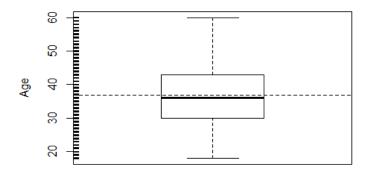
```
> hist(attr$YearsInCurrentRole,xlab='',main = 'Histogram of YearsInCurrentRol
e',freq = FALSE)
> lines(density(attr$YearsInCurrentRole,na.rm = T))
> rug(jitter(attr$YearsInCurrentRole))
  qqPlot(attr$YearsInCurrentRole,main='Normal QQ plot of YearsInCurrentRole')
[1] 124 191

> par(mfrow=c(1,1))

.ograni or rear sincurrents in the proton rear sincurrent 1296)
                                       IO.
                                       9
 .............
> par(mfrow = c(1,2))
> hist(attr$YearsSinceLastPromotion,xlab='',main = 'Histogram of YearsSinceLastPromotion',freq = FALSE)
> lines(density(attr$YearsSinceLastPromotion,na.rm = T))
> rug(jitter(attr$YearsSinceLastPromotion))
> qqPlot(attr$YearsSinceLastPromotion,main='Normal QQ plot of YearsSinceLastP
romotion')
[1] 46 124
> par(mfrow=c(1,1))
alli di teaisoliidelastri<u>ying piotoi teaisoliidelastri</u>
                                       5
                                       Ю
```

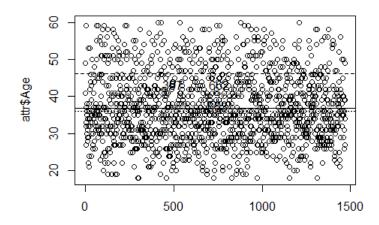
```
> par(mfrow = c(1,2))
> hist(attr$YearsWithCurrManager,xlab='',main = 'Histogram of YearsWithCurrManager',freq = FALSE)
> lines(density(attr$YearsWithCurrManager,na.rm = T))
> rug(jitter(attr$YearsWithCurrManager))
> qqPlot(attr$YearsWithCurrManager,main='Normal QQ plot of YearsWithCurrManager')
[1] 29 387
> par(mfrow=c(1,1))
Idii Oi TearsWithCurrManager,main='Normal QQ plot of YearsWithCurrManager')
```

```
> #Boxplot distributions for our numeric columns
> #The dashed line shows the mean and the dark center line shows the median
> #Difference between these two lines depict the deviation from the central limit theorem
> #Boxplot distributions for Age
> boxplot(attr$Age, ylab = "Age")
> rug(jitter(attr$Age), side = 2)
> abline(h = mean(attr$Age, na.rm = T), lty = 2)
```

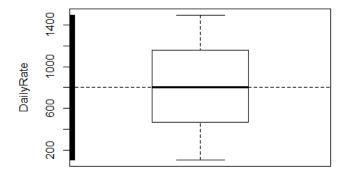


 $\circ \infty$

```
> #Plotting the Age with 3 lines for mean, median and mean+std
> plot(attr$Age, xlab = "")
> abline(h = mean(attr$Age, na.rm = T), lty = 1)
> abline(h = mean(attr$Age, na.rm = T) + sd(attr$Age, na.rm = T), lty = 2)
> abline(h = median(attr$Age, na.rm = T), lty = 3)
> identify(attr$Age)
[1] 286 696 709 720 1174 1323
```



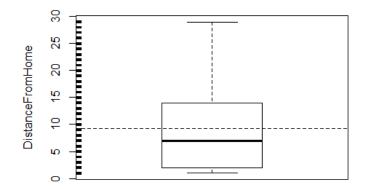
```
> #Boxplot distributions for Daily rate
> boxplot(attr$DailyRate, ylab = "DailyRate",outline = TRUE)
> rug(jitter(attr$DailyRate), side = 2)
> abline(h = mean(attr$DailyRate, na.rm = T), lty = 2)
```



```
> #Plotting the DailyRate with 3 lines for mean, median and mean+std
> plot(attr$DailyRate, xlab = "")
> abline(h = mean(attr$DailyRate, na.rm = T), lty = 1)
> abline(h = mean(attr$DailyRate, na.rm = T) + sd(attr$DailyRate, na.rm = T), lty = 2)
> abline(h = median(attr$DailyRate, na.rm = T), lty = 3)
> identify(attr$DailyRate)
[1] 49 235 486 645 1263
```

```
attt$DallyRate
```

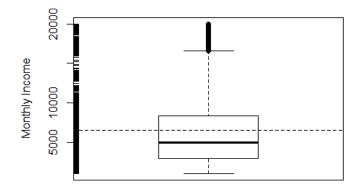
```
> #Boxplot distributions for Distance from home
> boxplot(attr$DistanceFromHome, ylab = "DistanceFromHome",outline = TRUE)
> rug(jitter(attr$DistanceFromHome), side = 2)
> abline(h = mean(attr$DistanceFromHome, na.rm = T), lty = 2)
```



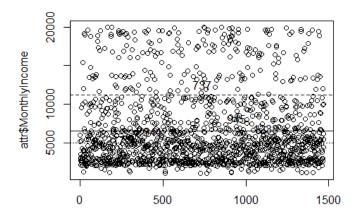
```
> plot(attr$DistanceFromHome, xlab = "")
> abline(h = mean(attr$DistanceFromHome, na.rm = T), lty = 1)
> abline(h = mean(attr$DistanceFromHome, na.rm = T) + sd(attr$DistanceFromHome, na.rm = T), lty = 2)
> abline(h = median(attr$DistanceFromHome, na.rm = T), lty = 3)
> identify(attr$DistanceFromHome)
[1] 149 538 817 998 1322
```

```
attrapolitation of the control of th
```

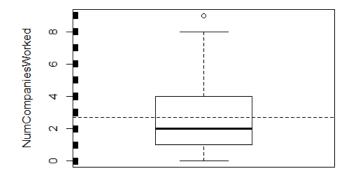
```
> #Boxplot distributions for Monthly Income
> boxplot(attr$MonthlyIncome, ylab = "Monthly Income")
> rug(jitter(attr$MonthlyIncome), side = 2)
> abline(h = mean(attr$MonthlyIncome, na.rm = T), lty = 2)
```



```
> #Plotting the Monthly Income and Age with 3 lines for mean, median and mea
n+std
> plot(attr$MonthlyIncome, xlab = "")
> abline(h = mean(attr$MonthlyIncome, na.rm = T), lty = 1)
> abline(h = mean(attr$MonthlyIncome, na.rm = T) + sd(attr$MonthlyIncome, na.
rm = T),lty = 2)
> abline(h = median(attr$MonthlyIncome, na.rm = T), lty = 3)
> identify(attr$MonthlyIncome)
[1] 217 341 737 945 1238
```



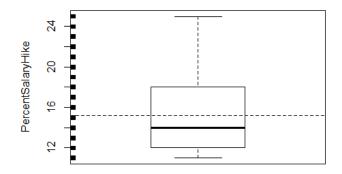
```
> #Boxplot distributions for NumCompaniesWorked
> boxplot(attr$NumCompaniesWorked, ylab = "NumCompaniesWorked")
> rug(jitter(attr$NumCompaniesWorked), side = 2)
> abline(h = mean(attr$NumCompaniesWorked, na.rm = T), lty = 2)
```



```
> #Plotting the NumCompaniesWorked with 3 lines for mean, median and mean+st
d
> plot(attr$NumCompaniesWorked, xlab = "")
> abline(h = mean(attr$NumCompaniesWorked, na.rm = T), lty = 1)
> abline(h = mean(attr$NumCompaniesWorked, na.rm = T) + sd(attr$NumCompaniesWorked, na.rm = T), lty = 2)
> abline(h = median(attr$NumCompaniesWorked, na.rm = T), lty = 3)
> identify(attr$NumCompaniesWorked)
[1] 88 592 746 1068 1288
```

```
0 500 1000 1500
```

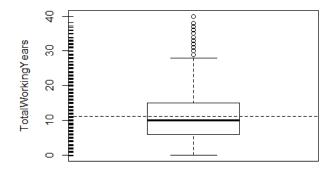
```
> #Boxplot distributions for PercentSalaryHike
> boxplot(attr$PercentSalaryHike, ylab = "PercentSalaryHike")
> rug(jitter(attr$PercentSalaryHike), side = 2)
> abline(h = mean(attr$PercentSalaryHike, na.rm = T), lty = 2)
```



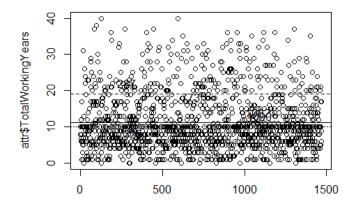
```
> #Plotting the PercentSalaryHike with 3 lines for mean, median and mean+std
> plot(attr$PercentSalaryHike, xlab = "")
> abline(h = mean(attr$PercentSalaryHike, na.rm = T), lty = 1)
> abline(h = mean(attr$PercentSalaryHike, na.rm = T) + sd(attr$PercentSalaryHike, na.rm = T), lty = 2)
> abline(h = median(attr$PercentSalaryHike, na.rm = T), lty = 3)
> identify(attr$PercentSalaryHike)
[1] 266 371 671 750 1203
```

```
0000
                                                                                                                                                                    0
                                                                                                                                                                                                                        0
                                                                                                                                                                                                                                                              000
                                                                                                                                                                                                                                                                                                             ത ത
                                                                                                                                                                                                                                                                                                                                                               000
                                                                                                 00 000
                                                                                                                                                                                                      000000000
                                                                                                                                                                                                                                                                          0
                                                                                                                                                                                                                                                                                                        o o
                                                                                                                                                                                                                                                                                                                                                                   0 0 0
attr$PercentSalaryHike
                                                                                                                                                                                                                                            0 0 0 000 0
                                                                             .
നഠയായ ഗയായ
                                                                                                                                                                                                                                                                                                                                                                @ OO
                                                                             \infty
                                                                             ം അനാരന രാത്ത നെന്നാത്ത
                                                                                                                                                                                                                                                                    oo commo 2,666 con conoccoc coc തതോ o o o o o o o o o
                                                                               ാനായായായായായായായായായായുള്ളത്ത് വൈറ്റോയുന്നു വരുന്നു വരുന്നു പ്രത്യായുന്നു വരുന്നു വരുന്നു വരുന്നു വരുന്നു വരുന
                                                                             o o തോണാഠാത അതാരോഗാത്തെത്തെതെ തെറായിക്റ്റ് അതോ
                                                                               തെ റെ തതാരെ ആിക്കാതോഠ അറാനെ 7ിആളിൽ ഒതുതാനെ വന്നെ വാതാരനാ നേ
                                                                             -(c0(00000) -: ) XX -(>(c) | 12(610+0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(0+0)(12(8) + (-0)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(8)(12(
                                                                             (0 + + :0); + *(1000(00); +(100(0)+1)(0:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(10:0); +(
                                                                             0
                                                                                                                                                                            500
                                                                                                                                                                                                                                                                                    1000
                                                                                                                                                                                                                                                                                                                                                                                             1500
```

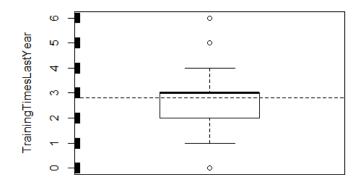
```
> #Boxplot distributions for TotalworkingYears
> boxplot(attr$TotalworkingYears, ylab = "TotalworkingYears")
> rug(jitter(attr$TotalworkingYears), side = 2)
> abline(h = mean(attr$TotalworkingYears, na.rm = T), lty = 2)
```



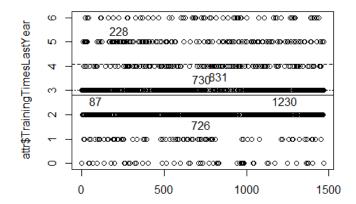
```
> #Plotting the TotalworkingYears with 3 lines for mean, median and mean+std
> plot(attr$TotalworkingYears, xlab = "")
> abline(h = mean(attr$TotalworkingYears, na.rm = T), lty = 1)
> abline(h = mean(attr$TotalworkingYears, na.rm = T) + sd(attr$TotalworkingYears, na.rm = T), lty = 2)
> abline(h = median(attr$TotalworkingYears, na.rm = T), lty = 3)
> identify(attr$TotalworkingYears)
[1] 287 325 773 1082 1090
```



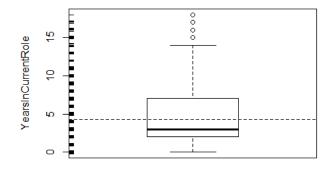
```
> #Boxplot distributions for TrainingTimesLastYear
> boxplot(attr$TrainingTimesLastYear, ylab = "TrainingTimesLastYear")
> rug(jitter(attr$TrainingTimesLastYear), side = 2)
> abline(h = mean(attr$TrainingTimesLastYear, na.rm = T), lty = 2)
```



```
> #Plotting the TrainingTimesLastYear with 3 lines for mean, median and mean
+std
> plot(attr$TrainingTimesLastYear, xlab = "")
> abline(h = mean(attr$TrainingTimesLastYear, na.rm = T), lty = 1)
> abline(h = mean(attr$TrainingTimesLastYear, na.rm = T) + sd(attr$TrainingTimesLastYear, na.rm = T), lty = 2)
> abline(h = median(attr$TrainingTimesLastYear, na.rm = T), lty = 3)
> identify(attr$TrainingTimesLastYear)
[1] 87 228 726 730 831 1230
```

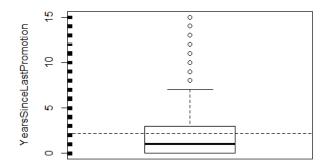


```
> #Boxplot distributions for YearsInCurrentRole
> boxplot(attr$YearsInCurrentRole, ylab = "YearsInCurrentRole")
> rug(jitter(attr$YearsInCurrentRole), side = 2)
> abline(h = mean(attr$YearsInCurrentRole, na.rm = T), lty = 2)
```



```
> #Plotting the YearsInCurrentRole with 3 lines for mean, median and mean+st
d
> plot(attr$YearsInCurrentRole, xlab = "")
> abline(h = mean(attr$YearsInCurrentRole, na.rm = T), lty = 1)
> abline(h = mean(attr$YearsInCurrentRole, na.rm = T) + sd(attr$YearsInCurrentRole, na.rm = T), lty = 2)
> abline(h = median(attr$YearsInCurrentRole, na.rm = T), lty = 3)
> identify(attr$YearsInCurrentRole)
[1] 81 380 450 688 978 1007 1082
```

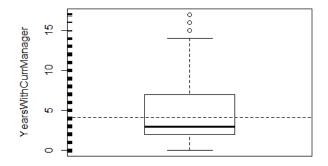
```
> #Boxplot distributions for YearsSinceLastPromotion
> boxplot(attr$YearsSinceLastPromotion, ylab = "YearsSinceLastPromotion")
> rug(jitter(attr$YearsSinceLastPromotion), side = 2)
> abline(h = mean(attr$YearsSinceLastPromotion, na.rm = T), lty = 2)
```



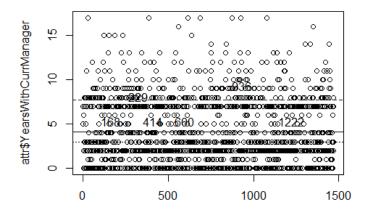
```
> #Plotting the YearsSinceLastPromotion with 3 lines for mean, median and me
an+std
> plot(attr$YearsSinceLastPromotion, xlab = "")
> abline(h = mean(attr$YearsSinceLastPromotion, na.rm = T), lty = 1)
> abline(h = mean(attr$YearsSinceLastPromotion, na.rm = T) + sd(attr$YearsSin
ceLastPromotion, na.rm = T),lty = 2)
> abline(h = median(attr$YearsSinceLastPromotion, na.rm = T), lty = 3)
> identify(attr$YearsSinceLastPromotion)
[1] 162 520 928 930 1132 1286
```

```
attr$Y earsSinceLastPromotion
                        0 0
                                      00
                    0
              0
                   0
                      0
                                           0 0
           0
             00000 0000
                           ഠതാ
                                000
                                            0 00
    9
               0
                   0 0
                           0
             0
                               0 0 00
         00
                                            00
         തമാത അവരോ താതാ
         ၀ ၀၀၀၀၀ ၀ ၈၀၀ေ 0<mark>926</mark>0 ျဖစ္မွာ
၀၀၈ ၈၀၀ ၈၈၀ ၀၈၀၀၀၈၀ေတာ ၀၀
         0
                     500
                                 1000
                                              1500
```

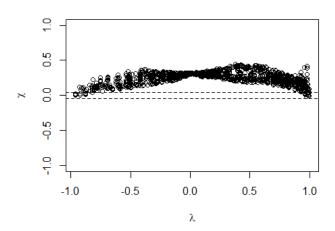
```
> #Boxplot distributions for YearsWithCurrManager
> boxplot(attr$YearsWithCurrManager, ylab = "YearsWithCurrManager")
> rug(jitter(attr$YearsWithCurrManager), side = 2)
> abline(h = mean(attr$YearsWithCurrManager, na.rm = T), lty = 2)
```



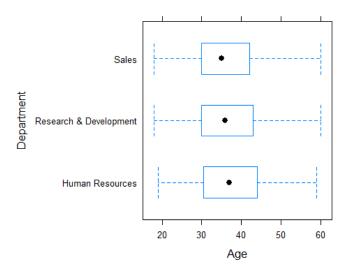
```
> #Boxplot distributions for YearsWithCurrManager
> plot(attr$YearsWithCurrManager, xlab = "")
> abline(h = mean(attr$YearsWithCurrManager, na.rm = T), lty = 1)
> abline(h = mean(attr$YearsWithCurrManager, na.rm = T) + sd(attr$YearsWithCurrManager, na.rm = T), lty = 2)
> abline(h = median(attr$YearsWithCurrManager, na.rm = T), lty = 3)
> identify(attr$YearsWithCurrManager)
[1] 168 229 414 600 936 1222
```



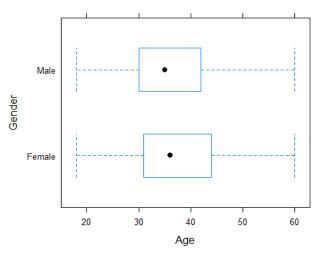
- > #Chi Plot for inspecting the independence
 > chi.plot(attr\$MonthlyIncome,attr\$Age)



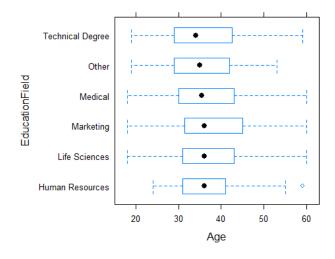
> #Plotting joint boxplots for various categories wrt Age
> bwplot(attr\$Department ~ attr\$Age, data=attr, ylab='Department',xlab='Age')



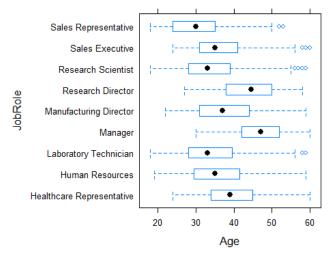
> bwplot(attr\$Gender ~ attr\$Age, data=attr, ylab='Gender',xlab='Age')



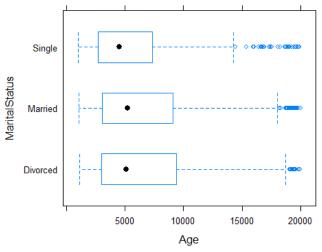
> bwplot(attr\$EducationField \sim attr\$Age, data=attr, ylab='EducationField',xla b='Age')



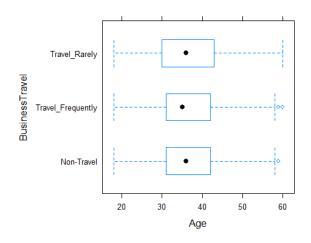
> bwplot(attr\$JobRole ~ attr\$Age, data=attr, ylab='JobRole',xlab='Age')



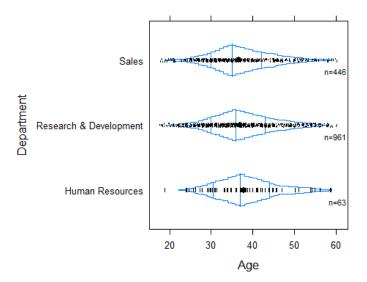
> bwplot(attr $MaritalStatus \sim attr<math>MonthlyIncome$, data=attr, ylab='MaritalStatus',xlab='Age')



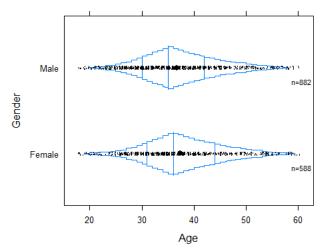
> bwplot(attr\$BusinessTravel ~ attr\$Age, data=attr, ylab='BusinessTravel',xla
b='Age')



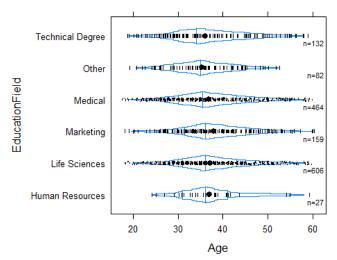
#Plotting stripplots for various categories wrt numerical column TotalCharges
> bwplot(attr\$Department ~ attr\$Age, data=attr,panel=panel.bpplot,
+ probs=seq(.01,.49,by=.01), datadensity=TRUE, ylab='Department',xlab=
'Age')



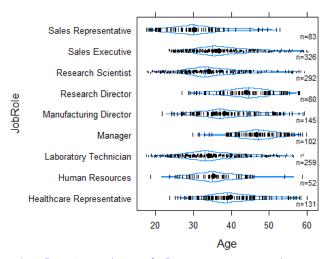
> bwplot(attr\$Gender ~ attr\$Age, data=attr,panel=panel.bpplot,
+ probs=seq(.01,.49,by=.01), datadensity=TRUE, ylab='Gender',xlab='Age')



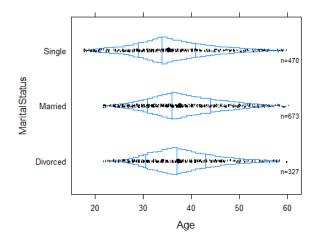
> bwplot(attr\$EducationField ~ attr\$Age, data=attr,panel=panel.bpplot, + probs=seq(.01,.49,by=.01), datadensity=TRUE, ylab='EducationField',xlab='Age')



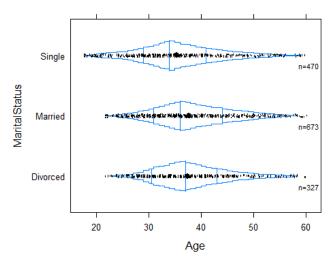
> bwplot(attr\$JobRole ~ attr\$Age, data=attr,panel=panel.bpplot,
+ probs=seq(.01,.49,by=.01), datadensity=TRUE, ylab='JobRole',xlab='Age')



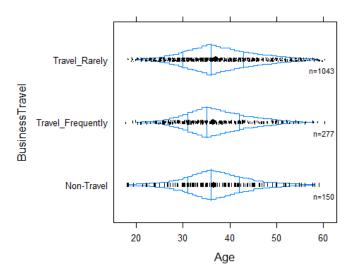
> bwplot(attr\$MartialStatus ~ attr\$Age, data=attr,panel=panel.bpplot,
+ probs=seq(.01,.49,by=.01), datadensity=TRUE, ylab='MartialStatus',xlab='Age')

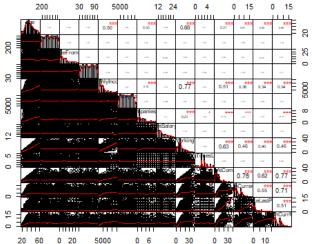


```
> bwplot(attr$MaritalStatus ~ attr$Age, data=attr,panel=panel.bpplot,
+ probs=seq(.01,.49,by=.01), datadensity=TRUE, ylab='MaritalStatus',xlab='Age')
```



> bwplot(attr\$BusinessTravel ~ attr\$Age, data=attr,panel=panel.bpplot,
+ probs=seq(.01,.49,by=.01), datadensity=TRUE, ylab='BusinessTravel',xlab='Age')





```
##Creating Temporary Variables
       out the numeric columns from categorical columns and storing them as a seperate datafra attr_i <- attr[,c("Age","DailyRate","DistanceFromHome","HourlyRate", "MonthlyIncome","MonthlyRate","NumCompaniesWorked","PercentSalaryHike "TrainingTimesLastYear","YearsAtCompany", "YearsInCurrentRole","YearsSinceLastPromotion","YearsWithCurrManager"
        attr_i <- data.frame(scale(attr_i))</pre>
       #Creating temporary variables for the categorical data attr_c <- attr[,-c(2,3,5,8,10,11,12,13,14,15,19,21,22,23)] temporary<- data.frame(sapply(attr_c,function(x) data.frame(model.matrix(\simx-1,data =att
        head(temporary)
        Education.x2 Education.x3 Education.x4 Education.x5 EnvironmentSatisfaction.x2 EnvironmentSatisfaction.x2 EnvironmentSatisfaction.x2 EnvironmentSatisfaction.x3 Education.x3 Education.x4 Education.x5 EnvironmentSatisfaction.x6 EnvironmentSatisfaction.x7 EnvironmentSatisfaction.x8 Education.x8 Education.x
2
3
4
                                                         0
                                                                                                                   0
                                                                                                                                                                             0
                                                                                                                                                                                                                                       0
                                                                                                                                                                                                                                                                                                                                                               0
                                                                                                                   0
                                                                                                                                                                             0
                                                                                                                                                                                                                                       0
                                                                                                                                                                                                                                                                                                                                                               0
                                                         1
                                                         0
                                                                                                                   0
                                                                                                                                                                                                                                       0
                                                                                                                                                                                                                                                                                                                                                               0
                                                         0
                                                                                                                   0
                                                                                                                                                                             0
                                                                                                                                                                                                                                       0
                                                                                                                                                                                                                                                                                                                                                               0
        EnvironmentSatisfaction.x4 MaritalStatus.xMarried MaritalStatus.xSingle OverTime StockO
1
2
3
                                                                                                                        0
                                                                                                                                                                                                                                                                                                                                0
                                                                                                                                                                                                                                                                                                                                                                         0
                                                                                                                                                                                                                               0
                                                                                                                        1
                                                                                                                                                                                                                                                                                                                                1
                                                                                                                                                                                                                                                                                                                                                                         1
4
                                                                                                                                                                                                                             1
                                                                                                                                                                                                                                                                                                                                0
                                                                                                                        1
                                                                                                                                                                                                                                                                                                                                                                         1
                                                                                                                       0
                                                                                                                                                                                                                               1
                                                                                                                                                                                                                                                                                                                                                                        0
        StockOptionLevel.x2 StockOptionLevel.x3 WorkLifeBalance.x2 WorkLifeBalance.x3
                                                                                                                                                                                                                                                                                                                                                                  WorkLifeB
2
3
4
                                                                                                                                                                                  0
                                                                                                                                                                                                                                                                                                                                                           1
                                                                                                                                                                                                                                                                      0
                                                                                                                                                                                  0
                                                                                                                                                                                                                                                                      0
                                                                                                                                                                                                                                                                                                                                                           1
                                                                                        0
                                                                                                                                                                                  0
                                                                                                                                                                                                                                                                       0
                                                                                                                                                                                                                                                                                                                                                           1
                                                                                                                                                                                  0
                                                                                                                                                                                                                                                                      0
```

```
> View(attr)
```

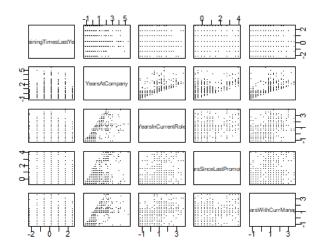
YearsWithCurrManager

```
#Combining the temporary and the numeric columns and create the final dataset
attr_final <- cbind(attr_i,temporary)</pre>
    head(attr_final)
                                    DailyRate DistanceFromHome HourlyRate MonthlyIncome MonthlyRate NumCompani 0.7422739 -1.0105654 1.3826677 -0.1083127 0.7257730 2
       0.44619856
       1.32191535
                                  -1.2973331
                                                                             -0.1470997 -0.2405949
                                                                                                                                           -0.2916193
                                                                                                                                                                           1.4883696
                                                                                                                                                                                                                        -0
       0.00834016
                                     1.4138821
                                                                             -0.8872132
                                                                                                          1.2842882
                                                                                                                                           -0.9373347
                                                                                                                                                                        -1.6742711
    -0.42951824
                                     1.4609690
                                                                             -0.7638609 -0.4865438
                                                                                                                                           -0.7633739
                                                                                                                                                                           1.2427877
    -1.08630583
                                  -0.5241163
                                                                             -0.8872132 -1.2735802
                                                                                                                                           -0.6446387
                                                                                                                                                                           0.3257890
                                                                                                                                          -0.7296013
    -0.53898284
                                    0.5018828
                                                                             -0.8872132
                                                                                                        0.6448211
                                                                                                                                                                        -0.3440822
    PercentSalaryHike TotalWorkingYears TrainingTimesLastYear YearsAtCompany YearsInCurrent
                    -1.15016269
                                                                                                                                                          -0.164557109
                                                                  -0.4214990
                                                                                                                         -2.1712429
                                                                                                                                                                                                            -0.0632
2
                    2.12858163
-0.05724792
                                                                                                                           0.1556541
0.1556541
                                                                                                                                                          0.488341541
-1.143905083
                                                                   -0.1644554
                                                                                                                                                                                                             0.7647
                                                                   -0.5500208
                                                                                                                                                                                                            -1.1672
4
                    -1.15016269
                                                                   -0.4214990
                                                                                                                            0.1556541
                                                                                                                                                           0.161892216
                                                                                                                                                                                                             0.7647
                    -0.87693400
                                                                   -0.6785426
                                                                                                                            0.1556541
                                                                                                                                                          -0.817455758
                                                                                                                                                                                                            -0.6152
                    -0.60370530
                                                                   -0.4214990
                                                                                                                         -0.6199782
                                                                                                                                                          -0.001332446
                                                                                                                                                                                                             0.7647
    YearsSinceLastPromotion YearsWithCurrManager Education.x2 Education.x3 Education.x4 Edu
                                   -0.67891464
                                                                                            0.2457504
1
2
3
                                                                                            0.8062671
                                  -0.36858985
                                                                                                                                                0
                                                                                                                                                                                                                0
                                  -0.67891464
                                                                                         -1.1555415
                                                                                                                                                                                0
                                                                                                                                                                                                                0
                                                                                                                                                1
4
                                     0.25205973
                                                                                         -1.1555415
-0.5950247
                                                                                                                                                0
                                                                                                                                                                                0
                                                                                                                                                                                                                1
                                   -0.05826506
                                                                                                                                                                                                                0
                                                                                                                                                                                0
                                     0.25205973
                                                                                           0.5260087
                                                                                                                                                                                                                0
                                                                                                                                                                                0
    EnvironmentSatisfaction.x2 EnvironmentSatisfaction.x3 EnvironmentSatisfaction.x4
                                                                                                                                                                                                             Marita
1
2
3
4
                                                                  0
                                                                                                                                                                                                         0
                                                                                                                                      1
                                                                  0
                                                                                                                                      0
                                                                                                                                                                                                         1
                                                                  Õ
                                                                                                                                                                                                         \overline{1}
                                                                                                                                      0
5
                                                                  0
                                                                                                                                      0
                                                                                                                                                                                                         0
6
                                                                                                                                      ი
    MaritalStatus.xSingle OverTime StockOptionLevel.x1 StockOptionLevel.x2 StockOptionLevel
1
2
3
4
                                                                             0
                                                                                                                                                                                0
                                                      0
                                                                                                                              0
                                                      1
                                                                             1
                                                      0
                                                                             1
                                                                                                                              0
                                                                                                                                                                                0
                                                                             0
                                                                                                                              1
                                                                                                                                                                                0
                                                                                                                                                                                0
                                                                             0
    WorkLifeBalance.x2 WorkLifeBalance.x3 WorkLifeBalance.x4
1
2
3
                                               0
                                                                                              1
                                               0
                                                                                              1
                                                                                                                                             0
4
                                                                                              1
                                                                                                                                             0
                                               0
                                                                                              1
                                               0
                                                                                                                                             0
                                                                                              0
    glimpse(attr_final)
Observations: 1,470
Variables: 30
                                                                       <db7> 0.44619856, 1.32191535, 0.00834016, -0.42951824, -1.08
<db7> 0.74227393, -1.29733311, 1.41388208, 1.46096900, -0.52
<db7> -1.01056544, -0.14709966, -0.88721318, -0.76386093, -0.
<db7> 1.38266773, -0.24059489, 1.28428818, -0.48654378, -1.2
<db7> -0.108312654, -0.291619349, -0.937334707, -0.763373892
<db7> 0.7257730, 1.4883696, -1.6742711, 1.2427877, 0.3257890
<db7> -1.15016269, 2.12848163, -0.6778187, 2.524731
$ Age
    DailyRate
    DistanceFromHome
    HourlyRate
MonthlyIncome
    MonthlyRate
    NumCompaniesWorked
                                                                        <db1> -1.15016269, 2.12858163, -0.05724792, -1.15016269, -0.
    PercentSalaryHike
                                                                        <db1> -0.42149902, -0.16445544, -0.55002081, -0.42149902, -0
<db1> -2.1712429, 0.1556541, 0.1556541, 0.1556541, 0.1556541
    TotalWorkingYears
    TrainingTimesLastYear
                                                                       <db1> -0.164557109, 0.488341541, -1.143905083, 0.161892216,
<db1> -0.06327437, 0.76473737, -1.16729002, 0.76473737, -0.6
<db1> -0.67891464, -0.36858985, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, 0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205973, -0.67891464, -0.25205975, -0.67891464, -0.25205975, -0.67891464, -0.2520595, -0.678914
    YearsAtCompany
    YearsInCurrentRole
    YearsSinceLastPromotion
```

<db1> 0.2457504, 0.8062671, -1.1555415, -1.1555415, -0.59502

```
<db1> 1, 0, 1, 0, 0, 1, 0, 0, 0, 0, 0, 1, 0, 1, 0, 
<db1> 0, 0, 0, 0, 0, 0, 1, 0, 1, 1, 1, 0, 0, 0, 1,
$ Education.x2
                                                                                     0, 0, 0,
$ Education.x3
                               <db1> 0,
                                                              0,
                                                                  0,
                                                                     0,
                                                                                  0,
                                        Ο,
                                                        0, 0,
                                                                               0,
                                                                                     1,
$ Education.x4
                                           0, 1, 0, 0,
                                                                        0, 0,
                                                                                        0, 0,
                                                              Ο,
                                                                  0,
                                                                     0,
                                                                              0,
                                                                                  0,
                                                        0, 0,
$ Education.x5
                               <db1> 0, 0, 0, 0, 0, 0,
                                                                        0, 0,
                                                                                        0, 0,
$ EnvironmentSatisfaction.x2
                               <db7> 1, 0, 0, 0, 0, 0,
                                                        0, 0, 0,
                                                                  0, 0,
                                                                        0, 0, 1, 0,
                                                                                     1, 0, 0,
                               <db1> 0,
                                                 0,
                                                           0,
                                        1,
                                                        1,
                                                              0,
                                                                  1,
                                                                     0,
                                                                        0,
                                                                               0,
                                                                                  1,
$ EnvironmentSatisfaction.x3
                                           0, 0,
                                                     Ο,
                                                                            Ο,
                              <db1> 0,
                                        0,
                                                        0,
$ EnvironmentSatisfaction.x4
                                                            1,
                                                                           0,
                                                                                  Ο,
                                               1,
                                                  Ο,
                                                     1,
                                                                  0,
                                                                     0,
                                                                               0,
                               \langle db7 \rangle 0,
                                                     0,
                                                           0,
                                                              Ο,
                                                                                  0,
$ MaritalStatus.xMarried
                                           0, 1,
                                                  1,
                                                        1,
                                                                  1,
                                                                        0,
                                        1,
                                                                     1,
                                                                           0,
                                                                               Ο,
                                                                                     Ο,
                               <db7> 1,
                                              0,
                                                           0,
                                        0,
                                                  0,
                                                        0,
                                                                  0,
                                                                     0,
$ MaritalStatus.xSingle
                                           1,
                                                              1,
                                                                        1,
                                                                           0,
                                                                               0,
                                                     1,
                                                                                  1,
                               <db1> 1,
                                                           0,
                                                              0,
                                                                           0,
                                                        1,
                                                                  Ο,
                                                                     0,
$ OverTime
                                        0, 1, 1,
                                                  0, 0,
                                                                               0, 1,
                               <db1> 0, 1, 0, 0, 1, 0, 0, 1,
                                                              0,
                                                                  0,
                                                                     1,
$ StockOptionLevel.x1
                                           0, 0, 0, 0,
                                                        0, 0,
                                                              Ο,
                                                                  1,
                                                                     Ο,
$ StockOptionLevel.x2
                               < db / 2 > 0, 0,
                                                                        0, 0, 0, 0,
                                                           0,
                                                                  0,
                                                                              0,
                                                                                  0,
                                                        1,
                                                              Ο,
                                                                     0,
$ StockOptionLevel.x3
                               <db1> 0, 0, 0, 0, 0, 0,
                                                                        0, 0,
                                                                     0,
$ WorkLifeBalance.x2
                                                                  1,
                                                                                     0, 1,
                                                                                           1,
                               <db1> 0, 0, 0, 0, 0, 1, 1,
                                                           0, 0,
                                                                        0, 1, 0, 0,
                               1,
                                                                  0,
                                                                                  1,
                                                                     1,
                                                                        1,
                                                                           0,
                                                                               1,
                                                                                     1,
$ WorkLifeBalance.x3
                                                              0.
 WorkLifeBalance.x4
                                                                  0,
```

##Matrix Plots, Covariance and Corelations Plots
#ScatterPlot matrix
pairs(attr_final[,10:14],pch=".",cex=1.5)



##Test of Significance

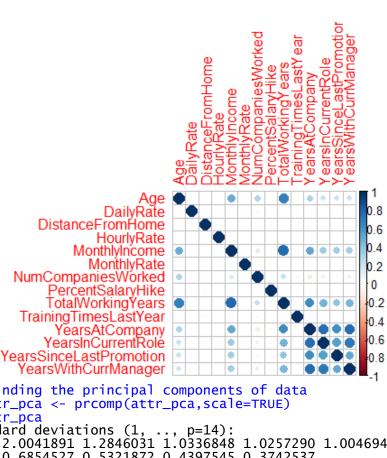
```
#Null Hypothesis - The two means are equal
#Alternate Hypothesis - Difference in the two means is not zero
#pvalue >= 0.05, accept null hypothesis
#Or
#else accept the alternate hypothesis
#Univariate mean comparison using t test
> #Monthly Income and Attrition
> with(data=attr,t.test(attr$MonthlyIncome[attr$Attrition=="Yes"],attr$MonthlyIncome[attr$l=TRUE))
```

Two Sample t-test

data: attrMonthlyIncome[attr<math>Attrition == "Yes"] and attrMonthlyIncome[attr<math>Attrition t = -6.2039, df = 1468, p-value = 7.147e-10 alternative hypothesis: true difference in means is not equal to 0 95 percent confidence interval:

```
-2692.446 -1398.847
sample estimates:
mean of x mean of y
 4787.093 6832.740
> #HourlyRate and Attrition
> with(data=attr,t.test(attr$HourlyRate[attr$Attrition=="Yes"],attr$HourlyRate[attr$Attri
          Two Sample t-test
data: attr$HourlyRate[attr$Attrition == "Yes"] and attr$HourlyRate[attr$Attrition == "No
t = -0.26229, df = 1468, p-value = 0.7931
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval: -3.207565 2.450946
sample estimates:
mean of x mean of y
65.57384 65.95215
> #Daily Rate and Attrition
> with(data=attr,t.test(attr$DailyRate[attr$Attrition=="Yes"],attr$DailyRate[attr$Attriti
          Two Sample t-test
data: attr$DailyRate[attr$Attrition == "Yes"] and attr$DailyRate[attr$Attrition == "No"]
t = -2.1741, df = 1468, p-value = 0.02986 alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -118.209251
                   -6.073932
sample estimates:
mean of x mean of y 750.3629 812.5045
> #Age and Attrition
> with(data=attr,t.test(attr$Age[attr$Attrition=="Yes"],attr$Age[attr$Attrition=="No"],va
          Two Sample t-test
data: attrAge[attr}Attrition == "Yes"] and attrAge[attr}Attrition == "No"] t = -6.1787, df = 1468, p-value = 8.356e-10 alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval: -5.208825 -2.698450
sample estimates:
mean of x mean of y 33.60759 37.56123
> #DistanceFromHome and Attrition
> with(data = attr.t.test(attr$DistanceFromHome[attr$Attrition=="Yes"].attr$Age[attr$Attr
RUE))
          Two Sample t-test
data: attrpistanceFromHome[attr<math>tition == "Yes"] and attrqistanteriseant = "No" t = -43.048, df = 1468, p-value < 2.2e-16 alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval: -28.15538 -25.70126
sample estimates:
mean of x mean of y
 10.63291 37.56123
> #Monthly Income and Gender
```

```
> with(data = attr,t.test(attr$MonthlyIncome[attr$Gender=="Male"],attr$MonthlyIncome[attr
al = TRUE)
        Two Sample t-test
        attr$MonthlyIncome[attr$Gender == "Male"] and attr$MonthlyIncome[attr$Gender == "F
t = -1.2213, df = 1468, p-value = 0.2222
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -797.6470 185.5303
sample estimates:
mean of x mean of y
 6380.508
            6686.566
> #DistanceFromHome and Gender
> with(data = attr,t.test(attr$DistanceFromHome[attr$Gender=="Male"],attr$DistanceFromHom
ar.equal = TRUE))
        Two Sample t-test
        attr$DistanceFromHome[attr$Gender == "Male"] and attr$DistanceFromHome[attr$Gender
t = -0.070902, df = 1468, p-value = 0.9435
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval: -0.8775316  0.8163071
sample estimates:
mean of x mean of y 9.180272 9.210884
> #Monthly Income and gender
> t2testgender <- hotelling.test(attr$MonthlyIncome + attr$DistanceFromHome ~ attr$Gender
> cat("T2 statistic =",t2testgender$stat[[1]],"\n")
T2 statistic = 1.499903
> print(t2testgender)
Test stat: 0.74944
Numerator df: 2
Denominator df: 1467
P-value: 0.4728
> #Monthly Income and Attrition
> t2testattr <- hotelling.test(attr$MonthlyIncome + attr$DistanceFromHome ~ attr$Attritio
> cat("T2 statistic =",t2testattr$stat[[1]],"\n")
T2 statistic = 47.28597
> print(t2testattr)
Test stat: 23.627
Numerator df: 2
Denominator df: 2
P-value: 7.957e-11
> #PCA
> #plot.new(); dev.off()
> #Considering the numeric columns that will help to get variance in data
> attr_pca <- attr[,numvar]</pre>
> #Plotting correlation plot to understand the how feature are related to each other
> correplot<-cor(attr_pca)</pre>
> corrplot(correplot,method="circle")
```



PC1

```
> #Finding the principal components of data
```

attr_pca <- prcomp(attr_pca,scale=TRUE)</pre>

attr_pca

Standard deviations (1,

[1] 2.0041891 1.2846031 1.0336848 1.0257290 1.0046944 0.9962218 0.9763963 0.9578606 0.84 [11] 0.6854527 0.5321872 0.4397545 0.3742537

PC2

PC3

PC4

```
Rotation (n x k) = (14 \times 14):
```

```
0.280157344
                                       -0.472170158
                                                      0.003362193
                                                                    0.004488409 -0.039563410
                                                     -0.207301367
DailyRate
                          -0.006815197
                                       -0.077962430
                                                                   -0.609569867
                                                                                 -0.211568990
                                        0.041564987
                          0.004812032
                                                     -0.664884791
                                                                                  0.048941659
DistanceFromHome
                                                                    0.306131593
                                                     -0.352147686
HourlyRate
                          -0.011288550
                                       -0.062668026
                                                                   -0.255816205
                                                                                  0.602292088
                          0.360622909
MonthlyIncome
                                       -0.290395305
                                                      0.052415102
                                                                    0.025332267
                                                                                 -0.034941693
MonthlyRate
                          0.001123298 -0.086158010
                                                      0.020312197
                                                                    0.664085954 -0.101166486
                          0.030991906 -0.560133264
                                                      0.005628265
                                                                   -0.041875610
NumCompaniesWorked
                                                                                  0.017785645
                                        0.004618486 -0.465841883
                                                                   -0.055689609 -0.698726672
                          -0.015351368
PercentSalaryHike
                          0.415285665
                                       -0.318115831
                                                      0.009368263
                                                                    0.007027664 -0.024159198
TotalWorkingYears
TrainingTimesLastYear
                          -0.010993402
                                        0.092457674
                                                      0.409028173
                                                                   -0.138279489
                                                                                 -0.293982017
YearsAtCompany
                          0.443443529
                                        0.213079968
                                                      0.002115638
                                                                   -0.010571214
                                                                                  0.024921329
                          0.391353065
0.344322397
                                        0.279423881
                                                     -0.048111956
                                                                   -0.038785223
                                                                                 -0.004927194
YearsInCurrentRole
                                        0.198658357
                                                      0.003993040
                                                                    0.027659809
YearsSinceLastPromotion
                                                                                  0.019935007
                          0.386171187
                                        0.295138965
                                                                   -0.034459502
YearsWithCurrManager
                                                     -0.031745944
                                                                                  0.021898300
                                                              PC9
                                                                           PC10
                                                                                        PC11
                                   PC7
                                                PC8
                         -0.098196914
                                                    -0.183114693
                                                                   0.005033984
                                       -0.05927715
                                                                                -0.74367068
                                                                                             -0
                                                                   0.040304455 -0.01980752
DailyRate
                          0.715405171
                                       -0.02770642
                                                    -0.028707475
                                                                                              0
                                       -0.65217193
                                                     0.037737577
                          0.031447533
                                                                   0.002338630
                                                                                 0.02927699
DistanceFromHome
                                                                                              0
                                                                                 \substack{0.03725997 \\ 0.61775910}
HourlyRate
                          -0.221010405
                                        0.40142111 -0.004675476
                                                                   0.018009772
                                                                                             -0
                                       -0.03685912 -0.377381332
MonthlyIncome
                          -0.012272736
                                                                   0.104651321
                                                                                             -0
                          0.482943083
                                        0.40448871
MonthlyRate
                                                     0.056690883
                                                                  -0.044889268
                                                                                -0.01681584
                                                                                              0
NumCompaniesWorked
                         -0.032989593
                                       -0.03355765
                                                     0.775796629
                                                                  -0.129586743
                                                                                 0.19687866
                                                                                              0
PercentSalaryHike
                                        0.38335261
                                                     0.012190972
                         -0.376210309
                                                                   0.019568502
                                                                                 0.04082482
                                       -0.04398227
TotalWorkingYears
                         -0.029511945
                                                    -0.196663458
                                                                                 0.08301594
                                                                                              0
                                                                  -0.038585533
TrainingTimesLastYear
                         -0.217564575
                                       -0.29622601
                                                     0.130785998
                                                                  -0.017811234
                                                                                 0.02954240
                                                                                              -0
                                        0.01862614
                          0.005335572
                                                    -0.001551392
                                                                  -0.104225054
                                                                                 0.03762072
                                                                                              0
YearsAtCompany
                                        0.05420752
                                                     0.201595025
                          0.062086964
                                                                  -0.271683842
                                                                                -0.04458982
YearsInCurrentRole
                                                                                             -0
YearsSinceLastPromotion
                          0.022129234
                                        0.03850513
                                                     0.306725567
                                                                   0.845951303 -0.08053456
```

```
YearsWithCurrManager
                          0.011525930
                                       0.04176204  0.161413516  -0.407140185  -0.06576770
                                   PC13
                                                PC14
                          0.1893016403
                                         0.237072230
Age
                         -0.0099081253
DailyRate
                                         0.018837870
                                         0.011991386
DistanceFromHome
                          0.0057709912
HourlyRate
MonthlyIncome
                          0.0049037331
                                        -0.003314012
                          0.4041044054
                                         0.279006032
                                         0.009367738
MonthlyRate
                         -0.0083381972
NumCompaniesWorked
                         -0.0369554196
                                         0.107234673
                                         0.010585240
PercentSalaryHike
                         -0.0183445446
TotalWorkingYears
                         -0.4158888971 -0.705989494
TrainingTimesLastYear
                          0.0008431661 -0.012085362
                         -0.6494086309
                                        0.562584645
YearsAtCompany
                          0.1948014145 -0.130643692
YearsInCurrentRole
YearsSinceLastPromotion
                          0.0977011821 -0.083447864
                          0.3959144832 -0.121010943
YearsWithCurrManager
"scale"
                                                  "x"
> head(attr_pca)
 [1] 2.0041891 1.2846031 1.0336848 1.0257290 1.0046944 0.9962218 0.9763963 0.9578606 0.84
[11] 0.6854527 0.5321872 0.4397545 0.3742537
$rotation
                                                PC2
                                                                            PC4
                          0.280157344 - 0.472170158
                                                     0.003362193
                                                                   0.004488409 -0.039563410
Age
                         -0.006815197
                                       -0.077962430 -0.207301367
                                                                  -0.609569867 -0.211568990
DailyRate
                          0.004812032
                                        0.041564987 -0.664884791
                                                                   0.306131593
                                                                                 0.048941659
DistanceFromHome
HourlyRate
                         -0.011288550 -0.062668026 -0.352147686
                                                                  -0.255816205
                                                                                 0.602292088
MonthlyIncome
                          0.360622909 -0.290395305
                                                     0.052415102
                                                                   0.025332267 -0.034941693
                                                                   0.664085954 -0.101166486
                          0.001123298 -0.086158010
                                                     0.020312197
MonthlyRate
NumCompaniesWorked
                          0.030991906 -0.560133264
                                                                  -0.041875610
                                                     0.005628265
                                                                                 0.017785645
                                                                  -0.055689609 -0.698726672
0.007027664 -0.024159198
-0.138279489 -0.293982017
PercentSalaryHike
                         -0.015351368
                                        0.004618486 -0.465841883
TotalWorkingYears
                          0.415285665
                                      -0.318115831
                                                     0.009368263
TrainingTimesLastYear
                         -0.010993402
                                        0.092457674
                                                     0.409028173
                                        0.213079968
YearsAtCompany
                          0.443443529
                                                     0.002115638
                                                                  -0.010571214
                                                                                 0.024921329
YearsInCurrentRole
                          0.391353065
                                        0.279423881
                                                    -0.048111956
                                                                  -0.038785223
                                                                                -0.004927194
                          0.344322397
                                        0.198658357
                                                     0.003993040
                                                                   0.027659809
                                                                                 0.019935007
YearsSinceLastPromotion
YearsWithCurrManager
                          0.386171187
                                        0.295138965 -0.031745944
                                                                  -0.034459502
                                                                                 0.021898300
                                               PC8
                                                             PC9
                                   PC7
                                                                         PC10
                                                                                      PC11
                         -0.098196914 -0.05927715 -0.183114693
                                                                  0.005033984 -0.74367068 -0
DailyRate
                          0.715405171
                                      -0.02770642 -0.028707475
                                                                  0.040304455 -0.01980752
                                                                                            0
                          0.031447533 -0.65217193
                                                    0.037737577
                                                                  0.002338630
                                                                                0.02927699
DistanceFromHome
                                                                                            0
                                                                  0.018009772
                                                                                0.03725997
HourlyRate
                         -0.221010405
                                        0.40142111 -0.004675476
                                                                                            -0
                         -0.012272736
                                       -0.03685912
                                                                                0.61775910
MonthlyIncome
                                                   -0.377381332
                                                                  0.104651321
                                                                                            -0
                          0.482943083
                                        0.40448871
                                                    0.056690883
                                                                 -0.044889268
                                                                               -0.01681584
MonthlyRate
                                                                                            0
                         -0.032989593
                                                    0.775796629
NumCompaniesWorked
                                       -0.03355765
                                                                 -0.129586743
                                                                                0.19687866
                                                                                            0
                                        0.38335261
PercentSalaryHike
                         -0.376210309
                                                    0.012190972
                                                                  0.019568502
                                                                                0.04082482
                         -0.029511945
                                       -0.04398227
                                                   -0.196663458
                                                                 -0.038585533
                                                                                0.08301594
TotalWorkingYears
                                                                                            0
                                                    0.130785998 -0.017811234
TrainingTimesLastYear
                         -0.217564575
                                      -0.29622601
                                                                                0.02954240
                                                                                            -0
YearsAtCompany
                          0.005335572
                                        0.01862614
                                                   -0.001551392 -0.104225054
                                                                                0.03762072
                                                                                            0
                                                                 -0.271683842
                                                                               -0.04458982
                          0.062086964
                                        0.05420752
                                                    0.201595025
YearsInCurrentRole
                                                                                            -0
YearsSinceLastPromotion
                          0.022129234
                                        0.03850513
                                                    0.306725567
                                                                  0.845951303
                                                                              -0.08053456
                                                                                            0
YearsWithCurrManager
                          0.011525930
                                        0.04176204
                                                    0.161413516 -0.407140185 -0.06576770
                                                                                            0
                                                PC14
                                   PC13
                          0.1893016403
                                         0.237072230
DailyRate
                         -0.0099081253
                                         0.018837870
                          0.0057709912
                                         0.011991386
DistanceFromHome
                          0.0049037331
                                        -0.003314012
HourlyRate
                          0.4041044054
MonthlyIncome
                                         0.279006032
                         -0.0083381972
                                         0.009367738
MonthlyRate
                         -0.0369554196
                                         0.107234673
NumCompaniesWorked
PercentSalaryHike
                         -0.0183445446
                                         0.010585240
                         -0.4158888971 -0.705989494
TotalWorkingYears
```

```
TrainingTimesLastYear
                           0.0008431661 -0.012085362
YearsAtCompany
                          -0.6494086309
                                         0.562584645
YearsInCurrentRole
                           0.1948014145 -0.130643692
                           0.0977011821 -0.083447864
YearsSinceLastPromotion
                           0.3959144832 -0.121010943
YearsWithCurrManager
$center
                                         DailyRate
                                                           DistanceFromHome
                                                                                            Hour
                                        802.485714
               36.923810
                                                                    9.192517
                                                                                             65.
          MonthlyIncome
                                       MonthlyRate
                                                          NumCompaniesWorked
                                                                                     PercentSala
             6502.931293
                                      14313.103401
                                                                    2.693197
                                                                                             15.
      TotalWorkingYears
                            TrainingTimesLastYear
                                                              YearsAtCompany
                                                                                    YearsInCurre
                                                                                              4.
               11.279592
                                          2.799320
                                                                     7.008163
                             YearsWithCurrManager
YearsSinceLastPromotion
                2.187755
                                          4.123\bar{1}29
$scale
                                         DailyRate
                                                            DistanceFromHome
                                                                                            Hour
                9.135373
                                        403.509100
                                                                    8.106864
                                                                                             20.
                                                         NumCompaniesWorked
          MonthlyIncome
                                       MonthlyRate
                                                                                     PercentSala
             4707.956783
                                       7117.786044
                                                                    2.498009
                                                                                               3.
                            TrainingTimesLastYear
      TotalWorkingYears
                                                              YearsAtCompany
                                                                                    YearsInCurre
                7.780782
                                          1.289271
                                                                    6.126525
                                                                                               3.
YearsSinceLastPromotion
                             YearsWithCurrManager
                3.222430
                                          3.568136
$x
                  PC1
                                PC2
                                                PC3
                                                              PC4
                                                                             PC<sub>5</sub>
                                                                                           PC6
        -0.243044079
                       -1.805296680
                                     -0.3104169553
                                                    -0.384994275
                                                                   2.0169575215
                                                                                  0.984793983
   [1,]
    [2,]
[3,]
         0.854288163
                        0.381073595
                                    -0.5252390003
                                                     1.608645799
                                                                  -1.5927436292
                                                                                  -0.481865695
                                                    -2.596801032
        -2.198275394
                       -1.413301606
                                    -0.0582282745
                                                                   0.6022422032
                                                                                 -0.023230640
   ٳٙ, 4
                        0.682294015
        -0.570845554
                                      0.9530781591
                                                    -0.112517223
                                                                   0.0144209522
                                                                                 -0.415235118
   -1.567685771
                       -0.965438549
                                      1.6427717726
                                                     0.537047071
                                                                  -0.0703157168
                                                                                  0.940560119
    6,
                        1.476192828
                                      0.1768758528
        -0.033228256
                                                    -0.871158691
                                                                   0.9282306482
                                                                                  0.367849216
   [7,
        -1.176981984
                       -2.344142438
                                     -0.5229233979
                                                    -1.666338771
                                                                  -0.8793271137
                                                                                 -0.417767837
        -2.668563284
                                                                  -1.2486460778
                                                                                 -0.052250851
    [8,
                        0.310022541 -2.6128166708
                                                    -0.330963952
   Ī9,
                                                     1.144947290
         0.910894519
                        1.213005861 -1.5039201417
                                                                                  1.049881443
                                                                  -1.1238829367
  ΓĪ0,]
          1.339778839
                                     -1.9076328247
                                                    -0.281672326
                       -0.208584655
                                                                   1.0866328829
                                                                                 -1.252674274
  [11,]
        -1.227202504
                        0.961999888
                                      0.0613545738
                                                     0.034499533
                                                                   0.4709461858
                                                                                 -2.043427871
  [12,
        -0.073116546
                        1.760186112
                                      0.5344916830
                                                     1.247906142
                                                                   0.5189044912
                                                                                  0.442256861
  [13,]
                                                     1.573775407
                                                                  -0.7475549471
        -1.087474516
                        1.023377864
                                     -1.5147071841
                                                                                  1.511464717
  [14,]
        -1.814073316
                        0.601874393
                                    -1.3014136722
                                                    -1.101977678
                                                                   1.6522331947
                                                                                 -0.334506872
  [15,]
[16,]
        -1.659410211
                        0.292702788
                                    -0.0672556843
                                                     1.527211158
                                                                   0.0369416431
                                                                                 -0.176183833
         1.744251934
                        1.686663324
                                     -1.1177364895
                                                    -0.381693162
                                                                   0.6609099755
                                                                                  1.223658522
        -1.118546968
                        1.132058901
                                      1.4189672811
                                                     0.273681898
   [17,]
                                                                   0.7687430566
                                                                                 -1.460717606
                        0.684977918
                                                                   1.5219403902
  [18,]
        -2.875446285
                                     -1.2101773533
                                                    -1.069482747
                                                                                 -0.105065952
  [19,]
          4.306398521
                       -1.060188116
                                      0.2102166478
                                                    -0.374474127
                                                                  -0.3205736368
                                                                                 -1.006842601
  [20,]
        -1.274793286
                                      1.7607337154
                       -0.518252552
                                                    -0.263605442
                                                                   0.4775025923
                                                                                  1.296215086
   <sup>21,</sup>
                                                    -0.911443288
                                                                                  -1.694982203
                        1.416074395
        -1.707674413
                                     -0.2866612249
                                                                   0.0740619531
  [22,]
        -0.973935456
                      -1.013413533
                                     -1.1120212000
                                                    -1.850388185
                                                                  -1.3640205357
                                                                                 -0.666890243
  [23,]
[24,]
                                                                                 -0.652215366
-2.782189999
         1.686994016
                        1.312303531
                                      1.5096245660
                                                     1.224455487
                                                                   0.2429059015
        -3.186960204
                        1.127496005
                                      0.4028852195
                                                     0.661084708
                                                                   0.6427677466
   [25,]
        -1.236420346
                        0.070998887
                                      0.2998566707
                                                     0.248336464
                                                                   1.5088956715
                                                                                  0.030328006
  [26,]
[27,
          4.335210193
                       -1.187855044
                                      0.8439064948
                                                    -1.135518002
                                                                   0.1502712115
                                                                                  0.089980426
                        1.487707345
          0.202667449
                                                    -1.510499974
                                                                  -1.5194444667
                                     -1.0496066009
                                                                                 -1.172856717
  [28,j
         0.522611662
                        0.517960123
                                      0.7496484428
                                                     1.189509235
                                                                   0.3725504816
                                                                                  0.467749272
  [29,]
          4.167497779
                        1.068632778
                                      1.1917707595
                                                    -0.655936499
                                                                  -0.3603395503
                                                                                  0.680646739
  [30,]
          0.855668649
                                                     0.725830150
                       -2.594944348
                                      0.7337329455
                                                                   0.9881939586
                                                                                 -0.389610046
   [31,]
        -2.101453288
                      -0.598109160
                                      0.9218830885
                                                    -1.261397525
                                                                   1.1285699242
                                                                                  0.185406411
   32,]
        -0.628686779
                       -0.506577343
                                      1.0557480273
                                                    -0.359363863
                                                                  -1.2767722294
                                                                                 -1.259019980
  [33,]
[34,]
                        1.290594877
                                                     0.759970743
                                                                   0.8434796204
        -0.585760317
                                      1.0175278792
                                                                                 -1.537202603
        -1.453000790
                       -0.878346751
                                      1.6553451372
                                                    -1.466979255
                                                                  -0.7652620288
                                                                                 -1.050427892
        -2.295426038
                        0.497391245
                                      0.3961407175
                                                    -1.173667681
                                                                   0.0495687553
                                                                                  1.396660954
                        0.042990012
                                      0.7006144001 -0.308495224
        -0.832994065
                                                                   0.3417332881 -0.722274641
```

```
-1.354693336 -0.382172652 -0.0113330121 -1.423881781
                                                                1.0314915947
                                                                               0.517495020
[38,]
      -1.788459375
                     0.520002398
                                   0.3186189447 -1.168483914
                                                                1.3010327250
                                                                              -0.499080505
39,]
      -1.940888185
                    -1.947119717
                                   0.3014065269
                                                -0.616302576
                                                                0.6580712905
                                                                              -0.112112477
لِ, 40
                                                               -1.5424619460
                                                 -1.617065750
      -0.826827035
                     0.269317986
                                   0.4683770185
                                                                               1.078602496
رِ ,41
      -2.540242339
                     0.231335668
                                   0.9249250633
                                                 -0.019213294
                                                                1.0357898965
                                                                               0.023182442
42,
                                   2.2688244419
                                                                               -1.351223462
      -2.775064596
                     0.699871648
                                                 -0.255818018
                                                               -1.5958498425
[43,
                                                                               0.580484544
                                  -1.1151323620
                                                 -0.173311857
      -2.660977369
                     0.709039810
                                                                0.1700305471
[44,]
                                                 -0.773576913
       0.494241988
                     1.355663630 -0.4558314906
                                                              -0.0893201999
                                                                               2.889936395
Ī45,<sub>.</sub>
       0.755465347
                     1.607572626 -0.5109637132
                                                 -0.506888091
                                                               -1.4233075836
                                                                               1.057147451
آ46,
       5.804951893
                     1.078091201 -0.6975281151
                                                  0.051444706
                                                                0.4337848886
                                                                               1.614106696
וַ, 47
       0.806658069
                     1.653442819 -2.3068106160
                                                 -0.295882847
                                                               -0.4722918379
                                                                               0.134169049
_48,<u>j</u>
      -1.995881882
                    -0.926896408 -1.9960316143
                                                  0.633599363
                                                               -0.1729888148
                                                                               1.021151201
49,
       0.844245935
                    -0.616849916 -0.8194206960
                                                 -0.921810229 -0.7717068286
                                                                              -1.818536061
ָבָ, סָּ
                                                                               1.499053343
      -2.418330657
                     0.297326189 -0.3513459999
                                                 -1.101751982
                                                               -1.5156578641
[51,]
[52,]
                    -3.634989196
      -0.617002088
                                   0.3562096372
                                                  0.118216390
                                                                1.4389894618
                                                                              -0.220229442
                                                               -0.3600199657
      -1.874898008
                     0.830881805
                                   0.6248015543
                                                 -1.142134976
                                                                               0.329946720
Ī53,]
      -0.595964470
                                 -0.8408839570
                                                 -2.447215614
                                                               -0.9399446833
                                                                               0.774272087
                    -1.218466650
آ54,
                   -0.440311397 -0.1001609790
                                                 -1.002941201
                                                                0.6741005136
      -0.697653611
                                                                              -0.305412825
[55,]
                                                               -1.3960822450
      -2.079810230
                   -0.955185144 -1.8161177942
                                                  0.441813227
                                                                               0.253432093
[56, ]
       3.708466615
                     1.814109184 -0.0097541922
                                                 -0.036909451
                                                                2.1090226075
                                                                               0.552998695
57,
       0.809848967
                     1.103897503 -1.7108414088
                                                 -0.291327045 -1.1137226784
                                                                              -0.318923581
58,]
                     0.058005177
                                                                               0.275086845
      -1.465681948
                                 -0.5799431432
                                                  0.624721643 -1.1676958094
<sup>-</sup>59,]
      0.172118882
                     0.857390902 -0.3222266947
                                                 -0.286150650 -1.6974104391
                                                                               0.722818482
60,
      -0.134488687
                     0.774824505
                                   0.0742047436
                                                 -1.668328387
                                                               -0.8320217703
                                                                               1.458220908
61,
                                                                               1.172737829
       1.154466224
                     1.922306493
                                   0.5340354541
                                                  0.208456672
                                                               -2.0449281318
[62,]
       1.015549604
                     1.685679343
                                                  0.522264077
                                                                0.9425346951
                                  -1.0836803069
                                                                               0.960676995
                   -1.151655660
                                                               -0.0405314789
       5.230825960
                                   0.8119758029
                                                  0.364485427
                                                                               0.826552609
[63,]
[64,]
                                                                              -0.737221001
       5.030282900
                    -0.755218265
                                  -1.7678975054
                                                 -2.044562287
                                                                1.6478909242
[65,]
       3.788984539
                     1.946298043
                                  -0.0945560272
                                                 -1.067010987
                                                                               0.860439229
                                                                0.3184679516
<sup>:</sup>66, إ
       0.660742882
                    -2.427444222
                                   0.7464731633
                                                  1.051907583
                                                               -0.8666771968
                                                                               0.700339962
رِ 67,
                     0.194433528
                                  -0.4992692899
                                                                              -1.467101142
      -0.689313482
                                                 -0.091816631
                                                                0.9077818943
[68,]
      -0.360119052
                    -2.235551626 -0.3033093916
                                                 -0.208683127
                                                               -0.8858009134
                                                                               0.057772762
[69,]
      -1.590660053
                                   0.5118655703
                   -0.244778958
                                                 -0.944308747
                                                                1.1711060680
                                                                               0.909011154
[70,]
[71,]
                                 -1.0212757577
      -2.349000231
                   -0.024496709
                                                  1.625278907
                                                                               0.977055716
                                                                0.8108621115
       0.537061435 -3.049510452
                                   0.9612799574
                                                  0.240109595
                                                                0.1951466351
                                                                               0.179765350
                                PC9
                 PC8
                                              PC10
                                                             PC11
                                                                            PC12
                                                                   0.1652689774
       1.5917738507
                      1.1863471823
                                    -0.8721216003 -0.0964053395
                                                                                  2.697995e-
 [2,]
                     -0.2915207036
       1.4396138690
                                    -0.9133153760 -1.2704956060
                                                                  -0.1223848585
                                                                                  3.003787e-
 [3,]
                                                                                 -2.034191e-
       0.1645450520
                      0.7037177946
                                     0.2334286037
                                                   -0.2063109991
                                                                   0.0757180104
 [4, ]
                     -0.0232142896
                                     0.4483748666 -0.4255970757
       0.3788485663
                                                                  -1.1905425766
                                                                                 -5.888785e-
ןָׁ, כַּן
      -0.2110090034
                      2.3132854086
                                    -0.0092829889
                                                    0.7911383832
                                                                   0.0932147601 -1.001822e-
[6,]
[7,]
                                                                  -0.2311142456
       0.8232618244
                    -0.2219554949
                                    -0.0872069258 -0.4352547853
                                                                                  2.074828e-
       0.6783978017
                     -0.4439152914
                                     0.2850426885
                                                   -1.9955214056
                                                                   0.0476998780
                                                                                 -7.608564e-
 [8,]
      -0.3684730529
                     -0.4875080936
                                     0.4800518063
                                                    0.0543954145
                                                                   0.1020736714
                                                                                 -4.659415e-
 Ī9,
      -0.9351740522
                     -0.8467583073
                                    -0.7791175369
                                                    0.1173708729
                                                                  -0.0207647030
                                                                                  7.178969e-
[10,]
      -0.9887551265
                      1.8168832792
                                     0.5496258442
                                                    0.0893646974
                                                                   0.1719743118
                                                                                  1.482873e-
[11,]
      -0.7428933771
                     -0.3487121205
                                    -0.3578297611
                                                   -0.5029560805
                                                                  -0.2422407358
                                                                                 -3.914638e-
                                                                                 -2.594555e-
      -1.0813690872
                                    -1.1058405989
                                                    0.0965394361
[12,]
                     -0.3767620037
                                                                   0.4399899746
[13, <u>]</u>
      -1.2884619372
                     -0.0363538480
                                     0.8308304610
                                                   -0.2190499489
                                                                   0.3017206595
                                                                                 -5.138678e-
[14,]
      -0.8195524226
                     -0.7310455341
                                     0.3812739185
                                                   -0.4949317648
                                                                  -0.0110627441
                                                                                  2.587105e-
[15,]
      -1.9271549894
                      1.2343495139
                                                    0.4250203594
                                                                   0.1772497877
                                    -0.5198251249
                                                                                 -2.805626e-
[16,]
                                                    0.6052322133
      -1.2962378063
                      0.1672283742
                                     0.9190505173
                                                                  -0.1396419825
                                                                                  7.886224e-
ָן, 17
                                    -0.4908235512
                                                   -0.1712840455
      -0.0866130578
                     -0.4359922773
                                                                   0.4964863948
                                                                                 -6.197885e-
18,
      -0.3703968876
                     -0.4515944960
                                     0.4707221281
                                                    0.6870011577
                                                                   0.0480464742
                                                                                 -1.323742e-
Ī19,
                                                   -0.0202145544
       1.1419762947
                     -1.3201148540
                                    -0.5553725566
                                                                                 -1.330532e+
                                                                   0.0106513546
[20,]
      -0.9326540622
                      0.6299363640
                                    -0.0098247146
                                                   -0.2880597580
                                                                  -0.0739027515
                                                                                  1.175321e-
[21,]
                     -0.3112305780
       0.0042898132
                                     0.1801517860
                                                    0.6691640181
                                                                   0.1912063602
                                                                                 -6.152712e-
[22,]
       0.3446067836
                      1.3648622584
                                    -0.4792426584
                                                    0.2130812121
                                                                   0.0911878469
                                                                                 -3.605121e-
[23,]
                     -0.6875524464
      -0.2496196395
                                    -0.9335162824
                                                    0.6027692112
                                                                   0.8094891808
                                                                                  7.005028e-
[24,]
[25,]
      -0.3520700093
                      0.2822430507
                                     0.2555611279
                                                    0.6350192662
                                                                   0.0179911182
                                                                                 -1.389628e-
      0.5077089246
                     -0.1612550579
                                    -0.0186130089
                                                   -0.3041024579
                                                                   0.2026623054
                                                                                 -1.190615e-
[26,]
                    -0.5375940379
                                                    0.3347066400
                                                                  -1.0951792994
      -0.6259760526
                                    -0.5583140528
                                                                                  8.320370e-
                      0.3570074959
      -0.6537874675
                                     0.9290619928 -0.0189461399
                                                                   1.1560600116
                                                                                 -2.554831e-
Ī28.Ī
     -0.0648482848 -0.7354981588
                                     0.5503138531 -0.7380133792 -0.9496643546
                                                                                  8.389053e-
```

```
[31,]
        -0.1895100955
                         0.2414887412
                                         0.1464112473 -0.0495438258 -0.1690167656 -2.514129e-
                                                                                       2.991824e-
   [32,<u>]</u>
        -1.1586344712 -0.3666531671
                                         0.0562237019 -0.6611355034
                                                                        0.2298295473
  [33, ]
                         0.0895757307
                                       -0.5992509197 -0.0332054293
        -0.1491699406
                                                                        1.5600371817 -5.381913e-
  [34,]
[35,
                        -0.2065832996
         -1.5329294741
                                         0.1820633909 -0.4482305144
                                                                        0.1077454163
                                                                                      -8.542825e-
          0.2134201607
                        -0.1299260602
                                         0.8657952064
                                                        0.4687972163
                                                                        0.1202434785
                                                                                      -4.949487e-
  [36,]
          0.7203396398 -0.3895527430
                                                                        0.1954059923
                                       -0.1574012260 -1.2429413892
                                                                                       1.912162e-
   [37,<u>]</u>
          0.2688390818 -0.9067448813
                                         0.0479551510 -1.6866316116
                                                                      -0.1441330064
                                                                                       4.304295e-
   38,]
          0.6935995880 -0.2003120841
                                         0.5271573093 -0.6067308937
                                                                       -0.0279386513
                                                                                       2.824748e-
  [39,<u>]</u>
          0.2429085978
                         1.7646246196
                                       -0.1129573297
                                                        0.2507919469 -0.1314289782 -1.482093e-
   40,]
         -0.1179524881 -0.3580190226
                                         0.0556865761
                                                        0.1396045303
                                                                        0.0353093528 -1.389953e-
   41,
          0.0181823818 -0.5107722810
                                         0.3263458397 -0.5465772678 -0.0602546854
                                                                                       5.658773e-
   رِ 42,
        -0.7388494377 -0.0587506994
                                         0.2787045616
                                                        0.0926434197
                                                                        0.0901210156 -1.196858e-
   43,]
                                       0.3022550599
-0.7113741266
                                                        0.1729522027
0.7779144715
        -1.9884712967 -0.3763602810
                                                                        0.2552767122 -3.327794e-
  [44,]
[45,]
         -0.3462124514
                        -0.6086221030
                                                                      -0.3180020334
                                                                                      4.068577e-
          1.5058488466
                         0.0966839023
                                        -0.4001732785
                                                        0.0586933619 -0.1521141805 -3.945470e-
   [46,
          0.0542470485 -0.2605203348
                                         2.2309102556
                                                        0.7861699813 -1.1179707031
                                                                                       4.072934e-
   47,]
                                                                        0.5396748825
         -0.3676769926
                         0.0803763634
                                         1.3065788470 -0.3439303856
                                                                                       1.926447e-
   [48,<u>]</u>
          0.0379981462
                         0.0139823408
                                         0.2379323987 -0.1482978143
                                                                        0.0345722067 -2.626249e-
   <sup>-</sup>49, إ
          1.5880220441
                         0.4128727770 -1.2321509722 -0.6278155609
                                                                        0.3533099316
                                                                                       1.678164e-
   [50, ]
        -0.4960323101 -0.6439180110
                                        0.3515209761 -0.5484838822
                                                                        0.2054958400
                                                                                       1.408071e-
   [51, ]
         1.1704670085
                         0.8200564211 -0.1123759892 -0.2977384011
                                                                        0.1285674151 -6.899389e-
  [52,]
[53,]
[54,]
        -0.3941110717
                        -0.1764307635
                                         0.5591763859
                                                        0.0448168714
                                                                        0.0596852002
                                                                                       2.356005e-
                                                                                       1.985134e-
         0.8857772453
                         0.2519075061
                                         0.0130817786 -0.4850733698
                                                                        0.0278447233
        -0.6111756017
                        -0.7690695559
                                         0.6284517406
                                                                        0.6113545988
                                                                                       3.056229e-
                                                        0.6011938058
   [55,]
         -0.5984018598
                                       -0.0643320469
                                                        0.9721652618
                                                                      -0.1949743264 -3.069309e-
                         1.3970676765
   [56,]
          1.7422401316
                                       -0.0199461188
                                                        0.7410413537
                                                                       -0.5297862525
                                                                                       1.093202e+
                         0.1408058227
  [57,]
        -0.0108146406
                        -0.3106679951 -0.8493487541
                                                        0.3863867848 -0.1458192162
                                                                                       6.892529e-
   .
[58,]
        -1.8215348214
                         0.3621471351
                                         0.4006851921
                                                       -0.2172714122
                                                                        0.0608335537
                                                                                       2.928318e-
   [59,]
                                                        0.4163000283 -0.0858083206
                         0.4740138563 -0.8411057977
          0.3335120551
                                                                                       2.931242e-
   [60,]
          0.2284006406 - 0.6348604010 - 0.7475512841 - 0.2920548376
                                                                        0.2496513450
                                                                                       4.888034e-
   [6<u>1</u>,]
          0.7408606053
                         0.5122781140
                                         0.5793496320 -0.0105572994 -0.0042066309
                                                                                       5.488545e-
   [62,]
[63,]
                                                                                       1.734229e-
         -2.4733087118
                         0.5540510535
                                         1.2979592812 -0.9935329529
                                                                        1.2766076994
                                                        0.5895255433
        -0.4001018830
                         0.0656254162
                                         2.1963468297
                                                                        1.4470277217 -1.086096e+
   [64,]
[65,]
        -1.7992385929
                         1.6436332545 -0.5355851584 -1.3269684512 -1.2755865234 -5.269145e-
                         0.5395449026
                                                        0.0325762440 -1.0121301749
        -0.1566109309
                                        1.4430413025
                                                                                       2.073019e-
        -0.5389467786 -2.0662901268
                                         0.1446763110 -0.3168046990
                                                                        0.3722514197
                                                                                       2.468134e-
   [66,]
   [67,]
                                       -0.3750836045 -0.0545365082 -0.4224485744
          0.6267828319 -0.5362398552
                                                                                       2.452230e-
   [68,<u>]</u>
          0.3270971145 -1.6969908177
                                         0.3987065997 -0.0530068030
                                                                        0.1509487886 -4.247686e-
  [69,]
                        0.4293974391
                                         0.0802128266 -0.3229283966 -0.0234897322 -3.881229e-
          0.3792991801
 [70,] 1.5255487349 -1.1502222404 0.3958031962 -0.5136583440 -0.0367616655 1.303524e-
[71,] 0.4884620531 0.4469007175 -0.3625035208 -1.6091056814 0.0695982865 -7.853735e-
[ reached getOption("max.print") -- omitted 1399 rows ]
> summary(attr_pca)
Importance of components:
                                                              PC5
                             PC1
                                    PC2
                                             PC3
                                                      PC4
                                                                       PC6
                                                                              PC7
                                                                                       PC8
                                                                                               PC9
                         2.0042 1.2846 1.03368 1.02573 1.0047 0.99622 0.9764 0.95786 0.8500
Standard deviation
Proportion of Variance 0.2869 0.1179 0.07632 0.07515 0.0721 0.07089 0.0681 0.06554 0.0516
Cumulative Proportion 0.2869 0.4048 0.48111 0.55626 0.6284 0.69925 0.7673 0.83288 0.8845
                             PC12
                                     PC13
                                             PC14
                         0.53219 0.43975 0.3743
Standard deviation
Proportion of Variance 0.02023 0.01381 0.0100
                         0.97618 0.99000 1.0000
Cumulative Proportion
> #Extract variance against features
> eigenvalues<-attr_pca$sdev^2
> eigenvalues
 [1] 4.0167738 1.6502052 1.0685042 1.0521201 1.0094108 0.9924579 0.9533497 0.9174969 0.72
[11] 0.4698454 0.2832233 0.1933840 0.1400658
> sum(eigenvalues)
[1] 14
> names(eigenvalues) <- paste("PC",1:14,sep="")</pre>
> eigenvalues
```

0.3155536872 -1.1110140575 -0.1549320265

0.7155359778

2.1008653026 -1.743973e-

7.444228e-

1.0274567321 -0.2257845320

[29,] -1.2648397307

0.9457428880 -1.6915126800

[30,]

```
PC9
                 PC2
                            PC3
                                        PC4
                                                   PC5
                                                              PC6
                                                                         PC7
                                                                                    PC8
4.0167738 1.6502052 1.0685042 1.0521201 1.0094108 0.9924579 0.9533497 0.9174969 0.7224654
     PC12
                PC13
                           PC14
0.2832233 0.1933840 0.1400658
> sumoflambdas <- sum(eigenvalues)</pre>
  sumoflambdas
[1] 14
> #Variance %
> pctvar<- (eigenvalues/sumoflambdas)*100</pre>
> pctvar
                                                                                               PC9
                 PC2
                             PC3
                                        PC4
                                                   PC5
                                                              PC6
                                                                         PC7
                                                                                    PC8
28.691241 11.787180
                                  7.515143 7.210077 7.088985
                                                                  6.809641
                                                                             6.553550 5.160467
                       7.632173
     PC12
                PC13
                           PC14
                       1.000470
 2.023023 1.381314
> #Calculate cumulative of variance
> cumvar <- cumsum(pctvar)</pre>
> cumvar
      PC1
                                                                                               PC9
                             PC3
                                        PC4
                                                   PC5
                                                              PC6
                                                                         PC7
                                                                                    PC8
                                                                              83.28799
 28.69124
            40.47842
                       48.11059
                                  55.62574
                                             62.83581 69.92480
                                                                  76.73444
                                                                                         88.44846
     PC12
                PC13
                           PC14
 97.61822
           98.99953 100.00000
> #Visualize PCA using Scree plot
> fviz_screeplot(attr_pca, ncp=14)
    Scree plot
  30 -
Percentage of explained variances
```

> summary(attr_pca)

1 2 3 4

Importance of components:

8 9

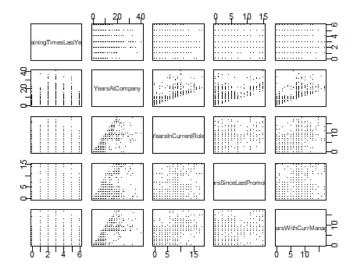
Dimensions

```
PC1
                                          PC2
                                                    PC3
                                                              PC4
                                                                       PC5
                                                                                 PC6
                                                                                                    PC8
                                                                                          PC7
Standard deviation 2.0042 1.2846 1.03368 1.02573 1.0047 0.99622 0.9764 0.95786 0.8500 Proportion of Variance 0.2869 0.1179 0.07632 0.07515 0.0721 0.07089 0.0681 0.06554 0.0516
Cumulative Proportion
                             0.2869 0.4048 0.48111 0.55626 0.6284 0.69925 0.7673 0.83288 0.8845
                                 PC12
                                           PC13
                                                    PC14
                             0.53219 0.43975 0.3743
Standard deviation
Proportion of Variance 0.02023 0.01381 0.0100
Cumulative Proportion 0.97618 0.99000 1.0000
```

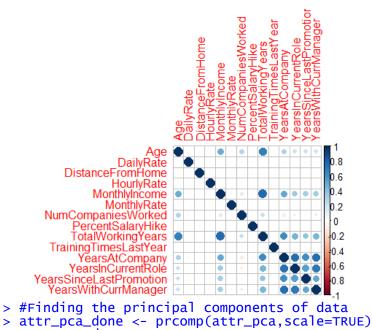
```
> #PCA
> #plot.new(); dev.off()
> #Considering the numeric columns that will help to get variance in data
> attr_pca <- attr[,numvar]
> # solve the error "Figure margins too large"
> par("mar")
[1] 5.1 4.1 4.1 2.1
```

10 11 12 13 14

```
> par(mar=c(1,1,1,1))
 #graphics.off()
 #dev.off()
> ##Matrix Plots, Covariance and Corelations Plots
> #ScatterPlot matrix
> pairs(attr_pca[,10:14],pch=".",cex=1.5)
```



- > #Plotting correlation plot to understand the how feature are related to each other
- > correplot<-cor(attr_pca)</pre>
- corrplot(correplot,method="circle")



- > attr_pca_done

Standard deviations (1, .., p=14): [1] 2.0041891 1.2846031 1.0336848 1.0257290 1.0046944 0.9962218 0.9763963 0.9578606 0.84 [11] 0.6854527 0.5321872 0.4397545 0.3742537

Rotation (n x k) = (14×14) :

```
PC2
                                                                            PC4
                                                                                          PC5
                          0.280157344 -0.472170158
                                                      0.003362193
                                                                    0.004488409 -0.039563410
Age
DailyRate
                         -0.006815197
                                       -0.077962430 -0.207301367
                                                                   -0.609569867 -0.211568990
                                                                    0.306131593
                          0.004812032
                                        0.041564987
                                                     -0.664884791
DistanceFromHome
                                                                                 0.048941659
HourlyRate
                         -0.011288550
                                       -0.062668026 -0.352147686
                                                                  -0.255816205
                                                                                 0.602292088
MonthlyIncome
MonthlyRate
                          0.360622909
                                       -0.290395305
                                                      0.052415102
                                                                    0.025332267
                                                                                -0.034941693
                          0.001123298
                                       -0.086158010
                                                      0.020312197
                                                                    0.664085954 -0.101166486
                          0.030991906 -0.560133264
                                                                  -0.041875610
                                                                                 0.017785645
                                                      0.005628265
NumCompaniesWorked
PercentSalaryHike
                         -0.015351368
                                        0.004618486 -0.465841883
                                                                   -0.055689609 -0.698726672
TotalWorkingYears
                          0.415285665
                                       -0.318115831
                                                      0.009368263
                                                                    0.007027664 -0.024159198
TrainingTimesLastYear
                         -0.010993402
                                        0.092457674
                                                      0.409028173
                                                                   -0.138279489 -0.293982017
YearsAtCompany
                          0.443443529
                                        0.213079968
                                                      0.002115638
                                                                  -0.010571214
                                                                                 0.024921329
YearsInCurrentRole
                          0.391353065
                                        0.279423881 -0.048111956
                                                                  -0.038785223
                                                                                -0.004927194
YearsSinceLastPromotion
                          0.344322397
                                        0.198658357
                                                      0.003993040
                                                                    0.027659809
                                                                                 0.019935007
YearsWithCurrManager
                          0.386171187
                                        0.295138965 -0.031745944
                                                                  -0.034459502
                                                                                 0.021898300
                                                PC8
                                                             PC9
                                                                          PC10
                                                                                       PC11
                         -0.098196914 -0.05927715 -0.183114693
                                                                   0.005033984 -0.74367068
                                                                                            -0
Age
DailyRate
                          0.715405171 -0.02770642
                                                    -0.028707475
                                                                  0.040304455 -0.01980752
                                                                                             0
                          0.031447533 -0.65217193
                                                     0.037737577
                                                                  0.002338630
                                                                                0.02927699
DistanceFromHome
                                                                                             0
HourlyRate
                         -0.221010405
                                        0.40142111 -0.004675476
                                                                  0.018009772
                                                                                0.03725997
                                                                                            -0
MonthlyIncome
                         -0.012272736 -0.03685912
                                                   -0.377381332
                                                                  0.104651321
                                                                                0.61775910
                                                                                            -0
                          0.482943083
                                        0.40448871
                                                     0.056690883 -0.044889268
                                                                               -0.01681584
MonthlyRate
                                                                                             0
                         -0.032989593 -0.03355765
                                                     0.775796629 -0.129586743
                                                                                0.19687866
                                                                                             0
NumCompaniesWorked
                                       0.38335261
-0.04398227
PercentSalaryHike
                         -0.376210309
                                                     0.012190972
                                                                  0.019568502
                                                                                0.04082482
                                                                                             0
                         -0.029511945
                                                    -0.196663458
                                                                 -0.038585533
                                                                                0.08301594
TotalWorkingYears
                                                                                             0
                         -0.217564575
                                                     0.130785998
                                       -0.29622601
                                                                 -0.017811234
                                                                                0.02954240
TrainingTimesLastYear
                                                                                            -0
                                                    -0.001551392
                          0.005335572
                                        0.01862614
                                                                 -0.104225054
                                                                                0.03762072
                                                                                             0
YearsAtCompany
                          0.062086964
                                        0.05420752
                                                     0.201595025
YearsInCurrentRole
                                                                 -0.271683842
                                                                               -0.04458982
                                                                                            -0
                          0.022129234
                                        0.03850513
                                                     0.306725567
                                                                  0.845951303
                                                                               -0.08053456
YearsSinceLastPromotion
                                                                                             0
YearsWithCurrManager
                          0.011525930
                                        0.04176204
                                                     0.161413516 -0.407140185 -0.06576770
                                                                                             0
                                   PC13
                          0.1893016403
                                         0.237072230
Age
                         -0.0099081253
DailyRate
                                         0.018837870
DistanceFromHome
                          0.0057709912
                                         0.011991386
HourlyRate
MonthlyIncome
                          0.0049037331
                                        -0.003314012
                          0.4041044054
                                         0.279006032
MonthlyRate
                         -0.0083381972
                                         0.009367738
                         -0.0369554196
                                         0.107234673
NumCompaniesWorked
PercentSalaryHike
                         -0.0183445446
                                         0.010585240
                         -0.4158888971 -0.705989494
TotalWorkingYears
                          0.0008431661 -0.012085362
TrainingTimesLastYear
YearsAtCompany
                         -0.6494086309
                                        0.562584645
                          0.1948014145 -0.130643692
YearsInCurrentRole
YearsSinceLastPromotion
                          0.0977011821 -0.083447864
YearsWithCurrManager
                          0.3959144832 -0.121010943
> names(attr_pca_done)
[1] "sdev" "rotati
                "rotation" "center"
                                       "scale"
> head(attr_pca_done)
$sdev
 [1] 2.0041891 1.2846031 1.0336848 1.0257290 1.0046944 0.9962218 0.9763963 0.9578606 0.84
[11] 0.6854527 0.5321872 0.4397545 0.3742537
$rotation
                                                                            PC4
                                                      0.003362193
                                                                    0.004488409 -0.039563410
                          0.280157344 -0.472170158
Age
DailyRate
                         -0.006815197
                                       -0.077962430 -0.207301367
                                                                   -0.609569867 -0.211568990
DistanceFromHome
                          0.004812032
                                        0.041564987 -0.664884791
                                                                    0.306131593
                                                                                 0.048941659
                         -0.011288550 -0.062668026 -0.352147686
HourlyRate
                                                                  -0.255816205
                                                                                 0.602292088
                          0.360622909 -0.290395305
MonthlyIncome
                                                      0.052415102
                                                                    0.025332267 -0.034941693
MonthlyRate
                          0.001123298 -0.086158010
                                                      0.020312197
                                                                    0.664085954 -0.101166486
                          0.030991906 -0.560133264
                                                                  -0.041875610
NumCompaniesWorked
                                                      0.005628265
                                                                                 0.017785645
                         -0.015351368
                                        0.004618486
                                                     -0.465841883
                                                                   -0.055689609 -0.698726672
PercentSalaryHike
```

-0.318115831

0.092457674

0.009368263

TotalWorkingYears

TrainingTimesLastYear

0.415285665

-0.010993402

0.007027664 -0.024159198

0.409028173 -0.138279489 -0.293982017

```
YearsAtCompany
                           0.443443529
                                         0.213079968
                                                      0.002115638 -0.010571214
                                                                                   0.024921329
YearsInCurrentRole
                           0.391353065
                                         0.279423881 -0.048111956 -0.038785223
                                                                                  -0.004927194
                                                      0.003993040
                                                                                   0.019935007
YearsSinceLastPromotion
                           0.344322397
                                         0.198658357
                                                                     0.027659809
YearsWithCurrManager
                           0.386171187
                                         0.295138965 -0.031745944
                                                                   -0.034459502
                                                                                   0.021898300
                                   PC7
                                                PC8
                                                              PC9
                                                                           PC10
                                                                                        PC11
                                                                    0.005033984 -0.74367068
                          -0.098196914
                                       -0.05927715
                                                     -0.183114693
Age
                                        -0.02770642
                                                                    0.040304455
DailyRate
                           0.715405171
                                                     -0.028707475
                                                                                 -0.01980752
                                                                                               0
                           0.031447533
                                        -0.65217193
                                                                    0.002338630
                                                                                  0.02927699
DistanceFromHome
                                                      0.037737577
                                                                                               0
HourlyRate
                          -0.221010405
                                                                                  0.03725997
0.61775910
                                         0.40142111
                                                                    0.018009772
                                                    -0.004675476
                                                                                              -0
MonthlyIncome
                          -0.012272736
                                        -0.03685912
                                                    -0.377381332
                                                                    0.104651321
                                                                                              -0
                           0.482943083
                                                                  -0.044889268
MonthlyRate
                                         0.40448871
                                                      0.056690883
                                                                                 -0.01681584
                                                                                               0
                          -0.032989593
                                                                  -0.129586743
NumCompaniesWorked
                                        -0.03355765
                                                      0.775796629
                                                                                  0.19687866
                                                                                               0
                          -0.376210309
                                         0.38335261
                                                      0.012190972
                                                                   0.019568502
                                                                                  0.04082482
                                                                                               0
PercentSalaryHike
TotalWorkingYears
                          -0.029511945
                                        -0.04398227
                                                     -0.196663458
                                                                  -0.038585533
                                                                                  0.08301594
                                                                                               0
                          \substack{-0.217564575\\0.005335572}
                                                    0.130785998
-0.001551392
                                                                                  0.02954240
0.03762072
TrainingTimesLastYear
                                        -0.29622601
                                                                  -0.017811234
                                                                                              -0
                                         0.01862614
                                                                  -0.104225054
YearsAtCompany
                                                                                               0
                           0.062086964
                                         0.05420752
                                                      0.201595025
                                                                  -0.271683842
                                                                                 -0.04458982
YearsInCurrentRole
                                                                                              -0
                           0.022129234
                                         0.03850513
                                                      0.306725567
                                                                   0.845951303 -0.08053456
YearsSinceLastPromotion
                                                                                               0
                           0.011525930
                                         0.04176204
                                                      0.161413516 -0.407140185 -0.06576770
                                                                                               0
YearsWithCurrManager
                                                 PC14
                           0.1893016403
                                          0.237072230
Age
                          -0.0099081253
DailyRate
                                          0.018837870
                           0.0057709912
                                          0.011991386
DistanceFromHome
HourlyRate
MonthlyIncome
                           0.0049037331
                                         -0.003314012
                           0.4041044054
                                          0.279006032
                          -0.0083381972
                                          0.009367738
MonthlyRate
                          -0.0369554196
                                          0.107234673
NumCompaniesWorked
PercentSalaryHike
                                          0.010585240
                          -0.0183445446
TotalWorkingYears
                          -0.4158888971 -0.705989494
TrainingTimesLastYear
                           0.0008431661 -0.012085362
                          -0.6494086309
                                         0.562584645
YearsAtCompany
                           0.1948014145 -0.130643692
YearsInCurrentRole
YearsSinceLastPromotion
                           0.0977011821 -0.083447864
YearsWithCurrManager
                           0.3959144832 -0.121010943
$center
                                         DailyRate
                                                           DistanceFromHome
                                                                                           Hour
               36.923810
                                        802.485714
                                                                    9.192517
                                                                                             65.
          MonthlyIncome
                                      MonthlyRate
                                                         NumCompaniesWorked
                                                                                    PercentSala
             6502.931293
                                      14313.103401
                                                                    2.693197
                                                                                             15.
      TotalWorkingYears
                            TrainingTimesLastYear
                                                             YearsAtCompany
                                                                                   YearsInCurre
               11.279592
                                          2.799320
                                                                    7.008163
                                                                                              4.
                             YearsWithCurrManager
YearsSinceLastPromotion
                2.187755
                                          4.123129
$scale
                                         DailyRate
                                                           DistanceFromHome
                                                                                           Hour
                9.135373
                                        403.509100
                                                                    8.106864
                                                                                            20.
          MonthlyIncome
                                      MonthlyRate
                                                         NumCompaniesWorked
                                                                                    PercentSala
             4707.956783
                                       7117.786044
                                                                    2.498009
                                                                                              3.
      TotalWorkingYears
                            TrainingTimesLastYear
                                                             YearsAtCompany
                                                                                   YearsInCurre
                7.780782
                                          1.289271
                                                                    6.126525
                                                                                              3.
YearsSinceLastPromotion
                             YearsWithCurrManager
                3.222430
                                          3.568\overline{1}36
$x
                                PC2
                                                                                          PC6
                      -1.805296680 -0.3104169553
                                                   -0.384994275
                                                                   2.0169575215
                                                                                  0.984793983
        -0.243044079
                       0.381073595 -0.5252390003
                                                    1.608645799 -1.5927436292
         0.854288163
                                                                                 -0.481865695 -
                      -1.413301606 -0.0582282745
                                                   -2.596801032
                                                                  0.6022422032
        -2.198275394
                                                                                 -0.023230640 -
                       0.682294015
                                     0.9530781591
                                                                  0.0144209522
        -0.570845554
                                                   -0.112517223
                                                                                 -0.415235118
        -1.567685771 -0.965438549
                                     1.6427717726
                                                    0.537047071 -0.0703157168
                                                                                  0.940560119
                                     0.1768758528
        -0.033228256
                       1.476192828
                                                   -0.871158691
                                                                  0.9282306482
                                                                                  0.367849216
```

-1.176981984 -2.344142438 -0.5229233979 -1.666338771 -0.8793271137 -0.417767837 -0.417767837

```
-2.668563284
                     0.310022541 -2.6128166708 -0.330963952 -1.2486460778 -0.052250851
[9,]
                                                  1.144947290 -1.1238829367
       0.910894519
                     1.213005861 -1.5039201417
                                                                               1.049881443
[10,]
       1.339778839
                    -0.208584655
                                 -1.9076328247
                                                 -0.281672326
                                                                1.0866328829
                                                                              -1.252674274
[11,
                     0.961999888
                                                  0.034499533
                                                                0.4709461858
                                                                              -2.043427871
      -1.227202504
                                   0.0613545738
.
[12,
                                                  1.247906142
      -0.073116546
                     1.760186112
                                   0.5344916830
                                                                0.5189044912
                                                                               0.442256861
13,
      -1.087474516
                                  -1.5147071841
                     1.023377864
                                                  1.573775407
                                                               -0.7475549471
                                                                               1.511464717
Ī14,
                                                                1.6522331947
                     0.601874393
                                                 -1.101977678
                                                                              -0.334506872
      -1.814073316
                                  -1.3014136722
[15,]
                                                  1.527211158
      -1.659410211
                     0.292702788
                                 -0.0672556843
                                                                0.0369416431
                                                                              -0.176183833
[16,]
                     1.686663324
                                                                               1.223658522
       1.744251934
                                  -1.1177364895
                                                 -0.381693162
                                                                0.6609099755
[17,]
      -1.118546968
                     1.132058901
                                   1.4189672811
                                                  0.273681898
                                                                0.7687430566
                                                                              -1.460717606
[18,]
      -2.875446285
                     0.684977918
                                  -1.2101773533
                                                 -1.069482747
                                                                1.5219403902
                                                                              -0.105065952
[19,]
       4.306398521
                    -1.060188116
                                   0.2102166478
                                                 -0.374474127
                                                               -0.3205736368
                                                                              -1.006842601
20,
      -1.274793286
                    -0.518252552
                                   1.7607337154
                                                 -0.263605442
                                                                0.4775025923
                                                                               1.296215086
[21, ]
      -1.707674413
                     1.416074395
                                                 -0.911443288
                                                                0.0740619531
                                                                              -1.694982203
                                  -0.2866612249
[22,]
[23,]
                   -1.013413533
                                                 -1.850388185
                                                               -1.3640205357
      -0.973935456
                                  -1.1120212000
                                                                              -0.666890243
                                                  1.224455487
       1.686994016
                     1.312303531
                                   1.5096245660
                                                                0.2429059015
                                                                              -0.652215366
[24,]
                                                                0.6427677466
                     1.127496005
                                   0.4028852195
                                                  0.661084708
                                                                              -2.782189999
      -3.186960204
[25,]
[26,]
                     0.070998887
                                                                1.5088956715
      -1.236420346
                                   0.2998566707
                                                  0.248336464
                                                                               0.030328006
       4.335210193
                                                                               0.089980426
                    -1.187855044
                                   0.8439064948 -1.135518002
                                                                0.1502712115
[27,]
       0.202667449
                     1.487707345
                                  -1.0496066009
                                                 -1.510499974
                                                               -1.5194444667
                                                                              -1.172856717
[28,]
       0.522611662
                     0.517960123
                                   0.7496484428
                                                  1.189509235
                                                                0.3725504816
                                                                               0.467749272
29,
       4.167497779
                                   1.1917707595
                                                 -0.655936499
                                                               -0.3603395503
                     1.068632778
                                                                               0.680646739
[30,]
       0.855668649
                    -2.594944348
                                   0.7337329455
                                                  0.725830150
                                                                0.9881939586
                                                                              -0.389610046
                                                 -1.261397525
31,
      -2.101453288
                    -0.598109160
                                   0.9218830885
                                                                1.1285699242
                                                                               0.185406411
32,
      -0.628686779
                    -0.506577343
                                   1.0557480273
                                                 -0.359363863
                                                               -1.2767722294
                                                                              -1.259019980
[33,]
                                                  0.759970743
                                                                              -1.537202603
                     1.290594877
                                   1.0175278792
                                                                0.8434796204
      -0.585760317
34,
      -1.453000790
                    -0.878346751
                                   1.6553451372
                                                 -1.466979255
                                                               -0.7652620288
                                                                              -1.050427892
[35,]
                     0.497391245
                                                 -1.173667681
      -2.295426038
                                   0.3961407175
                                                                0.0495687553
                                                                               1.396660954
[36,]
      -0.832994065
                     0.042990012
                                   0.7006144001 -0.308495224
                                                                              -0.722274641
                                                                0.3417332881
37,
      -1.354693336
                    -0.382172652
                                  -0.0113330121
                                                 -1.423881781
                                                                1.0314915947
                                                                               0.517495020
[38,]
      -1.788459375
                     0.520002398
                                   0.3186189447
                                                                1.3010327250
                                                                              -0.499080505
                                                 -1.168483914
<sup>:</sup>39,]
      -1.940888185
                    -1.947119717
                                   0.3014065269
                                                 -0.616302576
                                                                0.6580712905
                                                                              -0.112112477
40, إ
                                                               -1.5424619460
      -0.826827035
                     0.269317986
                                   0.4683770185
                                                 -1.617065750
                                                                               1.078602496
41,
      -2.540242339
                                                                               0.023182442
                     0.231335668
                                   0.9249250633
                                                 -0.019213294
                                                                1.0357898965
42,
                                                               -1.5958498425
      -2.775064596
                     0.699871648
                                   2.2688244419
                                                 -0.255818018
                                                                              -1.351223462
ſ43,
      -2.660977369
                     0.709039810 -1.1151323620
                                                 -0.173311857
                                                                0.1700305471
                                                                               0.580484544
آ44,
       0.494241988
                     1.355663630 -0.4558314906
                                                 -0.773576913
                                                              -0.0893201999
                                                                               2.889936395
                                                                               1.057147451
[45,]
       0.755465347
                     1.607572626 -0.5109637132
                                                 -0.506888091
                                                               -1.4233075836
ر 46,
       5.804951893
                     1.078091201 -0.6975281151
                                                  0.051444706
                                                                0.4337848886
                                                                               1.614106696
ً 47, ٍ
                                                               -0.4722918379
       0.806658069
                                                 -0.295882847
                     1.653442819
                                 -2.3068106160
                                                                               0.134169049
[48,<u>]</u>
      -1.995881882
                    -0.926896408 -1.9960316143
                                                  0.633599363 -0.1729888148
                                                                               1.021151201
<sup>.</sup>49, <u> </u>
      0.844245935
                    -0.616849916 -0.8194206960
                                                 -0.921810229
                                                               -0.7717068286
                                                                              -1.818536061
50,
      -2.418330657
                                                               -1.5156578641
                     0.297326189
                                                 -1.101751982
                                                                               1.499053343
                                 -0.3513459999
51,]
      -0.617002088
                    -3.634989196
                                   0.3562096372
                                                  0.118216390
                                                                1.4389894618
                                                                              -0.220229442
52,
      -1.874898008
                     0.830881805
                                   0.6248015543
                                                 -1.142134976
                                                               -0.3600199657
                                                                               0.329946720
Ī53,
      -0.595964470
                    -1.218466650
                                  -0.8408839570
                                                 -2.447215614
                                                               -0.9399446833
                                                                               0.774272087
[54,]
      -0.697653611
                    -0.440311397
                                  -0.1001609790
                                                 -1.002941201
                                                                0.6741005136
                                                                              -0.305412825
55,]
      -2.079810230
                                                               -1.3960822450
                    -0.955185144 -1.8161177942
                                                  0.441813227
                                                                               0.253432093
56, <u>J</u>
                                                                               0.552998695
       3.708466615
                     1.814109184 -0.0097541922
                                                 -0.036909451
                                                                2.1090226075
์ 57, ๅ
                                                 -0.291327045
       0.809848967
                     1.103897503
                                 -1.7108414088
                                                               -1.1137226784
                                                                              -0.318923581
58,]
                     0.058005177
                                  -0.5799431432
                                                                               0.275086845
      -1.465681948
                                                  0.624721643
                                                               -1.1676958094
59,
                     0.857390902 -0.3222266947
       0.172118882
                                                 -0.286150650
                                                               -1.6974104391
                                                                               0.722818482
ُو, 60
                     0.774824505
                                   0.0742047436
                                                 -1.668328387
                                                               -0.8320217703
                                                                               1.458220908
      -0.134488687
61,
       1.154466224
                     1.922306493
                                   0.5340354541
                                                  0.208456672
                                                               -2.0449281318
                                                                               1.172737829
       1.015549604
                     1.685679343
                                  -1.0836803069
                                                                0.9425346951
                                                                               0.960676995
                                                  0.522264077
62,
[63,]
       5.230825960
                   -1.151655660
                                   0.8119758029
                                                  0.364485427
                                                               -0.0405314789
                                                                               0.826552609
64,]
       5.030282900
                                                                1.6478909242
                    -0.755218265
                                 -1.7678975054 -2.044562287
                                                                              -0.737221001
[65,]
       3.788984539
                     1.946298043
                                 -0.0945560272
                                                 -1.067010987
                                                                0.3184679516
                                                                               0.860439229
[66,<u>]</u>
                                                                               0.700339962
                    -2.427444222
       0.660742882
                                   0.7464731633
                                                  1.051907583
                                                               -0.8666771968
67,
      -0.689313482
                     0.194433528 -0.4992692899
                                                 -0.091816631
                                                                0.9077818943
                                                                              -1.467101142
68,
      -0.360119052
                    -2.235551626
                                 -0.3033093916
                                                 -0.208683127
                                                               -0.8858009134
                                                                               0.057772762
[69, <u>]</u>
      -1.590660053
                                                                               0.909011154
                    -0.244778958
                                   0.5118655703
                                                 -0.944308747
                                                                1.1711060680
70,
      -2.349000231
                    -0.024496709
                                  -1.0212757577
                                                  1.625278907
                                                                0.8108621115
                                                                               0.977055716
Ī71, Ī
       0.537061435
                   -3.049510452
                                   0.9612799574
                                                  0.240109595
                                                                0.1951466351
                                                                               0.179765350
```

```
PC9
                                               PC10
                                                               PC11
                 PC8
                                                                              PC12
       1.5917738507
                       1.1863471823
                                                                                     2.697995e-
                                     -0.8721216003 -0.0964053395
                                                                     0.1652689774
 [2, ]
[3, ]
       1.4396138690
                      -0.2915207036
                                     -0.9133153760
                                                    -1.2704956060
                                                                    -0.1223848585
                                                                                     3.003787e-
                                                    -0.2063109991
                                                                                   -2.034191e-
                                      0.2334286037
                                                                     0.0757180104
       0.1645450520
                      0.7037177946
 [4,]
       0.3788485663
                      -0.0232142896
                                      0.4483748666
                                                    -0.4255970757
                                                                    -1.1905425766
                                                                                   -5.888785e-
 5,
       -0.2110090034
                       2.3132854086
                                     -0.0092829889
                                                      0.7911383832
                                                                     0.0932147601
                                                                                   -1.001822e-
 6,
       0.8232618244
                      -0.2219554949
                                     -0.0872069258
                                                    -0.4352547853
                                                                    -0.2311142456
                                                                                     2.074828e-
 [7,
                     -0.4439152914
                                                    -1.9955214056
       0.6783978017
                                      0.2850426885
                                                                     0.0476998780
                                                                                   -7.608564e-
 [8,]
      -0.3684730529
                     -0.4875080936
                                      0.4800518063
                                                      0.0543954145
                                                                     0.1020736714
                                                                                   -4.659415e-
 Ī9,
      -0.9351740522
                      -0.8467583073
                                     -0.7791175369
                                                      0.1173708729
                                                                    -0.0207647030
                                                                                     7.178969e-
[\bar{1}0,]
      -0.9887551265
                                      0.5496258442
                       1.8168832792
                                                      0.0893646974
                                                                     0.1719743118
                                                                                     1.482873e-
[11,]
      -0.7428933771
                      -0.3487121205
                                     -0.3578297611
                                                     -0.5029560805
                                                                    -0.2422407358
                                                                                   -3.914638e-
[12,]
                     -0.3767620037
                                                                                   -2.594555e-
      -1.0813690872
                                     -1.1058405989
                                                     0.0965394361
                                                                     0.4399899746
[13,]
                                                                                   -5.138678e-
      -1.2884619372
                     -0.0363538480
                                      0.8308304610
                                                    -0.2190499489
                                                                     0.3017206595
[\overline{14},]
                                     0.3812739185
-0.5198251249
                     -0.7310455341
                                                                    -0.0110627441
                                                                                     2.587105e-
      -0.8195524226
                                                    -0.4949317648
Ī15,
                                                      0.4250203594
                       1.2343495139
                                                                     0.1772497877
                                                                                    -2.805626e-
      -1.9271549894
                                      0.9190505173
                                                                                     7.886224e-
[16,]
      -1.2962378063
                       0.1672283742
                                                      0.6052322133
                                                                    -0.1396419825
[17,
      -0.0866130578
                     -0.4359922773
                                     -0.4908235512
                                                     -0.1712840455
                                                                     0.4964863948
                                                                                   -6.197885e-
[18,]
                                                     0.6870011577
                                                                     0.0480464742
      -0.3703968876
                     -0.4515944960
                                      0.4707221281
                                                                                   -1.323742e-
[19,]
       1.1419762947
                      -1.3201148540
                                     -0.5553725566
                                                    -0.0202145544
                                                                     0.0106513546
                                                                                   -1.330532e+
[20,]
      -0.9326540622
                      0.6299363640
                                     -0.0098247146
                                                    -0.2880597580
                                                                    -0.0739027515
                                                                                     1.175321e-
21,
       0.0042898132
                      -0.3112305780
                                      0.1801517860
                                                      0.6691640181
                                                                     0.1912063602
                                                                                   -6.152712e-
[22,]
       0.3446067836
                                     -0.4792426584
                                                                     0.0911878469
                                                                                   -3.605121e-
                      1.3648622584
                                                      0.2130812121
[23,]
[24,]
                     -0.6875524464
0.2822430507
      -0.2496196395
                                     -0.9335162824
                                                      0.6027692112
                                                                     0.8094891808
                                                                                     7.005028e-
                                      0.2555611279
      -0.3520700093
                                                      0.6350192662
                                                                     0.0179911182
                                                                                    -1.389628e-
[25,
                      -0.1612550579
       0.5077089246
                                     -0.0186130089
                                                     -0.3041024579
                                                                     0.2026623054
                                                                                   -1.190615e-
[26,]
[27,]
                      -0.5375940379
                                     -0.5583140528
      -0.6259760526
                                                      0.3347066400
                                                                    -1.0951792994
                                                                                     8.320370e-
      -0.6537874675
                                                    -0.0189461399
                                                                                    -2.554831e-
                      0.3570074959
                                      0.9290619928
                                                                     1.1560600116
[28,]
      -0.0648482848
                      -0.7354981588
                                                    -0.7380133792
                                                                    -0.9496643546
                                                                                     8.389053e-
                                      0.5503138531
[29,]
      -1.2648397307
                      0.3155536872
                                     -1.1110140575
                                                    -0.1549320265
                                                                     2.1008653026
                                                                                    -1.743973e-
30,]
                      -1.6915126800
                                                                                     7.444228e-
                                      0.7155359778
                                                      1.0274567321
       0.9457428880
                                                                    -0.2257845320
[31,]
      -0.1895100955
                      0.2414887412
                                                    -0.0495438258
                                                                                    -2.514129e-
                                      0.1464112473
                                                                    -0.1690167656
[32,]
[33,]
                                                                                    2.991824e-
      -1.1586344712
                      -0.3666531671
                                      0.0562237019
                                                    -0.6611355034
                                                                     0.2298295473
      -0.1491699406
                      0.0895757307
                                     -0.5992509197
                                                    -0.0332054293
                                                                     1.5600371817
                                                                                   -5.381913e-
34,
      -1.5329294741
                      -0.2065832996
                                      0.1820633909
                                                    -0.4482305144
                                                                     0.1077454163
                                                                                    -8.542825e-
[35,
       0.2134201607
                     -0.1299260602
                                      0.8657952064
                                                      0.4687972163
                                                                     0.1202434785
                                                                                   -4.949487e-
                     -0.3895527430
                                     -0.1574012260
36,
                                                                     0.1954059923
       0.7203396398
                                                    -1.2429413892
                                                                                     1.912162e-
[37,]
                                      0.0479551510
                                                                                     4.304295e-
       0.2688390818
                     -0.9067448813
                                                    -1.6866316116
                                                                    -0.1441330064
[38,<u>]</u>
       0.6935995880
                     -0.2003120841
                                      0.5271573093
                                                    -0.6067308937
                                                                    -0.0279386513
                                                                                     2.824748e-
<sup>-</sup>39, <u>J</u>
       0.2429085978
                                     -0.1129573297
                                                     0.2507919469
                                                                    -0.1314289782
                                                                                   -1.482093e-
                       1.7646246196
[40,]
      -0.1179524881
                     -0.3580190226
                                      0.0556865761
                                                     0.1396045303
                                                                     0.0353093528
                                                                                   -1.389953e-
ر 41,
       0.0181823818
                     -0.5107722810
                                      0.3263458397
                                                     -0.5465772678
                                                                    -0.0602546854
                                                                                     5.658773e-
42,
      -0.7388494377
                     -0.0587506994
                                      0.2787045616
                                                      0.0926434197
                                                                                   -1.196858e-
                                                                     0.0901210156
[43, <u>]</u>
      -1.9884712967
                     -0.3763602810
                                      0.3022550599
                                                      0.1729522027
                                                                     0.2552767122
                                                                                    -3.327794e-
Ī44,
      -0.3462124514
                                     -0.7113741266
                                                      0.7779144715
                      -0.6086221030
                                                                    -0.3180020334
                                                                                     4.068577e-
                      0.0966839023
                                     -0.4001732785
[45,]
       1.5058488466
                                                      0.0586933619
                                                                    -0.1521141805
                                                                                   -3.945470e-
                                                                    -1.1179707031
                                                                                     4.072934e-
[46,]
       0.0542470485
                      -0.2605203348
                                      2.2309102556
                                                      0.7861699813
47, <u>]</u>
                      0.0803763634
                                                     -0.3439303856
                                                                     0.5396748825
                                                                                     1.926447e-
      -0.3676769926
                                      1.3065788470
[48,]
                       0.0139823408
                                      0.2379323987
                                                     -0.1482978143
                                                                     0.0345722067
       0.0379981462
                                                                                    -2.626249e-
[49,<u>]</u>
                                                                     0.3533099316
       1.5880220441
                                     -1.2321509722
                      0.4128727770
                                                    -0.6278155609
                                                                                     1.678164e-
50,]
      -0.4960323101
                      -0.6439180110
                                      0.3515209761
                                                                     0.2054958400
                                                    -0.5484838822
                                                                                     1.408071e-
51,
                                                                                   -6.899389e-
       1.1704670085
                                     -0.1123759892
                                                     -0.2977384011
                      0.8200564211
                                                                     0.1285674151
52,
      -0.3941110717
                      -0.1764307635
                                      0.5591763859
                                                      0.0448168714
                                                                     0.0596852002
                                                                                     2.356005e-
[53,]
[54,]
      0.8857772453
-0.6111756017
                      0.2519075061
                                      0.0130817786
                                                     -0.4850733698
                                                                     0.0278447233
                                                                                     1.985134e-
                      -0.7690695559
                                                                                     3.056229e-
                                      0.6284517406
                                                                     0.6113545988
                                                      0.6011938058
[̈55,]
      -0.5984018598
                       1.3970676765
                                     -0.0643320469
                                                      0.9721652618
                                                                    -0.1949743264
                                                                                   -3.069309e-
[56,]
                                                                    -0.5297862525
                                     -0.0199461188
       1.7422401316
                      0.1408058227
                                                      0.7410413537
                                                                                     1.093202e+
ِ 57, <u>آ</u>
                                                                                     6.892529e-
      -0.0108146406
                      -0.3106679951
                                     -0.8493487541
                                                      0.3863867848
                                                                    -0.1458192162
[58,<u>]</u>
                                      0.4006851921
                                                                                     2.928318e-
      -1.8215348214
                      0.3621471351
                                                     -0.2172714122
                                                                     0.0608335537
.59, <u>j</u>
       0.3335120551
                      0.4740138563
                                     -0.8411057977
                                                      0.4163000283
                                                                    -0.0858083206
                                                                                     2.931242e-
60,
       0.2284006406
                      -0.6348604010
                                     -0.7475512841
                                                    -0.2920548376
                                                                     0.2496513450
                                                                                     4.888034e-
[61, ]
                                      0.5793496320
                                                    -0.0105572994
       0.7408606053
                      0.5122781140
                                                                    -0.0042066309
                                                                                     5.488545e-
[62,]
[63,]
      -2.4733087118
                      0.5540510535
                                      1.2979592812
                                                    -0.9935329529
                                                                     1.2766076994
                                                                                     1.734229e-
      -0.4001018830
                      0.0656254162
                                      2.1963468297
                                                     0.5895255433
                                                                     1.4470277217
                                                                                   -1.086096e+
```

```
[64,] -1.7992385929
                          1.6436332545 -0.5355851584 -1.3269684512 -1.2755865234 -5.269145e-
                          0.5395449026
         -0.1566109309
                                          1.4430413025 0.0325762440 -1.0121301749
                                                                                            2.073019e-
                                           0.1446763110 -0.3168046990 0.3722514197
         -0.5389467786 -2.0662901268
   [66,<u>]</u>
                                                                                             2.468134e-
   67,
          0.6267828319 - 0.5362398552 - 0.3750836045 - 0.0545365082 - 0.4224485744
                                                                                             2.452230e-
   [68,]
          0.3270971145 -1.6969908177
                                           0.3987065997 -0.0530068030 0.1509487886 -4.247686e-
                         0.4293974391
                                           0.0802128266 -0.3229283966 -0.0234897322 -3.881229e-
   [69,
          0.3792991801
          1.5255487349 -1.1502222404 0.3958031962 -0.5136583440 -0.0367616655 1.303524e-0.4884620531 0.4469007175 -0.3625035208 -1.6091056814 0.0695982865 -7.853735e-
   [70,<u>]</u>
  [71,]
 [ reached getOption("max.print") -- omitted 1399 rows ]
> summary(attr_pca_done)
Importance of components:
                              PC1
                                       PC2
                                                PC3
                                                         PC4
                                                                  PC5
                                                                           PC6
                                                                                   PC7
                                                                                             PC8
                                                                                                     PC9
Standard deviation 2.0042 1.2846 1.03368 1.02573 1.0047 0.99622 0.9764 0.95786 0.8500 Proportion of Variance 0.2869 0.1179 0.07632 0.07515 0.0721 0.07089 0.0681 0.06554 0.0516 Cumulative Proportion 0.2869 0.4048 0.48111 0.55626 0.6284 0.69925 0.7673 0.83288 0.8845
                              PC12
                                        PC13
                                                PC14
                           0.53219 0.43975 0.3743
Standard deviation
Proportion of Variance 0.02023 0.01381 0.0100
Cumulative Proportion 0.97618 0.99000 1.0000
> #Extract variance against features
> eigenvalues<-attr_pca_done$sdev^2
> eigenvalues
[1] 4.0167738 1.6502052 1.0685042 1.0521201 1.0094108 0.9924579 0.9533497 0.9174969 0.72 [11] 0.4698454 0.2832233 0.1933840 0.1400658
  sum(eigenvalues)
[1] 14
> names(eigenvalues) <- paste("PC",1:14,sep="")</pre>
> eigenvalues
       PC1
                              PC3
                                          PC4
                                                      PC5
                                                                  PC6
                                                                             PC7
                                                                                         PC8
                                                                                                     PC9
4.0167738 1.6502052 1.0685042 1.0521201 1.0094108 0.9924579 0.9533497 0.9174969 0.7224654
      PC12
                 PC13
                             PC14
0.2832233 0.1933840 0.1400658
> sumoflambdas <- sum(eigenvalues)</pre>
  sumoflambdas
[1] 14
> #Variance %
> pctvar<- (eigenvalues/sumoflambdas)*100</pre>
> pctvar
                                                      PC<sub>5</sub>
                                                                             PC7
                                                                                                     PC9
       PC1
                   PC2
                              PC3
                                          PC4
                                                                  PC6
                                                                                         PC8
28.691241 11.787180
                        7.632173
                                    7.515143
                                               7.210077
                                                           7.088985
                                                                       6.809641
                                                                                   6.553550
                                                                                               5.160467
                 PC13
      PC12
                             PC14
 2.023023
            1.381314
                        1.000470
> #Calculate cumulative of variance
> cumvar <- cumsum(pctvar)</pre>
> cumvar
                                                                                                     PC9
       PC1
                   PC2
                              PC3
                                          PC4
                                                      PC5
                                                                  PC6
                                                                             PC7
                                                                                         PC8
 28.69124
             40.47842
                        48.11059
                                    55.62574
                                                62.83581 69.92480
                                                                       76.73444
                                                                                   83.28799
                                                                                               88.44846
      PC12
                 PC13
                             PC14
            98.99953 100.00000
 97.61822
> matlambdas <- rbind(eigenvalues,pctvar,cumvar)</pre>
> matlambdas
                                                                    PC5
                                                                                 PC6
                                                                                              PC7
                     PC1
                                 PC2
                                             PC3
                                                        PC4
                                                              1.009411
                                                                          0.9924579
eigenvalues
              4.016774
                           1.650205
                                       1.068504
                                                  1.052120
                                                                                       0.9533497
                                                                                                    0.91
                                                  7.515143
                                                              7.210077
                                                                          7.0889848
              28.691241 11.787180
                                      7.632173
                                                                                      6.8096407
                                                                                                   6.55
pctvar
              28.691241 40.478422 48.110594 55.625738 62.835815 69.9247997 76.7344404 83.28
cumvar
                     PC10
                                  PC11
                                               PC12
                                                           PC13
                                                                         PC14
                            0.4698454
                                                      0.193384
                                                                   0.1400658
eigenvalues
               0.5306975
                                         0.2832233
                            3.3560388
                                        2.0230233
                                                                   1.0004700
                                                     1.381314
pctvar
              92.2391537 95.5951925 97.6182158 98.999530 100.0000000
> rownames(matlambdas) <- c("Eigenvalues", "Prop. variance", "Cum. prop. variance")</pre>
> round(matlambdas,4)
                                                        PC4
                        4.0168
                                 1.6502
                                           1.0685
                                                    1.0521
                                                              1.0094 0.9925
                                                                                          0.9175
                                                                                                    0.72
Eigenvalues
                                                                                 0.9533
```

```
28.6912 11.7872
                                      7.6322 7.5151 7.2101 7.0890 6.8096 6.5535
                                                                                         5.16
Prop. variance
Cum. prop. variance 28.6912 40.4784 48.1106 55.6257 62.8358 69.9248 76.7344 83.2880 88.44
                        PC12
                                PC13
                                          PC14
                              0.19\overline{34}
                      0.2832
                                        0.1401
Eigenvalues
Prop. variance
                      2.0230
                              1.3813
                                       1.0005
Cum. prop. variance 97.6182 98.9995 100.0000
> attr_pca_done$rotation
                                                PC2
                                                              PC3
                                                                           PC4
                                  PC1
                                                                   0.004488409 -0.039563410
                          0.280157344 -0.472170158
                                                     0.003362193
Age
DailyRate
                         -0.006815197 -0.077962430 -0.207301367
                                                                  -0.609569867 -0.211568990
DistanceFromHome
                          0.004812032
                                       0.041564987
                                                    -0.664884791
                                                                   0.306131593
                                                                                0.048941659
HourlyRate
                         -0.011288550
                                      -0.062668026 -0.352147686
                                                                  -0.255816205
                                                                                0.602292088
MonthlyIncome
                          0.360622909 -0.290395305
                                                     0.052415102
                                                                   0.025332267 -0.034941693
MonthlyRate
                          0.001123298 -0.086158010
                                                     0.020312197
                                                                   0.664085954 -0.101166486
                         0.030991906 -0.560133264
-0.015351368 0.004618486
NumCompaniesWorked
                                                     0.005628265
                                                                  -0.041875610
                                                                                0.017785645
                                       0.004618486
                                                    -0.465841883
                                                                  -0.055689609 -0.698726672
PercentSalaryHike
                                                                   0.007027664 -0.024159198
TotalWorkingYears
                          0.415285665
                                       -0.318115831
                                                     0.009368263
                                                                  -0.138279489 -0.293982017
TrainingTimesLastYear
                         -0.010993402
                                       0.092457674
                                                     0.409028173
                          0.443443529
                                       0.213079968
                                                     0.002115638
                                                                  -0.010571214
                                                                                0.024921329
YearsAtCompany
YearsInCurrentRole
                          0.391353065
                                       0.279423881 -0.048111956
                                                                  -0.038785223
                                                                               -0.004927194
YearsSinceLastPromotion
                          0.344322397
                                       0.198658357
                                                     0.003993040
                                                                   0.027659809
                                                                                0.019935007
                                       0.295138965 -0.031745944
                                                                  -0.034459502
                          0.386171187
                                                                                0.021898300
YearsWithCurrManager
                                               PC8
                                                             PC9
                                                                         PC10
                                  PC7
                                                                                      PC11
                         -0.183114693
Age
                                                                  0.005033984 -0.74367068
                                                   -0.028707475
                                                                  0.040304455
DailyRate
                                                                              -0.01980752
                          0.031447533
                                       -0.65217193
                                                                  0.002338630
                                                                               0.02927699
DistanceFromHome
                                                    0.037737577
                                       0.40142111 -0.004675476
                                                                  0.018009772
                                                                               0.03725997
HourlyRate
                         -0.221010405
                                                                  0.104651321
                                                                               0.61775910
MonthlyIncome
                         -0.012272736
                                      -0.03685912
                                                   -0.377381332
                          0.482943083
                                       0.40448871
                                                    0.056690883 -0.044889268
                                                                              -0.01681584
MonthlyRate
NumCompaniesWorked
                         -0.032989593
                                      -0.03355765
                                                    0.775796629
                                                                -0.129586743
                                                                               0.19687866
                                       0.38335261
                                                    0.012190972
                                                                  0.019568502
                         -0.376210309
                                                                               0.04082482
PercentSalaryHike
                         -0.029511945 -0.04398227
                                                   -0.196663458 -0.038585533
                                                                               0.08301594
TotalWorkingYears
TrainingTimesLastYear
                         -0.217564575
                                      -0.29622601
                                                    0.130785998 -0.017811234
                                                                               0.02954240
YearsAtCompany
                          0.005335572
                                       0.01862614 -0.001551392
                                                                -0.104225054
                                                                               0.03762072
                                                    0.201595025
YearsInCurrentRole
                          0.062086964
                                       0.05420752
                                                                 -0.271683842
                                                                              -0.04458982
YearsSinceLastPromotion
                          0.022129234
                                       0.03850513
                                                    0.306725567
                                                                  0.845951303 -0.08053456
                          0.011525930
                                                    0.161413516 -0.407140185 -0.06576770
                                       0.04176204
YearsWithCurrManager
                                  PC13
                                                PC14
                          0.1893016403
                                         0.237072230
DailyRate
                         -0.0099081253
                                         0.018837870
                          0.0057709912
DistanceFromHome
                                        0.011991386
HourlyRate
                          0.0049037331 -0.003314012
MonthlyIncome
                          0.4041044054
                                        0.279006032
MonthlyRate
                         -0.0083381972
                                         0.009367738
NumCompaniesWorked
PercentSalaryHike
                         -0.0369554196
                                        0.107234673
                                        0.010585240
                         -0.0183445446
                         -0.4158888971 -0.705989494
TotalWorkingYears
TrainingTimesLastYear
                          0.0008431661 -0.012085362
                                        0.562584645
YearsAtCompany
                         -0.6494086309
                          0.1948014145 -0.130643692
YearsInCurrentRole
                          0.0977011821 -0.083447864
YearsSinceLastPromotion
                          0.3959144832 -0.121010943
YearsWithCurrManager
> #Visualize PCA using Scree plot
> fviz_screeplot(attr_pca_done, ncp=14)
```

-0

0

-0

-0

0

0

0

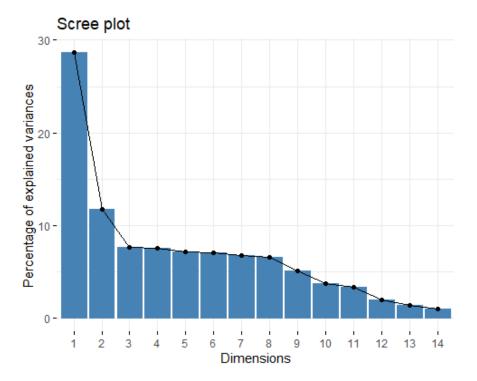
0

0

0

-0

-0



> summary(attr_pca_done)

Importance of components:

PC1 PC2 PC3 PC4 PC5 PC6 PC7 PC8 PC9 Standard deviation 2.0042 1.2846 1.03368 1.02573 1.0047 0.99622 0.9764 0.95786 0.8500 Proportion of Variance 0.2869 0.1179 0.07632 0.07515 0.0721 0.07089 0.0681 0.06554 0.0516 Cumulative Proportion 0.2869 0.4048 0.48111 0.55626 0.6284 0.69925 0.7673 0.83288 0.8845

PC12 PC13 PC14 Standard deviation 0.53219 0.43975 0.3743 Proportion of Variance 0.02023 0.01381 0.0100 Cumulative Proportion 0.97618 0.99000 1.0000

- > #Sample scores stored in attr_pca\$x
- > #We need to calculate the scores on each of these components for each individual in our

```
attr_pca_done$x
                              PC2
                                                           PC4
                                                                                        PC6
      -0.243044079 -1.805296680 -0.3104169553 -0.384994275
                                                                2.0169575215
                                                                               0.984793983
 [2,]
[3,]
[4,]
                                 -0.5252390003
                                                               -1.5927436292
                                                                              -0.481865695
       0.854288163
                     0.381073595
                                                  1.608645799
      -2.198275394
                    -1.413301606
                                 -0.0582282745
                                                 -2.596801032
                                                                0.6022422032
                                                                              -0.023230640
                                                                              -0.415235118
      -0.570845554
                     0.682294015
                                   0.9530781591
                                                 -0.112517223
                                                                0.0144209522
 [5,]
[6,]
                    -0.965438549
                                                  0.537047071
                                                                               0.940560119
      -1.567685771
                                   1.6427717726
                                                               -0.0703157168
                                   0.1768758528
                                                 -0.871158691
      -0.033228256
                     1.476192828
                                                                               0.367849216
                                                                0.9282306482
 [7,]
                                  -0.5229233979
                                                                              -0.417767837
      -1.176981984
                    -2.344142438
                                                 -1.666338771
                                                               -0.8793271137
 [8,]
[9,]
                                                               -1.2486460778
      -2.668563284
                     0.310022541 -2.6128166708
                                                 -0.330963952
                                                                              -0.052250851
       0.910894519
                     1.213005861 -1.5039201417
                                                  1.144947290
                                                               -1.1238829367
                                                                               1.049881443
[10,]
       1.339778839
                    -0.208584655 -1.9076328247
                                                 -0.281672326
                                                                1.0866328829
                                                                              -1.252674274
[11,]
      -1.227202504
                     0.961999888
                                   0.0613545738
                                                  0.034499533
                                                                0.4709461858 - 2.043427871
[12,]
                                                                               0.442256861 -
                                                                0.5189044912
      -0.073116546
                     1.760186112
                                   0.5344916830
                                                  1.247906142
[13,]
                     1.023377864 -1.5147071841
                                                               -0.7475549471
      -1.087474516
                                                  1.573775407
                                                                               1.511464717
[14,]
                     0.601874393 -1.3014136722
                                                                1.6522331947
                                                                              -0.334506872
      -1.814073316
                                                 -1.101977678
[15,]
[16,]
      -1.659410211
                     0.292702788 -0.0672556843
                                                  1.527211158
                                                                0.0369416431
                                                                              -0.176183833
       1.744251934
                     1.686663324 -1.1177364895
                                                 -0.381693162
                                                                0.6609099755
                                                                               1.223658522
[17,]
      -1.118546968
                     1.132058901
                                   1.4189672811
                                                  0.273681898
                                                                0.7687430566 -1.460717606
[18,]
      -2.875446285
                     0.684977918 -1.2101773533
                                                 -1.069482747
                                                                1.5219403902 -0.105065952
[19,]
                                   0.2102166478 -0.374474127
       4.306398521
                    -1.060188116
                                                               -0.3205736368 -1.006842601
 20, ]
      -1.274793286
                   -0.518252552
                                   1.7607337154 -0.263605442
                                                                0.4775025923
                                                                               1.296215086 -
      -1.707674413
                     1.416074395 -0.2866612249 -0.911443288
                                                                0.0740619531 -1.694982203 -
```

```
-0.973935456 -1.013413533 -1.1120212000 -1.850388185 -1.3640205357 -0.666890243 -
[23,]
       1.686994016
                     1.312303531
                                   1.5096245660
                                                  1.224455487
                                                                0.2429059015
                                                                              -0.652215366
[24,]
      -3.186960204
                     1.127496005
                                   0.4028852195
                                                  0.661084708
                                                                0.6427677466
                                                                              -2.782189999
[25,]
                                   0.2998566707
                                                  0.248336464
                     0.070998887
                                                                1.5088956715
      -1.236420346
                                                                               0.030328006
[26,]
       4.335210193
                    -1.187855044
                                   0.8439064948
                                                 -1.135518002
                                                                0.1502712115
                                                                               0.089980426
[27,
[28,
       0.202667449
                     1.487707345
                                  -1.0496066009
                                                 -1.510499974
                                                               -1.5194444667
                                                                              -1.172856717
                                                                0.3725504816
                     0.517960123
                                   0.7496484428
                                                  1.189509235
                                                                               0.467749272
       0.522611662
[29,]
                                                 -0.655936499
       4.167497779
                     1.068632778
                                   1.1917707595
                                                               -0.3603395503
                                                                               0.680646739
30,<sub>]</sub>
       0.855668649
                    -2.594944348
                                   0.7337329455
                                                  0.725830150
                                                                0.9881939586
                                                                              -0.389610046
[31, <u>]</u>
      -2.101453288
                    -0.598109160
                                   0.9218830885
                                                 -1.261397525
                                                                1.1285699242
                                                                               0.185406411
[32,]
      -0.628686779
                    -0.506577343
                                   1.0557480273
                                                 -0.359363863
                                                               -1.2767722294
                                                                              -1.259019980
[33,<u>]</u>
      -0.585760317
                     1.290594877
                                   1.0175278792
                                                  0.759970743
                                                                0.8434796204
                                                                              -1.537202603
34,]
      -1.453000790
                   -0.878346751
                                   1.6553451372
                                                 -1.466979255
                                                               -0.7652620288 -1.050427892
35,
                                   0.3961407175
                                                 -1.173667681
      -2.295426038
                     0.497391245
                                                                0.0495687553
                                                                               1.396660954
[36,]
      -0.832994065
                                                                              -0.722274641
                     0.042990012
                                   0.7006144001 -0.308495224
                                                                0.3417332881
37,
                    -0.382172652
                                                                               0.517495020
      -1.354693336
                                  -0.0113330121
                                                 -1.423881781
                                                                1.0314915947
[38,]
      -1.788459375
                                                                1.3010327250 -0.499080505
                     0.520002398
                                   0.3186189447
                                                 -1.168483914
[39,]
      -1.940888185
                                   0.3014065269 -0.616302576
                                                                0.6580712905 -0.112112477
                    -1.947119717
<sup>[</sup>40,]
      -0.826827035
                                   0.4683770185 -1.617065750
                     0.269317986
                                                                               1.078602496
                                                               -1.5424619460
رِ ,41
      -2.540242339
                     0.231335668
                                   0.9249250633 -0.019213294
                                                                1.0357898965
                                                                               0.023182442
رِ, 42
      -2.775064596
                     0.699871648
                                   2.2688244419 -0.255818018
                                                               -1.5958498425
                                                                              -1.351223462
43,
      -2.660977369
                     0.709039810 -1.1151323620 -0.173311857
                                                                0.1700305471
                                                                               0.580484544
[44,]
       0.494241988
                     1.355663630 -0.4558314906
                                                -0.773576913 -0.0893201999
                                                                               2.889936395
45,
       0.755465347
                     1.607572626 -0.5109637132
                                                 -0.506888091
                                                               -1.4233075836
                                                                               1.057147451
46,
       5.804951893
                     1.078091201 -0.6975281151
                                                  0.051444706
                                                                0.4337848886
                                                                               1.614106696
[47,]
                                                 -0.295882847
                                                               -0.4722918379
       0.806658069
                     1.653442819
                                  -2.3068106160
                                                                               0.134169049
[48,]
      -1.995881882
                    -0.926896408 -1.9960316143
                                                  0.633599363
                                                               -0.1729888148
                                                                               1.021151201
[49,]
       0.844245935
                    -0.616849916 -0.8194206960
                                                 -0.921810229
                                                               -0.7717068286
                                                                              -1.818536061
[50,]
                     0.297326189
                                  -0.3513459999
                                                 -1.101751982
                                                               -1.5156578641
                                                                               1.499053343
      -2.418330657
˙51, ַ
      -0.617002088
                   -3.634989196
                                   0.3562096372
                                                  0.118216390
                                                                1.4389894618
                                                                              -0.220229442
ِ 52, <u>ا</u>
                                                                               0.329946720
      -1.874898008
                     0.830881805
                                   0.6248015543
                                                 -1.142134976
                                                              -0.3600199657
[53,]
                                                                               0.774272087
      -0.595964470
                   -1.218466650 -0.8408839570
                                                 -2.447215614 -0.9399446833
54,]
                                                                0.6741005136
      -0.697653611
                   -0.440311397 -0.1001609790
                                                 -1.002941201
                                                                              -0.305412825
55,
                                                              -1.3960822450
      -2.079810230 -0.955185144 -1.8161177942
                                                  0.441813227
                                                                               0.253432093
[56,<u>]</u>
                                                                               0.552998695
       3.708466615
                     1.814109184 -0.0097541922
                                                 -0.036909451
                                                                2.1090226075
57,
       0.809848967
                     1.103897503
                                 -1.7108414088
                                                 -0.291327045 -1.1137226784
                                                                              -0.318923581
                                                  0.624721643 -1.1676958094
                                                                               0.275086845
[58,]
      -1.465681948
                     0.058005177 -0.5799431432
                                                 -0.286150650 -1.6974104391
                                                                               0.722818482
[59,]
       0.172118882
                     0.857390902 -0.3222266947
[60,<u>]</u>
      -0.134488687
                     0.774824505
                                   0.0742047436 -1.668328387
                                                               -0.8320217703
                                                                               1.458220908
ີ່ 61, <u>ເ</u>
       1.154466224
                     1.922306493
                                   0.5340354541
                                                               -2.0449281318
                                                  0.208456672
                                                                               1.172737829
[62, ]
       1.015549604
                     1.685679343 -1.0836803069
                                                  0.522264077
                                                                0.9425346951
                                                                               0.960676995
63,
       5.230825960 -1.151655660
                                   0.8119758029
                                                  0.364485427
                                                               -0.0405314789
                                                                               0.826552609
64,
                                                                1.6478909242
       5.030282900 -0.755218265
                                  -1.7678975054
                                                 -2.044562287
                                                                              -0.737221001
[65,<u>]</u>
       3.788984539
                     1.946298043
                                  -0.0945560272
                                                 -1.067010987
                                                                0.3184679516
                                                                               0.860439229
66,
                    -2.427444222
       0.660742882
                                   0.7464731633
                                                  1.051907583
                                                               -0.8666771968
                                                                               0.700339962
      -0.689313482
[67,]
                     0.194433528
                                  -0.4992692899
                                                 -0.091816631
                                                                0.9077818943
                                                                              -1.467101142
                                                                               0.057772762
[68,]
      -0.360119052
                    -2.235551626
                                  -0.3033093916
                                                 -0.208683127
                                                               -0.8858009134
      -1.590660053
[69,]
                    -0.244778958
                                   0.5118655703
                                                 -0.944308747
                                                                1.1711060680
                                                                               0.909011154
ָלַ, 70
      -2.349000231
                    -0.024496709
                                  -1.0212757577
                                                  1.625278907
                                                                0.8108621115
                                                                               0.977055716
Ī71,]
       0.537061435 -3.049510452
                                   0.9612799574
                                                  0.240109595
                                                                0.1951466351
                                                                               0.179765350
                 PC8
                                              PC10
                                                                            PC12
[1,]
[2,]
[3,]
[4,]
       1.5917738507
                                    -0.8721216003 -0.0964053395
                                                                   0.1652689774
                      1.1863471823
                                                                                   2.697995e-
       1.4396138690
                     -0.2915207036
                                    -0.9133153760
                                                   -1.2704956060
                                                                  -0.1223848585
                                                                                   3.003787e-
       0.1645450520
                      0.7037177946
                                     0.2334286037
                                                   -0.2063109991
                                                                   0.0757180104
                                                                                 -2.034191e-
                     -0.0232142896
                                                                  -1.1905425766 -5.888785e-
       0.3788485663
                                     0.4483748666
                                                   -0.4255970757
      -0.2110090034
                      2.3132854086
                                    -0.0092829889
                                                    0.7911383832
                                                                   0.0932147601 -1.001822e-
 [5,]
 [6,]
[7,]
       0.8232618244 -0.2219554949
                                    -0.0872069258 -0.4352547853
                                                                  -0.2311142456
                                                                                   2.074828e-
       0.6783978017
                     -0.4439152914
                                     0.2850426885 -1.9955214056
                                                                   0.0476998780
                                                                                 -7.608564e-
 [8, ]
      -0.3684730529 -0.4875080936
                                     0.4800518063
                                                    0.0543954145
                                                                   0.1020736714 -4.659415e-
 [̈́9, إ
      -0.9351740522
                     -0.8467583073
                                    -0.7791175369
                                                    0.1173708729
                                                                  -0.0207647030
                                                                                  7.178969e-
[10,]
                                                                   0.1719743118
      -0.9887551265
                      1.8168832792
                                     0.5496258442
                                                    0.0893646974
                                                                                   1.482873e-
[11,
      -0.7428933771 -0.3487121205
                                    -0.3578297611
                                                   -0.5029560805
                                                                  -0.2422407358
                                                                                 -3.914638e-
[12,]
[13,]
      -1.0813690872
                     -0.3767620037
                                    -1.1058405989
                                                    0.0965394361
                                                                   0.4399899746
                                                                                 -2.594555e-
      -1.2884619372 -0.0363538480
                                     0.8308304610 -0.2190499489
                                                                   0.3017206595 -5.138678e-
```

```
-0.8195524226 -0.7310455341
                                        0.3812739185 -0.4949317648 -0.0110627441
                                                                                     2.587105e-
  [15,]
        -1.9271549894
                        1.2343495139
                                      -0.5198251249
                                                       0.4250203594
                                                                      0.1772497877
                                                                                    -2.805626e-
  [16,]
        -1.2962378063
                        0.1672283742
                                        0.9190505173
                                                       0.6052322133
                                                                     -0.1396419825
                                                                                     7.886224e-
  17,
                                      -0.4908235512
                       -0.4359922773
                                                      -0.1712840455
                                                                      0.4964863948
                                                                                   -6.197885e-
        -0.0866130578
  [18,]
        -0.3703968876 -0.4515944960
                                       0.4707221281
                                                      0.6870011577
                                                                      0.0480464742 -1.323742e-
  [19,
[20,]
         1.1419762947
                       -1.3201148540
                                      -0.5553725566 -0.0202145544
                                                                      0.0106513546
                                                                                    -1.330532e+
                                                                     -0.0739027515
        -0.9326540622
                        0.6299363640
                                       -0.0098247146
                                                     -0.2880597580
                                                                                     1.175321e-
  [21,]
                       -0.3112305780
         0.0042898132
                                       0.1801517860
                                                       0.6691640181
                                                                      0.1912063602
                                                                                    -6.152712e-
  [22,]
[23,]
         0.3446067836
                        1.3648622584
                                      -0.4792426584
                                                       0.2130812121
                                                                      0.0911878469
                                                                                    -3.605121e-
        -0.2496196395
                       -0.6875524464
                                       -0.9335162824
                                                       0.6027692112
                                                                      0.8094891808
                                                                                     7.005028e-
  [24,]
        -0.3520700093
                        0.2822430507
                                        0.2555611279
                                                       0.6350192662
                                                                      0.0179911182
                                                                                    -1.389628e-
  [25,]
         0.5077089246
                       -0.1612550579
                                      -0.0186130089
                                                      -0.3041024579
                                                                      0.2026623054
                                                                                    -1.190615e-
  26,
        -0.6259760526
                       -0.5375940379
                                      -0.5583140528
                                                       0.3347066400
                                                                     -1.0951792994
                                                                                     8.320370e-
  [27,]
                        0.3570074959
        -0.6537874675
                                        0.9290619928 -0.0189461399
                                                                                    -2.554831e-
                                                                      1.1560600116
  [28,
[29,]
        -0.0648482848
                       -0.7354981588
                                        0.5503138531 -0.7380133792
                                                                     -0.9496643546
                                                                                     8.389053e-
                        0.3155536872
                                       -1.1110140575
                                                                                    -1.743973e-
        -1.2648397307
                                                      -0.1549320265
                                                                      2.1008653026
  Ī30,
                       -1.6915126800
                                       0.7155359778
                                                                                     7.444228e-
         0.9457428880
                                                       1.0274567321
                                                                     -0.2257845320
  [31,]
[32,]
        -0.1895100955
                        0.2414887412
                                        0.1464112473 -0.0495438258
                                                                     -0.1690167656
                                                                                   -2.514129e-
                                        0.0562237019 -0.6611355034
                                                                      0.2298295473
                                                                                     2.991824e-
        -1.1586344712
                       -0.3666531671
  [33,]
        -0.1491699406
                        0.0895757307
                                       -0.5992509197 -0.0332054293
                                                                      1.5600371817
                                                                                    -5.381913e-
   34,
        -1.5329294741
                       -0.2065832996
                                        0.1820633909 -0.4482305144
                                                                      0.1077454163
                                                                                    -8.542825e-
  35,]
         0.2134201607
                       -0.1299260602
                                        0.8657952064
                                                      0.4687972163
                                                                      0.1202434785 -4.949487e-
  [36,<u>]</u>
         0.7203396398 -0.3895527430
                                      -0.1574012260 -1.2429413892
                                                                      0.1954059923
                                                                                     1.912162e-
  [37,]
[38,]
                                        0.0479551510 -1.6866316116
         0.2688390818 -0.9067448813
                                                                     -0.1441330064
                                                                                     4.304295e-
         0.6935995880 -0.2003120841
                                        0.5271573093
                                                     -0.6067308937
                                                                     -0.0279386513
                                                                                     2.824748e-
                                      -0.1129573297
  Γ39,
         0.2429085978
                                                       0.2507919469
                                                                     -0.1314289782
                                                                                    -1.482093e-
                        1.7646246196
  [40,]
        -0.1179524881
                                        0.0556865761
                       -0.3580190226
                                                       0.1396045303
                                                                      0.0353093528
                                                                                    -1.389953e-
  آ41,
         0.0181823818
                                                      -0.5465772678
                       -0.5107722810
                                       0.3263458397
                                                                     -0.0602546854
                                                                                     5.658773e-
  [42,]
        -0.7388494377
                       -0.0587506994
                                        0.2787045616
                                                       0.0926434197
                                                                                   -1.196858e-
                                                                      0.0901210156
  Ī43,ļ
                                       0.3022550599
        -1.9884712967
                       -0.3763602810
                                                       0.1729522027
                                                                      0.2552767122
                                                                                    -3.327794e-
  44,]
                                      -0.7113741266
        -0.3462124514 -0.6086221030
                                                       0.7779144715
                                                                    -0.3180020334
                                                                                     4.068577e-
  [45,]
         1.5058488466
                        0.0966839023
                                      -0.4001732785
                                                       0.0586933619
                                                                                    -3.945470e-
                                                                     -0.1521141805
  ړ, 4<u>6</u>
                                        2.2309102556
         0.0542470485
                       -0.2605203348
                                                       0.7861699813
                                                                     -1.1179707031
                                                                                     4.072934e-
  47,
        -0.3676769926
                        0.0803763634
                                        1.3065788470
                                                     -0.3439303856
                                                                      0.5396748825
                                                                                     1.926447e-
  [48,
         0.0379981462
                        0.0139823408
                                        0.2379323987
                                                      -0.1482978143
                                                                      0.0345722067
                                                                                    -2.626249e-
  ſ49,
                        0.4128727770
         1.5880220441
                                      -1.2321509722 -0.6278155609
                                                                      0.3533099316
                                                                                     1.678164e-
  [50,]
        -0.4960323101
                       -0.6439180110
                                       0.3515209761
                                                     -0.5484838822
                                                                      0.2054958400
                                                                                     1.408071e-
                                      -0.1123759892
  [51,]
         1.1704670085
                                                     -0.2977384011
                                                                      0.1285674151 -6.899389e-
                        0.8200564211
  _52,<u></u>
                                                                                     2.356005e-
        -0.3941110717
                        -0.1764307635
                                        0.5591763859
                                                       0.0448168714
                                                                      0.0596852002
  رِ, 53,
         0.8857772453
                        0.2519075061
                                        0.0130817786
                                                     -0.4850733698
                                                                      0.0278447233
                                                                                     1.985134e-
  [54, ]
        -0.6111756017
                       -0.7690695559
                                       0.6284517406
                                                       0.6011938058
                                                                      0.6113545988
                                                                                     3.056229e-
  55,
        -0.5984018598
                        1.3970676765
                                      -0.0643320469
                                                       0.9721652618
                                                                     -0.1949743264 -3.069309e-
  '56,<sub>-</sub>
                                                       0.7410413537
         1.7422401316
                        0.1408058227
                                      -0.0199461188
                                                                     -0.5297862525
                                                                                     1.093202e+
   57,
                                                                                     6.892529e-
        -0.0108146406
                       -0.3106679951
                                      -0.8493487541
                                                       0.3863867848
                                                                    -0.1458192162
   58,
        -1.8215348214
                        0.3621471351
                                        0.4006851921
                                                      -0.2172714122
                                                                      0.0608335537
                                                                                     2.928318e-
                                                                                     2.931242e-
  آ59. ٔ
         0.3335120551
                        0.4740138563
                                      -0.8411057977
                                                       0.4163000283
                                                                     -0.0858083206
  [60,]
         0.2284006406
                       -0.6348604010
                                      -0.7475512841
                                                      -0.2920548376
                                                                      0.2496513450
                                                                                     4.888034e-
  [61,<u>]</u>
         0.7408606053
                        0.5122781140
                                       0.5793496320 -0.0105572994
                                                                     -0.0042066309
                                                                                     5.488545e-
   [62,<u>]</u>
                                        1.2979592812
                                                      -0.9935329529
                                                                                     1.734229e-
        -2.4733087118
                        0.5540510535
                                                                      1.2766076994
  <sup>[</sup>63,]
        -0.4001018830
                        0.0656254162
                                        2.1963468297
                                                       0.5895255433
                                                                      1.4470277217
                                                                                    -1.086096e+
  64,]
                        1.6436332545
                                      -0.5355851584 -1.3269684512
                                                                     -1.2755865234
                                                                                   -5.269145e-
        -1.7992385929
   Ğ5,]
                        0.5395449026
                                                       0.0325762440 -1.0121301749
        -0.1566109309
                                        1.4430413025
                                                                                     2.073019e-
  66, ]
                                                                                     2.468134e-
        -0.5389467786
                       -2.0662901268
                                        0.1446763110
                                                     -0.3168046990
                                                                      0.3722514197
   67,
         0.6267828319
                       -0.5362398552
                                       -0.3750836045
                                                     -0.0545365082
                                                                     -0.4224485744
                                                                                     2.452230e-
                       -1.6969908177
                                        0.3987065997
                                                                      0.1509487886 -4.247686e-
         0.3270971145
                                                     -0.0530068030
   [68,]
  [69,]
         0.3792991801
                        0.4293974391
                                        0.0802128266 -0.3229283966
                                                                     -0.0234897322
                                                                                    -3.881229e-
  [70,]
                                        0.3958031962 -0.5136583440 -0.0367616655
         1.5255487349 -1.1502222404
                                                                                     1.303524e-
                        0.4469007175 -0.3625035208 -1.6091056814
  [71,]
         0.4884620531
                                                                      0.0695982865 -7.853735e-
 [ reached getOption("max.print") -- omitted 1399 rows ]
  typ_pca
   Attrition
                                                              PC4
                                                                           PC5
                                                                                        PC6
                      PC1
                                   PC2
                                                 PC3
         Yes -0.24304408 -1.80529668 -0.310416955 -0.38499428
                                                                   2.01695752
                                                                                0.98479398
1
                                                                                             1.
                                                       1.60864580 -1.59274363
          No
               0.85428816
                           0.38107360 -0.525239000
                                                                               -0.48186570
                                                                                            -1.
```

-2.19827539 -1.41330161 -0.058228274 -2.59680103

0.60224220 -0.02323064

-0.

```
No -0.57084555
                            0.68229402
                                          0.953078159 -0.11251722
                                                                      0.01442095 -0.41523512
           No -1.56768577
                            -0.96543855
                                          1.642771773
                                                        0.53704707
                                                                     -0.07031572
                                                                                   0.94056012
                                                                                                0.
6
7
8
9
           No -0.03322826
                            1.47619283
                                          0.176875853
                                                       -0.87115869
                                                                      0.92823065
                                                                                   0.36784922
                                                                                                0
                                                                     -0.87932711
              -1.17698198
                            -2.34414244
                                         -0.522923398 -1.66633877
                                                                                  -0.41776784
                                                                                               -0
           No
              -2.66856328
                            0.31002254
                                         -2.612816671 -0.33096395
                                                                    -1.24864608
                                                                                  -0.05225085
                                                                                                0.
           No
                             1.21300586
           No
               0.91089452
                                         -1.503920142
                                                        1.14494729
                                                                     -1.12388294
                                                                                   1.04988144
                                                                                                -1
10
               1.33977884
                            -0.20858466
                                         -1.907632825
                                                       -0.28167233
                                                                      1.08663288
                                                                                  -1.25267427
                                                                                                 1
           No
11
              -1.22720250
                            0.96199989
                                          0.061354574
                                                        0.03449953
                                                                      0.47094619
                                                                                  -2.04342787
                                                                                               -0
           No
                                                        1.24790614
                                                                      0.51890449
12
              -0.07311655
                             1.76018611
                                          0.534491683
                                                                                   0.44225686
                                                                                               -0
           No
                                                                     -0.74755495
13
              -1.08747452
                             1.02337786
                                         -1.514707184
                                                        1.57377541
                                                                                   1.51146472
           No
                                                                                                0
                                                                      1.65223319
14
              -1.81407332
                            0.60187439
                                         -1.301413672
                                                       -1.10197768
                                                                                  -0.33450687
                                                                                                0
           No
15
          Yes
              -1.65941021
                            0.29270279
                                         -0.067255684
                                                        1.52721116
                                                                      0.03694164
                                                                                  -0.17618383
                                                                                                -1
16
                                                                      0.66090998
               1.74425193
                             1.68666332
                                         -1.117736489
                                                       -0.38169316
                                                                                   1.22365852
                                                                                                1
           No
17
                                          1.418967281
              -1.11854697
                             1.13205890
                                                        0.27368190
                                                                      0.76874306
                                                                                  -1.46071761
                                                                                               -0
           No
18
19
              -2.87544628
4.30639852
                                                                     1.52194039
-0.32057364
           No
                            0.68497792
                                         -1.210177353
                                                       -1.06948275
                                                                                  -0.10506595
                                                                                                0
                            -1.06018812
                                          0.210216648
                                                       -0.37447413
                                                                                  -1.00684260
                                                                                                0
           No
20
              -1.27479329
                           -0.51825255
                                          1.760733715
                                                       -0.26360544
                                                                      0.47750259
                                                                                   1.29621509
                                                                                               -0
           No
21
22
                            1.41607440
                                                                                  -1.69498220
              -1.70767441
                                         -0.286661225
                                                       -0.91144329
                                                                      0.07406195
                                                                                               -1
           No
              -0.97393546
                           -1.01341353
                                         -1.112021200
                                                       -1.85038818
                                                                     -1.36402054
                                                                                  -0.66689024
          Yes
                                                                                               -1
23
               1.68699402
                             1.31230353
                                          1.509624566
                                                        1.22445549
                                                                      0.24290590
                                                                                  -0.65221537
                                                                                                0.
           No
24
              -3.18696020
                             1.12749600
                                          0.402885220
                                                        0.66108471
                                                                      0.64276775
                                                                                  -2.78219000
                                                                                               -0
           No
25
                            0.07099889
              -1.23642035
                                          0.299856671
                                                        0.24833646
                                                                      1.50889567
                                                                                                0
          Yes
                                                                                   0.03032801
26
               4.33521019
                            -1.18785504
                                          0.843906495
                                                       -1.13551800
                                                                      0.15027121
                                                                                   0.08998043
                                                                                                0
           No
                                                                    -1.51944447
0.37255048
-0.36033955
27
28
                            1.48770734
0.51796012
                                         -1.049606601
                                                       -1.51049997
          Yes
               0.20266745
                                                                                  -1.17285672
                                                                                                -1
                                          0.749648443
                                                        1.18950923
                                                                                   0.46774927
               0.52261166
                                                                                                 1.
           No
29
               4.16749778
                                                       -0.65593650
                             1.06863278
                                          1.191770760
           No
                                                                                   0.68064674
                                                                                               -1.
30
                            -2.59494435
                                          0.733732945
                                                        0.72583015
                                                                      0.98819396
               0.85566865
                                                                                  -0.38961005
                                                                                                0
           No
                                          0.921883088
                                                                                   0.18540641
31
                            -0.59810916
                                                       -1.26139753
                                                                      1.12856992
              -2.10145329
           No
                                                                                               -0
32
              -0.62868678
                            -0.50657734
                                          1.055748027
                                                       -0.35936386
                                                                     -1.27677223
                                                                                  -1.25901998
           No
                                                                                                1.
33
           No
              -0.58576032
                             1.29059488
                                          1.017527879
                                                        0.75997074
                                                                      0.84347962
                                                                                  -1.53720260
34
              -1.45300079
                                          1.655345137
                                                                     -0.76526203
                                                                                  -1.05042789
                            -0.87834675
                                                       -1.46697925
                                                                                               -1
          Yes
35
                            0.49739124
                                          0.396140718
                                                                      0.04956876
              -2.29542604
                                                       -1.17366768
                                                                                   1.39666095
                                                                                               -0
          Yes
36
37
              -0.83299406
                            0.04299001
                                          0.700614400 -0.30849522
                                                                      0.34173329
           No
                                                                                  -0.72227464
                                                                                                1
              -1.35469334
                            0.38217265
                                                       -1.42388178
                                                                      1.03149159
                                                                                   0.51749502
                                         -0.011333012
                                                                                               -0
          Yes
                            0.52000240
38
              -1.78845938
                                          0.318618945
                                                       -1.16848391
                                                                      1.30103272
                                                                                  -0.49908050
                                                                                               -0
           No
                           -1.94711972
39
           No -1.94088819
                                          0.301406527
                                                       -0.61630258
                                                                      0.65807129
                                                                                  -0.11211248
                                                                                               -0
40
                            0.26931799
                                          0.468377019 -1.61706575
                                                                     -1.54246195
                                                                                   1.07860250
              -0.82682704
                                                                                               -0
           No
41
              -2.54024234
                            0.23133567
                                          0.924925063
                                                                      1.03578990
                                                                                   0.02318244
                                                       -0.01921329
                                                                                               -0
           No
42
           No
              -2.77506460
                            0.69987165
                                          2.268824442
                                                       -0.25581802
                                                                     -1.59584984
                                                                                  -1.35122346
                                                                                                1
43
              -2.66097737
                            0.70903981
                                         -1.115132362
                                                       -0.17331186
                                                                      0.17003055
                                                                                   0.58048454
          Yes
44
                                                                    -0.08932020
                                                                                                0
               0.49424199
                            1.35566363
                                         -0.455831491 -0.77357691
                                                                                   2.88993639
           No
               0.75546535
45
                             1.60757263
                                         -0.510963713 -0.50688809
                                                                    -1.42330758
                                                                                   1.05714745
                                                                                               -0
           No
                                                        0.05144471
46
               5.80495189
                             1.07809120
                                         -0.697528115
                                                                      0.43378489
                                                                                   1.61410670
                                                                                                2
          Yes
               0.80665807
47
                             1.65344282
                                         -2.306810616
                                                       -0.29588285
                                                                    -0.47229184
                                                                                   0.13416905
                                                                                               -0
           No
                                         -1.996031614
                                                        0.63359936
                                                                    -0.17298881
48
           No
              -1.99588188
                            -0.92689641
                                                                                   1.02115120
                                                                                               -1
49
               0.84424593
                            -0.61684992
                                         -0.819420696
                                                       -0.92181023
                                                                     -0.77170683
                                                                                  -1.81853606
                                                                                               -0
           No
50
              -2.41833066
                            0.29732619
                                         -0.351346000
                                                       -1.10175198
                                                                     -1.51565786
                                                                                   1.49905334
                                                                                                0
           No
51
52
          Yes
              -0.61700209
                            -3.63498920
                                          0.356209637
                                                        0.11821639
                                                                      1.43898946
                                                                                  -0.22022944
                                                                                               -0
                                                                                   0.32994672
              -1.87489801
                            0.83088181
                                          0.624801554
                                                       -1.14213498
          Yes
                                                                    -0.36001997
                                                                                                 1
53
                                                                                   0.77427209
              -0.59596447
                           -1.21846665
                                         -0.840883957
                                                       -2.44721561
                                                                    -0.93994468
                                                                                               -0
           No
                                                                      0.67410051
                                                                                  -0.30541283
0.25343209
54
              -0.69765361
                           -0.44031140
                                         -0.100160979
                                                       -1.00294120
                                                                                                0
           No
                                        -1.816117794
55
              -2.07981023
                           -0.95518514
                                                        0.44181323
                                                                    -1.39608225
           No
                                                                                                1
56
57
               3.70846662
                             1.81410918
                                         -0.009754192
                                                       -0.03690945
                                                                      2.10902261
                                                                                   0.55299870
                                                                                                0
           No
                            1.10389750
0.05800518
                                                                                  -0.31892358 \\ 0.27508684
                                         -1.710841409
                                                       -0.29132705
               0.80984897
                                                                    -1.11372268
                                                                                                -0.
           No
                                        -0.579943143
                                                        0.62472164
58
                                                                    -1.16769581
              -1.46568195
                                                                                                1.
           No
59
               0.17211888
                            0.85739090
                                         -0.322226695
                                                       -0.28615065
                                                                    -1.69741044
                                                                                   0.72281848
                                                                                               -1
           No
                                                       -1.66832839
60
           No
              -0.13448869
                            0.77482451
                                          0.074204744
                                                                    -0.83202177
                                                                                   1.45822091
                                                                                               -0.
                             1.92230649
                                                        0.20845667
                                                                                   1.17273783
61
               1.15446622
                                          0.534035454
                                                                    -2.04492813
                                                                                               -1.
           No
62
                                                                                                0.
               1.01554960
                            1.68567934
                                         -1.083680307
                                                        0.52226408
                                                                      0.94253470
                                                                                   0.96067700
           No
                                          0.811975803
63
               5.23082596
                           -1.15165566
                                                        0.36448543
                                                                    -0.04053148
                                                                                   0.82655261
                                                                                                1
           No
               5.03028290
                                         -1.767897505
                                                                      1.64789092
64
                           -0.75521827
                                                       -2.04456229
                                                                                  -0.73722100
                                                                                                0.
           No
65
               3.78898454
                            1.94629804 -0.094556027 -1.06701099
                                                                      0.31846795
                                                                                   0.86043923
           No
                                                                                                1.
66
           No
               0.66074288
                           -2.42744422
                                          0.746473163
                                                        1.05190758
                                                                    -0.86667720
                                                                                   0.70033996
                                                                                                0.
            PC9
                         PC10
                                                                   PC13
                                                                                 PC14
```

```
1.18634718 -0.872121600 -0.09640534
                                           0.165268977
                                                         0.269799504
                                                                      0.56169756
   -0.29152070 -0.913315376
                             -1.27049561
                                          -0.122384858
                                                         0.300378690
                                                                      0.39264772
    0.70371779
                0.233428604
                             -0.20631100
                                           0.075718010
                                                        -0.203419065
                                                                     -0.03027029
   -0.02321429
                0.448374867
                                          -1.190542577
                             -0.42559708
                                                        -0.588878508
                                                                      0.03760515
    2.31328541 -0.009282989
                              0.79113838
                                           0.093214760 -0.100182192
                                                                     -0.01465031
                -0.087206926
                                                                     -0.34016769
   -0.22195549
                             -0.43525479
                                          -0.231114246
                                                         0.207482785
                0.285042689
                             -1.99552141
                                           0.047699878
                                                                      0.15272680
   -0.44391529
                                                        -0.076085636
   -0.48750809
                0.480051806
                              0.05439541
                                           0.102073671
                                                        -0.046594152
                                                                      0.32533830
   -0.84675831
               -0.779117537
                              0.11737087
                                          -0.020764703
                                                         0.717896928
                                                                      0.20342651
                0.549625844
    1.81688328
                              0.08936470
                                           0.171974312
                                                         0.148287350
                                                                     -0.75927968
10
   -0.34871212
               -0.357829761
                             -0.50295608
                                          -0.242240736
                                                        -0.039146384
                                                                     -0.02624589
   -0.37676200
               -1.105840599
                              0.09653944
                                           0.439989975
                                                        -0.025945549
                                                                     -0.29403497
13
                             -0.21904995
   -0.03635385
                0.830830461
                                           0.301720660 -0.051386781
                                                                      0.06517152
                                          -0.011062744
                                                         0.258710503
                                                                      0.07880223
14
   -0.73104553
                0.381273918
                             -0.49493176
                                           0.177249788
15
    1.23434951 -0.519825125
                              0.42502036
                                                       -0.280562634
                                                                     -0.04452694
    0.16722837
                0.919050517
                              0.60523221
                                                         0.788622438
                                          -0.139641983
                                                                     -0.08889241
17
   -0.43599228
               -0.490823551
                             -0.17128405
                                           0.496486395 -0.061978852
                                                                     -0.08960470
   -0.45159450
                0.470722128
                                           0.048046474 -0.132374244
18
                              0.68700116
                                                                      0.07059914
   -1.32011485 -0.555372557
                                           0.010651355 -1.330532123
19
                             -0.02021455
                                                                      0.54193113
    0.62993636 -0.009824715
                             -0.28805976
                                          -0.073902751
                                                        0.117532074
                                                                      0.21483103
20
21
   -0.31123058
                0.180151786
                              0.66916402
                                           0.191206360 -0.061527117
                                                                     -0.18474214
22
    1.36486226 -0.479242658
                              0.21308121
                                           0.091187847 -0.360512122
                                                                      0.06632427
23
   -0.68755245 -0.933516282
                                           0.809489181
                                                        0.700502805
                              0.60276921
                                                                      0.11071287
                              0.63501927
                                           0.017991118
24
    0.28224305
                0.255561128
                                                       -0.138962804
                                                                     -0.11188786
   -0.16125506
                                           0.202662305
               -0.018613009
                             -0.30410246
                                                        -0.119061534
                                                                     -0.15837894
   -0.53759404 -0.558314053
                                          -1.095179299
26
                              0.33470664
                                                         0.832036960
                                                                      0.02989736
                                                        -0.255483067
27
    0.35700750
                0.929061993
                             -0.01894614
                                           1.156060012
                                                                     -0.06819902
                                                                      0.25967553
28
   -0.73549816
                0.550313853
                             -0.73801338
                                          -0.949664355
                                                         0.008389053
    0.31555369
                -1.111014058
                             -0.15493203
                                           2.100865303
                                                        -0.174397307
                                                                      0.02246194
   -1.69151268
                0.715535978
                              1.02745673
                                          -0.225784532
                                                         0.744422810
                                                                     -0.26383596
                                                        -0.251412918
                             -0.04954383
    0.24148874
                0.146411247
                                          -0.169016766
                                                                     -0.16472346
31
   -0.36665317
                0.056223702
                             -0.66113550
                                           0.229829547
                                                         0.299182395
                                                                      0.24667601
                                                                     -0.12374748
                                           1.560037182
33
    0.08957573
               -0.599250920
                             -0.03320543
                                                        -0.538191327
   -0.20658330
                0.182063391
                             -0.44823051
                                           0.107745416
                                                        -0.854282470
                                                                     -1.14616941
                                                                     -0.31419900
   -0.12992606
                0.865795206
                              0.46879722
                                           0.120243478
                                                        -0.494948660
   -0.38955274
               -0.157401226
                             -1.24294139
                                           0.195405992
                                                         0.191216222
                                                                      0.23944677
                                                         0.430429526
   -0.90674488
                0.047955151
                             -1.68663161 -0.144133006
                                                                      0.61334413
                             -0.60673089 -0.027938651
                                                         0.282474819
38
   -0.20031208
                0.527157309
                                                                      0.12472443
    1.76462462
                                                        -0.148209341
                                                                      0.29073071
               -0.112957330
                              0.25079195
                                          -0.131428978
40
   -0.35801902
                                           0.035309353
                                                        -0.138995276
                0.055686576
                              0.13960453
                                                                     -0.15147123
41
  -0.51077228
                0.326345840
                             -0.54657727
                                          -0.060254685
                                                         0.056587730
                                                                      0.29700932
                                                       -0.119685794
42
   -0.05875070
                0.278704562
                              0.09264342
                                           0.090121016
                                                                      0.13898868
                              0.17295220
                                           0.255276712
                                                        -0.003327794
43
   -0.37636028
                0.302255060
                                                                      0.13586788
44
   -0.60862210
                -0.711374127
                              0.77791447
                                          -0.318002033
                                                         0.406857687
                                                                      0.01109437
45
    0.09668390
               -0.400173278
                              0.05869336
                                          -0.152114181
                                                        -0.394547025
                                                                     -0.25084901
46
                                          -1.117970703
                                                                      0.32005748
   -0.26052033
                2.230910256
                              0.78616998
                                                         0.407293367
                                                                     -0.23562251
47
    0.08037636
                1.306578847
                             -0.34393039
                                           0.539674882
                                                         0.192644669
                0.237932399
                                                                     -0.03020186
48
    0.01398234
                             -0.14829781
                                           0.034572207
                                                        -0.262624929
49
    0.41287278
               -1.232150972
                             -0.62781556
                                           0.353309932
                                                         0.167816354
                                                                      0.06690825
                0.351520976
                                           0.205495840
   -0.64391801
                             -0.54848388
                                                         0.140807097
                                                                      0.35162772
               -0.112375989
                             -0.29773840
                                           0.128567415
                                                        -0.689938913
                                                                     -0.79242652
51
    0.82005642
                0.559176386
                                                         0.235600513
   -0.17643076
                              0.04481687
                                           0.059685200
                                                                      0.06709468
53
    0.25190751
                0.013081779
                             -0.48507337
                                           0.027844723
                                                         0.198513442
                                                                      0.29335630
54
   -0.76906956
                0.628451741
                              0.60119381
                                           0.611354599
                                                         0.305622885
                                                                      0.15411449
    1.39706768 -0.064332047
                                         -0.194974326
                                                        -0.306930947
                                                                      0.23036887
                              0.97216526
56
    0.14080582 -0.019946119
                              0.74104135
                                          -0.529786253
                                                         1.093201883
                                                                     -0.15809731
   -0.31066800 -0.849348754
                              0.38638678
                                          -0.145819216
                                                         0.689252882
                                                                      0.21050825
    0.36214714
                0.400685192
                             -0.21727141
                                           0.060833554
                                                         0.292831786
                                                                      0.21548050
59
    0.47401386 -0.841105798
                              0.41630003
                                          -0.085808321
                                                         0.293124207
                                                                     -0.22251524
                                                                      0.22308994
60
   -0.63486040 -0.747551284
                             -0.29205484
                                           0.249651345
                                                         0.488803355
                                          -0.004206631
                                                                     -0.23403874
                0.579349632
    0.51227811
                             -0.01055730
                                                         0.548854514
61
                1.297959281 -0.99353295
                                           1.276607699
                                                         0.173422905
62
    0.55405105
                                                                     -0.18562460
63
    0.06562542
                 2.196346830
                              0.58952554
                                           1.447027722
                                                        -1.086096447
                                                                      1.03490915
    1.64363325 -0.535585158 -1.32696845 -1.275586523 -0.526914507 -0.10402533
```

```
65 0.53954490
                 1.443041303 0.03257624 -1.012130175 0.207301917 -0.21108226
66 -2.06629013
                 0.144676311 -0.31680470 0.372251420 0.246813433 0.15949383
 [ reached 'max' / getOption("max.print") -- omitted 1404 rows ]
  str(typ_pca)
  ata.frame': 1470 obs. of 15 variables:
Attrition: Factor w/ 2 levels "No","Yes": 2 1 2 1 1 1 1 1 1 1 ...
PC1 : num -0.243 0.854 -2.198 -0.571 -1.568 ...
'data.frame':
                     -1.805 0.381 -1.413 0.682 -0.965
   PC2
               num
   PC3
               num
                     -0.3104 -0.5252 -0.0582 0.9531 1.6428
                     -0.385 1.609 -2.597 -0.113 0.537
   PC4
               num
                     2.017 -1.5927 0.6022 0.0144 -0.0703
   PC5
             : num
   PC6
                     0.9848 -0.4819 -0.0232 -0.4152 0.9406 ...
               num
 $
                     1.332 -1.043 -0.245 2.255 0.333
   PC7
               num
                     1.592 1.44 0.165 0.379 -0.211
   PC8
               num
                     1.1863 -0.2915 0.7037 -0.0232 2.3133 ...
-0.87212 -0.91332 0.23343 0.44837 -0.00928
-0.0964 -1.2705 -0.2063 -0.4256 0.7911 ...
   PC9
               num
   PC10
               num
   PC11
               num
                     0.1653 -0.1224 0.0757 -1.1905 0.0932 ...
0.27 0.3 -0.203 -0.589 -0.1 ...
   PC12
               num
   PC13
               num
                     0.5617 0.3926 -0.0303 0.0376 -0.0147 ...
 $ PC14
             : num
> #typ_pca
  typ_pca
   Attrition
                                                   PC3
                                                                PC4
                                                                              PC5
                                                                                           PC6
                       PC1
                                    PC2
                                                                      2.01695752
          Yes -0.24304408 -1.80529668 -0.310416955 -0.38499428
                                                                                   0.98479398
1
2
3
                                         -0.525239000
               0.85428816
                             0.38107360
                                                         1.60864580
                                                                     -1.59274363
                                                                                  -0.48186570
                                                                                                -1.
           No
                                                                      0.60224220
              -2.19827539
                                                                                  -0.02323064
          Yes
                            -1.41330161
                                         -0.058228274 -2.59680103
                                                                                                -0.
4
           No -0.57084555
                             0.68229402
                                          0.953078159 -0.11251722
                                                                      0.01442095
                                                                                  -0.41523512
                                                                                                 2.
                                                        0.53704707
                            -0.96543855
                                          1.642771773
                                                                     -0.07031572
                                                                                   0.94056012
              -1.56768577
                                                                                                 0.
           No
6
7
                                          0.176875853 -0.87115869
                                                                      0.92823065
                                                                                   0.36784922
             -0.03322826
                             1.47619283
                                                                                                 0.
           No
           No
              -1.17698198
                            -2.34414244
                                         -0.522923398 -1.66633877
                                                                     -0.87932711
                                                                                  -0.41776784
                                                                                                -0.
8
                                         -2.612816671 -0.33096395
                                                                                  -0.05225085
           No -2.66856328
                             0.31002254
                                                                     -1.24864608
                                                                                                 0.
9
               0.91089452
                             1.21300586 -1.503920142
                                                        1.14494729
                                                                     -1.12388294
           No
                                                                                   1.04988144
                                                                                                -1.
                                                                                  -1.25267427
10
               1.33977884
                            -0.20858466
                                        -1.907632825 -0.28167233
                                                                      1.08663288
                                                                                                 1
           NO
11
           No -1.22720250
                             0.96199989
                                          0.061354574
                                                         0.03449953
                                                                      0.47094619
                                                                                  -2.04342787
                                                                                                -0
           No -0.07311655
                             1.76018611
                                          0.534491683
                                                         1.24790614
                                                                      0.51890449
                                                                                   0.44225686
                                                                                                -0.
                                                                     -0.74755495
1.65223319
13
           No -1.08747452
                             1.02337786
                                         -1.514707184
                                                         1.57377541
                                                                                   1.51146472
                                                                                                 0
                                                                                  -0.33450687
           No -1.81407332
                             0.60187439
                                                       -1.10197768
14
                                         -1.301413672
                                                                                                 0.
                             0.29270279
                                         -0.067255684
                                                                      0.03694164
15
          Yes -1.65941021
                                                         1.52721116
                                                                                  -0.17618383
                                                                                                -1.
              1.74425193
                                                                      0.66090998
                                                                                   1.22365852
16
           No
                             1.68666332
                                         -1.117736489 -0.38169316
                                                                                                 1.
17
           No -1.11854697
                             1.13205890
                                          1.418967281
                                                        0.27368190
                                                                      0.76874306
                                                                                  -1.46071761
                                                                                                -0.
18
           No -2.87544628
                             0.68497792
                                         -1.210177353 -1.06948275
                                                                      1.52194039 -0.10506595
                                                                                                 0.
                            -1.06018812
                                          0.210216648 -0.37447413
                                                                     -0.32057364 -1.00684260
19
              4.30639852
                                                                                                 0
           NΩ
                            -0.51825255
                                                                                   1.29621509
20
           No -1.27479329
                                          1.760733715 -0.26360544
                                                                      0.47750259
                                                                                                -0.
21
           No -1.70767441
                             1.41607440
                                         -0.286661225
                                                       -0.91144329
                                                                      0.07406195
                                                                                  -1.69498220
                                                                                                -1.
22
              -0.97393546
          Yes
                            -1.01341353
                                         -1.112021200
                                                       -1.85038818
                                                                     -1.36402054
                                                                                  -0.66689024
                                                                                                -1.
23
                                          1.509624566
                                                         1.22445549
                                                                      0.24290590
                                                                                  -0.65221537
               1.68699402
                             1.31230353
                                                                                                 0.
           No
                                                                                  -2.78219000
24
                             1.12749600
                                          0.402885220
                                                                      0.64276775
              -3.18696020
                                                         0.66108471
           No
                                                                                                -0
25
          Yes
              -1.23642035
                             0.07099889
                                          0.299856671
                                                        0.24833646
                                                                      1.50889567
                                                                                   0.03032801
                                                                                                 0.
26
               4.33521019
                                                                      0.15027121
                            -1.18785504
                                          0.843906495 -1.13551800
                                                                                   0.08998043
                                                                                                 0.
           No
27
                                         -1.049606601 -1.51049997
                                                                     -1.51944447
          Yes
               0.20266745
                             1.48770734
                                                                                  -1.17285672
                                                                                                -1.
28
29
                             0.51796012
                                                        1.18950923
                                                                      0.37255048
                                                                                                 1.
               0.52261166
                                          0.749648443
                                                                                   0.46774927
           No
               4.16749778
                                          1.191770760 -0.65593650
                                                                     -0.36033955
           No
                             1.06863278
                                                                                   0.68064674
                                                                                                -1.
30
               0.85566865
                            -2.59494435
                                          0.733732945
                                                        0.72583015
                                                                      0.98819396
                                                                                  -0.38961005
                                                                                                 0.
           No
31
           No -2.10145329
                            -0.59810916
                                          0.921883088
                                                       -1.26139753
                                                                      1.12856992
                                                                                   0.18540641
                                                                                                -0.
                                                                                  -1.25901998
32
                           -0.50657734
                                          1.055748027 -0.35936386
                                                                     -1.27677223
           No -0.62868678
                                                                                                 1.
33
                             1.29059488
                                          1.017527879
                                                        0.75997074
                                                                      0.84347962
           No -0.58576032
                                                                                  -1.53720260
                                                                                                -1.
34
          Yes -1.45300079
                            -0.87834675
                                          1.655345137 -1.46697925
                                                                     -0.76526203
                                                                                  -1.05042789
                                                                                               -1.
                                          0.396140718 -1.17366768
35
                             0.49739124
                                                                      0.04956876
          Yes -2.29542604
                                                                                   1.39666095
                                                                                               -0.
36
           No -0.83299406
                             0.04299001
                                          0.700614400 -0.30849522
                                                                      0.34173329
                                                                                  -0.72227464
                                                                                                1.
37
          Yes -1.35469334
                            -0.38217265
                                         -0.011333012 -1.42388178
                                                                      1.03149159
                                                                                   0.51749502
                                                                                               -0
                             0.52000240
           No -1.78845938
                                                                      1.30103272
38
                                          0.318618945 -1.16848391
                                                                                  -0.49908050 -0.
39
           No -1.94088819
                                          0.301406527 -0.61630258
                                                                      0.65807129
                            -1.94711972
                                                                                  -0.11211248
                                                                                               -0.
40
           No -0.82682704
                             0.26931799
                                          0.468377019 -1.61706575
                                                                     -1.54246195
                                                                                   1.07860250
                                                                                               -0
41
           No -2.54024234
                             0.23133567
                                          0.924925063 -0.01921329
                                                                      1.03578990
                                                                                   0.02318244 - 0.
```

```
No -2.77506460
                           0.69987165
                                        2.268824442 -0.25581802 -1.59584984 -1.35122346
43
             -2.66097737
                           0.70903981 -1.115132362 -0.17331186
                                                                  0.17003055
                                                                               0.58048454
         Yes
44
          No
              0.49424199
                           1.35566363
                                      -0.455831491 -0.77357691 -0.08932020
                                                                               2.88993639
45
              0.75546535
                           1.60757263 -0.510963713 -0.50688809 -1.42330758
                                                                               1.05714745
          No
                                                                               1.61410670
46
         Yes
              5.80495189
                           1.07809120 -0.697528115
                                                     0.05144471
                                                                  0.43378489
47
          No
              0.80665807
                           1.65344282
                                       -2.306810616 -0.29588285
                                                                 -0.47229184
                                                                               0.13416905
48
             -1.99588188
                                       -1.996031614
                                                      0.63359936
                                                                 -0.17298881
          No
                          -0.92689641
                                                                               1.02115120
49
              0.84424593
                          -0.61684992
                                       -0.819420696 -0.92181023
                                                                 -0.77170683
                                                                              -1.81853606
          No
50
             -2.41833066
                           0.29732619
                                       -0.351346000 -1.10175198
                                                                 -1.51565786
                                                                               1.49905334
          No
                                                      0.11821639
51
         Yes
             -0.61700209
                          -3.63498920
                                        0.356209637
                                                                  1.43898946
                                                                              -0.22022944
52
             -1.87489801
                           0.83088181
                                        0.624801554
                                                    -1.14213498
                                                                 -0.36001997
                                                                               0.32994672
         Yes
                                                                 -0.93994468
53
             -0.59596447
                          -1.21846665
                                       -0.840883957
                                                    -2.44721561
                                                                               0.77427209
                                                                              -0.30541283
54
             -0.69765361
                          -0.44031140
                                      -0.100160979 -1.00294120
                                                                  0.67410051
          No
55
                          -0.95518514 -1.816117794
                                                      0.44181323
                                                                 -1.39608225
                                                                               0.25343209
          No
             -2.07981023
56
57
          No
              3.70846662
                           1.81410918
                                      -0.009754192 -0.03690945
                                                                  2.10902261
                                                                               0.55299870
                           1.10389750
                                       -1.710841409
                                                    -0.29132705
                                                                 -1.11372268
              0.80984897
                                                                              -0.31892358
          No
58
                                      -0.579943143
                                                      0.62472164
                                                                               0.27508684
                           0.05800518
                                                                 -1.16769581
          No
             -1.46568195
59
                           0.85739090 -0.322226695
                                                    -0.28615065
              0.17211888
                                                                 -1.69741044
                                                                               0.72281848
          No
             -0.13448869
                           0.77482451
                                        0.074204744 -1.66832839 -0.83202177
                                                                               1.45822091
60
          No
              1.15446622
                           1.92230649
                                        0.534035454
                                                      0.20845667
                                                                 -2.04492813
                                                                               1.17273783
61
          No
62
              1.01554960
                           1.68567934
                                      -1.083680307
                                                      0.52226408
                                                                  0.94253470
                                                                               0.96067700
          No
                          -1.15165566
              5.23082596
                                        0.811975803
                                                      0.36448543 -0.04053148
                                                                               0.82655261
63
          No
64
               5.03028290
                          -0.75521827
                                       -1.767897505 -2.04456229
                                                                  1.64789092
                                                                              -0.73722100
          No
              3.78898454
                           1.94629804 -0.094556027 -1.06701099
65
          No
                                                                  0.31846795
                                                                               0.86043923
66
              0.66074288 -2.42744422
                                        0.746473163
                                                      1.05190758
                                                                 -0.86667720
                                                                               0.70033996
          No
           PC9
                        PC10
                                     PC11
                                                                             PC14
                                                  PC12
                                                                PC13
                             -0.09640534
                                           0.165268977
                                                         0.269799504
    1.18634718
               -0.872121600
                                                                       0.56169756
2
                             -1.27049561
                                          -0.122384858
                                                         0.300378690
   -0.29152070
               -0.913315376
                                                                       0.39264772
    0.70371779
                 0.233428604
                             -0.20631100
                                           0.075718010
                                                        -0.203419065
                                                                      -0.03027029
   -0.02321429
                 0.448374867
                             -0.42559708
                                          -1.190542577
                                                        -0.588878508
                                                                       0.03760515
    2.31328541 -0.009282989
                              0.79113838
                                           0.093214760 -0.100182192
                                                                      -0.01465031
6
   -0.22195549 -0.087206926
                             -0.43525479
                                          -0.231114246
                                                         0.207482785
                                                                      -0.34016769
   -0.44391529
                 0.285042689
                             -1.99552141
                                           0.047699878 -0.076085636
                                                                       0.15272680
   -0.48750809
                 0.480051806
                              0.05439541
                                           0.102073671 -0.046594152
                                                                       0.32533830
   -0.84675831
               -0.779117537
                              0.11737087
                                          -0.020764703
                                                         0.717896928
                                                                       0.20342651
10
    1.81688328
                0.549625844
                              0.08936470
                                           0.171974312
                                                         0.148287350
                                                                      -0.75927968
               -0.357829761
11
   -0.34871212
                             -0.50295608
                                          -0.242240736 -0.039146384
                                                                      -0.02624589
                                           0.439989975 -0.025945549
12
   -0.37676200
               -1.105840599
                              0.09653944
                                                                      -0.29403497
   -0.03635385
13
                 0.830830461
                             -0.21904995
                                           0.301720660 -0.051386781
                                                                       0.06517152
   -0.73104553
                             -0.49493176
                                          -0.011062744
                                                         0.258710503
14
                 0.381273918
                                                                       0.07880223
15
    1.23434951 -0.519825125
                              0.42502036
                                           0.177249788 -0.280562634
                                                                     -0.04452694
                                          -0.139641983
                                                         0.788622438
16
    0.16722837
                0.919050517
                              0.60523221
                                                                     -0.08889241
                             -0.17128405
   -0.43599228
               -0.490823551
                                           0.496486395
                                                       -0.061978852
17
                                                                      -0.08960470
18
   -0.45159450
                0.470722128
                              0.68700116
                                           0.048046474
                                                        -0.132374244
                                                                       0.07059914
19
   -1.32011485
               -0.555372557
                             -0.02021455
                                           0.010651355
                                                        -1.330532123
                                                                       0.54193113
                                          -0.073902751
                                                         0.117532074
20
    0.62993636
               -0.009824715
                             -0.28805976
                                                                       0.21483103
21
   -0.31123058
                0.180151786
                              0.66916402
                                           0.191206360
                                                        -0.061527117
                                                                      -0.18474214
                                                        -0.360512122
22
    1.36486226 -0.479242658
                              0.21308121
                                           0.091187847
                                                                       0.06632427
   -0.68755245
23
               -0.933516282
                              0.60276921
                                           0.809489181
                                                         0.700502805
                                                                       0.11071287
    0.28224305
24
                0.255561128
                                           0.017991118
                              0.63501927
                                                        -0.138962804
                                                                      -0.11188786
   -0.16125506 -0.018613009
                             -0.30410246
                                           0.202662305
                                                        -0.119061534
                                                                     -0.15837894
   -0.53759404 -0.558314053
                                          -1.095179299
26
                              0.33470664
                                                         0.832036960
                                                                       0.02989736
                                           1.156060012
    0.35700750
                 0.929061993
                             -0.01894614
                                                        -0.255483067
                                                                      -0.06819902
   -0.73549816
                 0.550313853
                             -0.73801338
                                          -0.949664355
                                                         0.008389053
                                                                       0.25967553
                                                                       0.02246194
    0.31555369
29
               -1.111014058
                             -0.15493203
                                           2.100865303
                                                        -0.174397307
30
   -1.69151268
                0.715535978
                              1.02745673
                                          -0.225784532
                                                         0.744422810
                                                                      -0.26383596
                                          -0.169016766
31
    0.24148874
                 0.146411247
                             -0.04954383
                                                        -0.251412918
                                                                      -0.16472346
   -0.36665317
                 0.056223702
                             -0.66113550
                                           0.229829547
                                                         0.299182395
                                                                       0.24667601
    0.08957573
                             -0.03320543
                                           1.560037182
                                                        -0.538191327
               -0.599250920
33
                                                                      -0.12374748
                                                                     -1.14616941
34
   -0.20658330
                 0.182063391 -0.44823051
                                           0.107745416
                                                        -0.854282470
                                                                     -0.31419900
                                           0.120243478
   -0.12992606
                 0.865795206
                              0.46879722
                                                        -0.494948660
   -0.38955274
                                           0.195405992
36
                -0.157401226
                             -1.24294139
                                                         0.191216222
                                                                       0.23944677
   -0.90674488
                 0.047955151
                             -1.68663161
                                          -0.144133006
                                                         0.430429526
                                                                       0.61334413
38
  -0.20031208
                0.527157309 -0.60673089 -0.027938651
                                                         0.282474819
                                                                       0.12472443
```

1.

0.

2.

-0.

-0

-1 -0

0

-0

-0

1

0

1

0.

-0.

1.

-1.

-0.

-1.

0.

1

0.

1

0.

```
1.76462462 -0.112957330
                                0.25079195 -0.131428978 -0.148209341
                                                                           0.29073071
40 -0.35801902
                  0.055686576
                                0.13960453
                                              0.035309353 -0.138995276 -0.15147123
41 -0.51077228
                  0.326345840 -0.54657727 -0.060254685
                                                            0.056587730
                                                                           0.29700932
                  0.278704562
42 -0.05875070
                                0.09264342
                                              0.090121016 -0.119685794
                                                                           0.13898868
43 -0.37636028
                  0.302255060
                                0.17295220
                                              0.255276712 -0.003327794
                                                                           0.13586788
                                0.77791447
44 -0.60862210 -0.711374127
                                             -0.318002033
                                                            0.406857687
                                                                           0.01109437
                                             -0.152114181 -0.394547025
    0.09668390 -0.400173278
                                0.05869336
                                                                          -0.25084901
                                0.78616998 -1.117970703
46 -0.26052033
                  2.230910256
                                                            0.407293367
                                                                           0.32005748
47
    0.08037636
                  1.306578847
                               -0.34393039
                                              0.539674882
                                                             0.192644669 -0.23562251
48
    0.01398234
                  0.237932399
                               -0.14829781
                                              0.034572207
                                                            -0.262624929
                                                                          -0.03020186
49
    0.41287278 -1.232150972
                               -0.62781556
                                              0.353309932
                                                             0.167816354
                                                                           0.06690825
   -0.64391801
                 0.351520976
                               -0.54848388
                                              0.205495840
                                                            0.140807097
                                                                           0.35162772
51
   0.82005642 -0.112375989
                               -0.29773840
                                              0.128567415 -0.689938913 -0.79242652
   -0.17643076
                  0.559176386
                                0.04481687
                                              0.059685200
                                                             0.235600513
                                                                           0.06709468
53
    0.25190751
                  0.013081779
                               -0.48507337
                                              0.027844723
                                                             0.198513442
                                                                           0.29335630
54
   -0.76906956
                                              0.611354599
                                                             0.305622885
                                                                           0.15411449
                  0.628451741
                                0.60119381
                                                            -0.306930947
    1.39706768 -0.064332047
                                0.97216526 -0.194974326
                                                                           0.23036887
    0.14080582 -0.019946119
                                0.74104135 -0.529786253
                                                             1.093201883 -0.15809731
   -0.31066800 -0.849348754
                                0.38638678 -0.145819216
                                                             0.689252882
                                                                           0.21050825
    0.36214714
                 0.400685192 -0.21727141
                                              0.060833554
                                                             0.292831786
                                                                           0.21548050
59
    0.47401386 -0.841105798
                               0.41630003 -0.085808321
                                                             0.293124207 -0.22251524
60 -0.63486040 -0.747551284 -0.29205484
                                                             0.488803355
                                              0.249651345
                                                                           0.22308994
61
    0.51227811
                 0.579349632 -0.01055730 -0.004206631
                                                             0.548854514 -0.23403874
                  1.297959281 -0.99353295
2.196346830 0.58952554
62
    0.55405105
                                              1.276607699
                                                             0.173422905
                                                                          -0.18562460
    0.06562542
                                              1.447027722
                                                           -1.086096447
                                                                           1.03490915
    1.64363325 -0.535585158 -1.32696845 -1.275586523
                                                           -0.526914507 -0.10402533
64
    0.53954490
                  1.443041303
                                0.03257624 -1.012130175
                                                             0.207301917 -0.21108226
                  0.144676311 -0.31680470 0.372251420
66 -2.06629013
                                                            0.246813433
                                                                           0.15949383
 [ reached 'max' / getOption("max.print") -- omitted 1404 rows ]
> str(typ_pca)
'data.frame':
  ata.frame': 1470 obs. of 15 variables:
Attrition: Factor w/ 2 levels "No","Yes": 2 1 2 1 1 1 1 1 1 1 ...
PC1 : num -0.243 0.854 -2.198 -0.571 -1.568 ...
PC2 : num -1.805 0.381 -1.413 0.682 -0.965 ...
                     -0.3104 -0.5252 -0.0582 0.9531 1.6428 ...
   PC3
               num
                     -0.385 1.609 -2.597 -0.113 0.537 ...
2.017 -1.5927 0.6022 0.0144 -0.0703
   PC4
               num
   PC5
               num
                     0.9848 -0.4819 -0.0232 -0.4152 0.9406 ...
 $ PC6
             : num
                     1.332 -1.043 -0.245 2.255 0.333 ...
   PC7
             : num
                     1.592 1.44 0.165 0.379 -0.211
   PC8
             : num
                     1.1863 -0.2915 0.7037 -0.0232 2.3133 .
 $
   PC9
             : num
                     -0.87212 -0.91332 \ 0.23343 \ 0.44837 -0.00928 \dots
   PC10
             : num
                     -0.0964 -1.2705 -0.2063 -0.4256 0.7911 ...
   PC11
             : num
                     0.1653 -0.1224 0.0757 -1.1905 0.0932 ...
   PC12
             : num
                     0.27 0.3 -0.203 -0.589 -0.1
   PC13
               num
                     0.5617 \ 0.3926 \ -0.0303 \ 0.0376 \ -0.0147 \ \dots
   PC14
               num
  #typ_pca
> #T-Test-- We see that true difference in all the means is different from zero.
> t.test(PC1~attr$Attrition,data=typ_pca)
        Welch Two Sample t-test
data: PC1 by attr$Attrition
t = 7.0668, df = 332.39, p-value = 9.363e-12
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 0.7147174 1.2660970
sample estimates:
 mean in group No mean in group Yes
         0.1596779
                            -0.8307293
> t.test(PC2~attr$Attrition,data=typ_pca)
```

Welch Two Sample t-test

```
data: PC2 by attr$Attrition
t = -0.85944, df = 359.22, p-value = 0.3907
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.23869831 0.09351411
sample estimates:
 mean in group No mean in group Yes
       -0.01170362
                             0.06088848
> t.test(PC3~attr$Attrition,data=typ_pca)
        Welch Two Sample t-test
data: PC3 by attr$Attrition
t = 1.9682, df = 330.99, p-value = 0.04988
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 0.0000754401 0.2902563607
sample estimates:
 mean in group No mean in group Yes
         0.0234043
                             -0.1217616
> t.test(PC4~attr$Attrition,data=typ_pca)
        Welch Two Sample t-test
data: PC4 by attr$Attrition
t = -2.9421, df = 316.05, p-value = 0.003501
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.37886461 -0.07520897
sample estimates:
 mean in group No mean in group Yes
       -0.03660389
                             0.19043290
> t.test(PC5~attr$Attrition,data=typ_pca)
         Welch Two Sample t-test
data: PC5 by attr$Attrition
t = -1.8185, df = 335.9, p-value = 0.06988 alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval: -0.26708955 0.01048367
sample estimates:
 mean in group No mean in group Yes
       -0.02068558
                             0.10761736
> t.test(PC6~attr$Attrition,data=typ_pca)
        Welch Two Sample t-test
data: PC6 by attr$Attrition
t = -2.045, df = 337.68, p-value = 0.04163
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval: -0.27902161 -0.00542244
sample estimates:
 mean in group No mean in group Yes
       -0.02292967
                             0.11929235
> t.test(PC7~attr$Attrition,data=typ_pca)
```

```
Welch Two Sample t-test
data: PC7 by attr$Attrition
t = 0.12903, df = 338.09, p-value = 0.8974
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval: -0.1252946 0.1428859
sample estimates:
 mean in group No mean in group Yes
0.001418073 -0.007377570
> t.test(PC8~attr$Attrition,data=typ_pca)
         Welch Two Sample t-test
data: PC8 by attr$Attrition
t = 1.2417, df = 333.18, p-value = 0.2152
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.04925478 0.21789000
sample estimates:
 mean in group No mean in group Yes
        0.01359406
                             -0.07072355
> t.test(PC9~attr$Attrition,data=typ_pca)
         Welch Two Sample t-test
data: PC9 by attr$Attrition
t = -4.0487, df = 341.99, p-value = 6.374e-05 alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.3508967 -0.1214329
sample estimates:
 mean in group No mean in group Yes
       -0.03807555
                              0.19808925
> t.test(PC10~attr$Attrition,data=typ_pca)
         Welch Two Sample t-test
data: PC10 by attr$Attrition t = -4.7135, df = 407.32, p-value = 3.348e-06
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval: -0.2874191 -0.1182375
sample estimates:
 mean in group No mean in group Yes
       -0.03270088
                              0.17012739
> t.test(PC11~attr$Attrition,data=typ_pca)
         Welch Two Sample t-test
data: PC11 by attr$Attrition
t = -1.716, df = 344.09, p-value = 0.08705
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.17290429 0.01177642
sample estimates:
 mean in group No mean in group Yes
       -0.01298888
                              0.06757505
> t.test(PC12~attr$Attrition,data=typ_pca)
```

```
Welch Two Sample t-test
data:
        PC12 by attr$Attrition
t_{=} -1.3139, df = 419.64, p-value = 0.1896
alternative hypothesis: true difference in means is not equal to 0 95 percent confidence interval:
 -0.10145603 0.02016025
sample estimates:
 mean in group No mean in group Yes
                             0.034094458
      -0.006553436
> t.test(PC13~attr$Attrition,data=typ_pca)
         Welch Two Sample t-test
data: PC13 by attrAttrition t = 2.8529, df = 328.06, p-value = 0.004608 alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 0.02802803 0.15253970
sample estimates:
 mean in group No mean in group Yes
        0.01455597
                             -0.07572789
> t.test(PC14~attr$Attrition,data=typ_pca)
         Welch Two Sample t-test
data: PC14 by attrAttrition t = -1.1951, df = 362.54, p-value = 0.2328 alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -0.07713631 0.01882051
sample estimates:
 mean in group No mean in group Yes
-0.004700967 0.024456932
 > #F-Test #Testing Variation
 > #Variance Test- Test for variance
 > var.test(PC1~attr$Attrition,data=typ_pca)
          F test to compare two variances
 data: PC1 by attr$Attrition
 F = 0.99326, num df = 1232, denom df = 236, p-value = 0.9282
 alternative hypothesis: true ratio of variances is not equal to 1
 95 percent confidence interval:
  0.8099491 1.2018726
 sample estimates:
 ratio of variances
            0.9932578
> var.test(PC2~attr$Attrition,data=typ_pca)
          F test to compare two variances
 data: PC2 by attr$Attrition
 F=1.2515, num df = 1232, denom df = 236, p-value = 0.03136 alternative hypothesis: true ratio of variances is not equal to 1
 95 percent confidence interval:
  1.020537 1.514360
```

```
sample estimates:
ratio of variances
            1.251506
> var.test(PC3~attr$Attrition,data=typ_pca)
         F test to compare two variances
data: PC3 by attr$Attrition
F = 0.97956, num df = 1232, denom df = 236, p-value = 0.8191
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval: 0.7987755 1.1852922
sample estimates:
ratio of variances
          0.9795553
> var.test(PC4~attr$Attrition,data=typ_pca)
         F test to compare two variances
        PC4 by attr$Attrition
data:
F = 0.8328, num df = 1232, denom df = 236, p-value = 0.06007 alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
0.6791035 1.0077126
sample estimates:
ratio of variances
            0.832799
> var.test(PC5~attr$Attrition,data=typ_pca)
         F test to compare two variances
data: PC5 by attr$Attrition
F = 1.0274, num df = 1232, denom df = 236, p-value = 0.8065
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
 0.8377538 1.2431317
sample estimates:
ratio of variances
            1.027355
> var.test(PC6~attr$Attrition,data=typ_pca)
         F test to compare two variances
data: PC6 by attr$Attrition
F = 1.0446, num df = 1232, denom df = 236, p-value = 0.6821
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval: 0.8518521 1.2640519
sample estimates:
ratio of variances
            1.044644
> var.test(PC7~attr$Attrition,data=typ_pca)
         F test to compare two variances
data: PC7 by attr$Attrition
F=1.0486, num df = 1232, denom df = 236, p-value = 0.6552 alternative hypothesis: true ratio of variances is not equal to 1
```

```
95 percent confidence interval: 0.8550597 1.2688116
sample estimates:
ratio of variances
            1.048578
> var.test(PC8~attr$Attrition,data=typ_pca)
         F test to compare two variances
data: PC8 by attr$Attrition
F = 1.0009, num df = 1232, denom df = 236, p-value = 0.9893 alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval: 0.8162071 1.2111588
sample estimates:
ratio of variances
            1.000932
> var.test(PC9~attr$Attrition,data=typ_pca)
         F test to compare two variances
data: PC9 by attr\$Attrition F = 1.0863, num df = 1232, denom df = 236, p-value = 0.4278
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval: 0.8858151 1.3144492
sample estimates:
ratio of variances
            1.086294
> var.test(PC10~attr$Attrition,data=typ_pca)
         F test to compare two variances
        PC10 by attr$Attrition
F = 1.702, num df = 1232, denom df = 236, p-value = 7.271e-07
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
 1.387916 2.059510
sample estimates:
ratio of variances
            1.702031
> var.test(PC11~attr$Attrition,data=typ_pca)
         F test to compare two variances
data: PC11 by attr$Attrition
F=1.1066, num df = 1232, denom df = 236, p-value = 0.3303 alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval: 0.9023918 1.3390472
sample estimates:
ratio of variances
            1.106622
> var.test(PC12~attr$Attrition,data=typ_pca)
         F test to compare two variances
data: PC12 by attr$Attrition
```

```
F = 1.8153, num df = 1232, denom df = 236, p-value = 3.477e-08
 alternative hypothesis: true ratio of variances is not equal to 1
 95 percent confidence interval:
  1.480290 2.196582
 sample estimates:
 ratio of variances
             1.815311
> var.test(PC13~attr$Attrition,data=typ_pca)
          F test to compare two variances
 data: PC13 by attr$Attrition
F = 0.95092, num df = 1232, denom df = 236, p-value = 0.5988 alternative hypothesis: true ratio of variances is not equal to 1 95 percent confidence interval: 0.7754288 1.1506484
 sample estimates:
 ratio of variances
            0.9509248
> var.test(PC14~attr$Attrition,data=typ_pca)
          F test to compare two variances
 data: PC14 by attr$Attrition
 F = 1.2831, num df = 1232, denom df = 236, p-value = 0.01698 alternative hypothesis: true ratio of variances is not equal to 1
 95 percent confidence interval:
  1.046275 1.552554
 sample estimates:
 ratio of variances
              1.28307
> #Plotting the scores of Pricipal Component 1 and Principal component 2
> plot(typ_pca$PC1, typ_pca$PC2,xlab="PC1:", ylab="PC2")
> abline(h=0)
> abline(v=0)
                                       00
                                                   0
```

> #Plotting the Variance of Principal Components

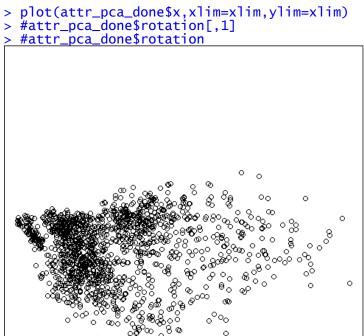
。。

۰.

°°

0

```
> plot(eigenvalues ,xlab= "Component number", ylab = "Component variance", type = "l", ma
> #Plotting the Log variance of COmponents
> plot(log(eigenvalues), xlab = "Component number",ylab = "log(Component variance)", type="1",main = "Log(eigenvalue) diagram")
Log(eigenvalue) diagram")
> #Variance of the principal components
> #View(attr_pca_done)
> diag(cov(attr_pca_done$x))
                                PC3
                                             PC4
                                                          PC5
                                                                      PC6
                                                                                   PC7
                      PC10
                                   PC11
4.0167738 1.6502052 1.0685042 1.0521201 1.0094108 0.9924579 0.9533497 0.91749
69 0.7224654 0.5306975 0.4698454
      PC12
                   PC13
                               PC14
0.2832233 0.1933840 0.1400658
> #x_pca$x[,1]
> #x_pca$x
> #Plotting the scores
> xlim <- range(attr_pca_done$x[,1])</pre>
```



> #Variance plot for each component. We can see that all components play a do minant role.

```
plot(attr_pca_done)
```

> #get the original value of the data based on PCA
> center <- attr_pca_done\$center
> scale <- attr_pca_done\$scale
> new_attrition <- as.matrix(attr[,-2])</pre>

> new_attrition

nomilomo	Age	BusinessTravel	DailyRate	Department	Di	stanceF
romHome		"Travel_Rarely"	"1102"	"Sales"	"	1"
[2,]	"49"	<pre>"Travel_Frequently" "Travel_Rarely"</pre>	" 279"	"Research & Development"	"	8"
[3,]	"37"	"Travel_Rarely"	"1373"	"Research & Development"	"	2"
_		"Travel_Frequently"	"1392"	"Research & Development"	"	3"

```
[5,] "27" "Travel_Rarely"
                                            "Research & Development" " 2"
                                 " 591"
"2" [6,] "32" "Travel_Frequently" "1005"
                                            "Research & Development" " 2"
[7,] "59" "Travel_Rarely"
                                            "Research & Development" " 3"
                                  "1324"
"1" [8,] "30" "Travel_Rarely"
                                            "Research & Development" "24"
                                  "1358"
"3"<sup>[9,]</sup> "38" "Travel_Frequently"
                                 " 216"
                                            "Research & Development" "23"
[10,] "36" "Travel_Rarely"
                                  "1299"
                                            "Research & Development" "27"
[11,] "35" "Travel_Rarely"
                                            "Research & Development" "16"
                                  " 809"
[12,] "29" "Travel_Rarely"
                                  " 153"
                                            "Research & Development" "15"
[13,] "31" "Travel_Rarely"
                                            "Research & Development" "26"
                                  " 670"
[14,] "34" "Travel_Rarely"
                                            "Research & Development" "19"
                                  "1346"
[15,] "28" "Travel_Rarely"
                                  " 103"
                                            "Research & Development" "24"
[16,] "29" "Travel_Rarely"
                                  "1389"
                                            "Research & Development" "21"
[17,] "32" "Travel_Rarely"
                                  " 334"
                                            "Research & Development" " 5"
[18,] "22" "Non-Travel"
                                  "1123"
                                            "Research & Development" "16"
[19,] "53" "Travel_Rarely"
                                  "1219"
                                            "Sales"
[20,] "38" "Travel_Rarely"
                                  " 371"
                                            "Research & Development" " 2"
[21,] "24" "Non-Travel"
                                  " 673"
                                            "Research & Development" "11"
[22,] "36" "Travel_Rarely"
                                 "1218"
                                            "sales"
[23,] "34" "Travel_Rarely"
                                  " 419"
                                            "Research & Development" " 7"
[24,] "21" "Travel_Rarely"
                                  " 391"
                                            "Research & Development" "15"
[25,] "34" "Travel_Rarely"
                                            "Research & Development" " 6"
                                  " 699"
[26,] "53" "Travel_Rarely"
                                  "1282"
                                            "Research & Development" " 5"
[27,] "32" "Travel_Frequently"
                                 "1125"
                                            "Research & Development" "16"
[28,] "42" "Travel_Rarely"
                                  " 691"
                                            "Sales"
[29,] "44" "Travel_Rarely"
                                  " 477"
                                            "Research & Development" " 7"
[30,] "46" "Travel_Rarely"
                                  " 705"
                                            "sales"
[31,] "33" "Travel_Rarely"
                                  " 924"
                                            "Research & Development" " 2"
[32,] "44" "Travel_Rarely"
                                 "1459"
                                            "Research & Development" "10"
[33,] "30" "Travel_Rarely"
                                            "Research & Development" " 9"
                                  " 125"
                           EnvironmentSatisfaction Gender
                                                             HourlyRate JobInv
        EducationField
olvement JobLevel [1,] "Life Sciences"
                           "2"
                                                    "Female" " 94"
"2" [2,] "Life Sciences"
                           "3"
                                                    "Male"
                                                             " 61"
```

[3,]	"Other"	"4"		"маlе"	"	92"	"2"
[4,]	"Life Sciences"	"4"		"Female"	"	56"	"3"
[5,]	"Medical"	"1"		"маlе"	"	40"	"3"
[6,]	"Life Sciences"	"4"		"маlе"	"	79"	"3"
1 [7,]	"Medical"	"3"		"Female"	"	81"	"4"
[8,]	"Life Sciences"	"4"		"маlе"	"	67"	"3"
[9,]	"Life Sciences"	"4"		"маlе"	"	44"	"2"
[10,]	"Medical"	"3"		"Male"	"	94"	"3"
[11,]	"Medical"	"1"		"маlе"	"	84"	"4"
[12,]	"Life Sciences"	"4"		"Female"	"	49"	"2"
	"Life Sciences"	"1"		"Male"	"	31"	"3"
	"Medical"	"2"		"Male"	"	93"	"3"
[15,]	"Life Sciences"	"3"		"Male"	"	50"	"2"
[16,]	"Life Sciences"	"2"		"Female"	"	51"	"4"
[17,]	"Life Sciences"	"1"		"Male"	"	80"	"4"
	"Medical"	"4"		"маlе"	"	96"	"4"
[19,]	"Life Sciences"	"1"		"Female"	"	78"	"2"
[20,]	"Life Sciences"	"4"		"Male"	"	45"	"3"
[21,]	"Other"	"1"		"Female"	"	96"	"4"
[22,]	"Life Sciences"	"3"		"маlе"	"	82"	"2"
[23,]	"Life Sciences"	"1"		"Female"	"	53"	"3"
[24,]	"Life Sciences"	"3"		"маlе"	"	96"	"3"
[25,]	"Medical"	"2"		"маlе"	"	83"	"3"
[26,]	"Other"	"3"		"Female"	"	58"	"3"
[27,]	"Life Sciences"	"2"		"Female"	"	72"	"1"
[28,]	"Marketing"	"3"		"маlе"	"	48"	"3"
[29,]	"Medical"	"1"		"Female"	"	42"	"2"
[30,]	"Marketing"	"2"		"Female"	"	83"	"3"
"5" [31,]	"Medical"	"3"		"маlе"	"	78"	"3"
[32,]	"Other"	"4"		"Male"	"	41"	"3"
[33,]	"Medical"	"4"		"Male"	"	83"	"2"
T	Johnola		JohSatisfaction	Marital (: + :	atus Montl	alvina

JobRole me MonthlyRate NumCompaniesWorked JobSatisfaction MaritalStatus MonthlyInco

[1,] "19479"	"Sales Executive"	"4"	"Single"	" 5993"
[2,] "24907"	"Research Scientist"	"2"	"Married"	" 5130"
[3,] " 2396"	"Laboratory Technician" "6"	"3"	"Single"	" 2090"
[4,] "23159"	"Research Scientist"	"3"	"Married"	" 2909"
[5,] "16632"	"Laboratory Technician"	"2"	"Married"	" 3468"
[6,]	"Laboratory Technician"	"4"	"Single"	" 3068"
"11864 [†] [7,]	"0" "Laboratory Technician"	"1"	"Married"	" 2670"
" 9964" [8,]	"4" "Laboratory Technician"	"3"	"Divorced"	" 2693"
"13335" [9,]	"1" "Manufacturing Director"	"3"	"Single"	" 9526"
" 8787" [10,]	"0" "Healthcare Representative"	"3"	"Married"	" 5237"
16577	"6" "Laboratory Technician"	"2"	"Married"	" 2426"
"16479" [12,]	"0" "Laboratory Technician"	"3"	"Single"	" 4193"
"12682" [13,]	"0" "Research Scientist"	"3"	"Divorced"	" 2911"
"15170" [14,]	"1" "Laboratory Technician"	"4"	"Divorced"	" 2661"
" 8758" [15,]	"0" "Laboratory Technician"	"3"	"Single"	" 2028"
"12947" [16,]	"5" "Manufacturing Director"	"1"	"Divorced"	" 9980"
"10195" [17,]	"1" "Research Scientist"	"2"	"Divorced"	" 3298"
"15053" [18,]	"0" "Laboratory Technician"	"4"	"Divorced"	" 2935"
" 7324" [19,]	"1" "Manager"	"4"	"Married"	"15427"
"22021" [20,]	"Ž" "Research Scientist"	"4"	"Single"	" 3944"
" 4306" [21,]	"5" "Manufacturing Director"	"3"	"Divorced"	" 4011"
" 8232 ["] [22,]	"0" "Sales Representative"	"1"	"Single"	" 3407"
" 6986" [23.]	"7" "Research Director"	"2"	"Single"	"11994"
"21293"	"O" "Research Scientist"	"4"	"Single"	" 1232"
[24,] "19281" [25,]	"1" "Research Scientist"	"1"	"Single"	" 2960"
"17102"	"2" "Manager"	"3"	"Divorced"	"19094"
[26,] "10735" [27,]	"A" "Research Scientist"	"1"	"Single"	" 3919"
" 4681" [28,]	"1" "Sales Executive"	"2"	"Married"	" 6825"
"21173"	"0" "Healthcare Representative"	_	"Married"	"10248"
[29,] " 2094" [30]	"3" "Manager"	"1"	"Single"	"18947"
[30,] "22822" [31,]	"3" "Laboratory Technician"	"4"	"Single"	" 2496"
" 6670" [32,]	"4" "Healthcare Representative"	•	"Married"	" 6465"
"19121"	"2"	-1	Mai i ieu	0403

[33,] "16117"	"Laborato	ory Technician"	"3"	'Single" " 2206"
StockOnt	OverTime		PerformanceRating	RelationshipSatisfaction
[1,]	ionLevel "Yes"	"11"	"3"	"1"
"1" [2,]	"No"	"23"	"4"	"4"
"0" [3,]	"Yes"	"15"	"3"	"2"
"0"[4,]	"Yes"	"11"	"3"	"3"
"1"	"No"	"12"	"3"	"4"
"0" [6,]	"No"	"13"	"3"	"3"
"3" ^[7,]	"Yes"	"20"	"4"	"1"
3 "1"	"No"	"22"	"4"	"2"
"0" [9,]	"No"	"21"	"4"	"2"
[10,]	"No"	"13"	"3"	"2"
[11,] "1"	"No"	"13"	"3"	"3"
[12,]	"Yes"	"12"	"3"	"4"
[13,] "1"	"No"	"17"	"3"	"4"
[14,] "1"	"No"	"11"	"3"	"3"
[15,]	"Yes"	"14"	"3"	"2"
[16,] "1"	"No"	"11"	"3"	"3"
[17,]	"Yes"	"12"	"3"	"4"
[18,]	"Yes"	"13"	"3"	"2"
[19,]	"No"	"16"	"3"	"3"
[20,]	"Yes"	"11"	"3"	"3"
[21,]	"No"	"18"	"3"	"4"
[22,]	"No"	"23"	"4"	"2"
[23,]	"No"	"11"	"3"	"3"
[24,]	"No"	"14"	"3"	"4"
[25,]	"No"	"11"	"3"	"3"
[26,]	"No"	"11"	"3"	"4"
[27,]	"Yes"	"22"	"4"	"2"
[28,]	"No"	"11"	"3"	"4"
[29,]	"No"	"14"	"3"	"4"
[30,]	"No"	"12"	"3"	"4"

[31,]	"No"	"11"	"3"	"4"
[32,]		"13"	"3"	"4"
[33,]		"13"	"3"	"1"
0		(inaVaans	TrainingTimesLastVear	Works ifor

"0"		-	_	
	TotalWorkingYears	TrainingTimesLastYear	WorkLifeBalance	YearsAtCompan
y Years [1,] " 4"	" 8"	"0"	"1"	" 6"
[2,]	"10"	"3"	"3"	"10"
[3,]	" 7"	"3"	"3"	" 0"
[4,] " 7"	" 8"	"3"	"3"	" 8"
[5,]	" 6"	"3"	"3"	" 2"
" 2" [6,] " 7"	" 8"	"2"	"2"	" 7"
[7,]	"12"	"3"	"2"	" 1"
" 0"	" 1"	"2"	"3"	" 1"
[9,] " 7"	"10"	"2"	"3"	" 9"
[10,] "7"	"17"	"3"	"2"	" 7"
[11,] " 4"	" 6"	"5"	"3"	" 5"
[12,] "5"	"10"	"3"	"3"	" 9"
[13,] " 2"	" 5"	"1"	"2"	" 5"
[14,] " 2"	" 3"	"2"	"3"	" 2"
[15,] " 2"	" 6"	"4"	"3"	" 4"
[16,] " 9"	"10"	"1"	"3"	"10"
[17,] " 2"	" 7"	"5"	"2"	" 6"
[18,] " 0"	" 1"	"2"	"2"	" 1"
[19,] " 8"	"31"	"3"	"3"	"25"
[20,]	" 6"	"3"	"3"	" 3"
[21,] " 2"	" 5"	"5"	"2"	" 4"
[22,] " 3"	"10"	"4"	"3"	" 5"
[23,] [6"	"13"	"4"	"3"	"12"
[24,] " 0"	" 0"	"6"	"3"	" 0"
" 0" [25,] " 2"	" 8"	"2"	"3"	" 4"
" 2" [26,] "13"	"26"	"3"	"2"	"14"
"13" [27,] " 2"	"10"	"5"	"3"	"10"
" 2" [28,] " 7"	"10"	"2"	"3"	" 9"
/"				

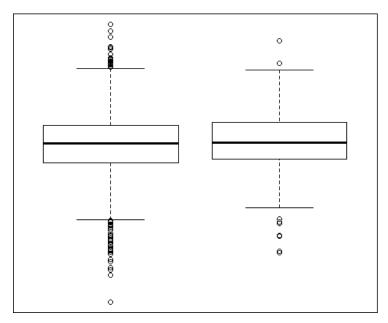
```
"4"
                                                            "3"
                                                                                "22"
                                                            "2"
                                                                                " 2"
                                "3"
                                                            "3"
                                                                                " 1"
  [32,] " 9"
2"
                                "5"
                                                            "4"
                                                                                " 4"
  [33,] "10"
                                                            "3"
                                                                                "10"
          YearsSinceLastPromotion YearsWithCurrManager
          " 0"
    [2,]
[3,]
[4,]
[5,]
          "
            0"
          "
                                        "
                                          0"
            3"
                                          0"
            ź"
                                          6"
            3"
            0"
                                        "
                                          0"
                                          0"
    [8,]
    [9,]
   ์ 10, ๅ
            0"
   ָוַ, 11
            0"
   [12,]
                                          8"
            4"
                                          3"
   [13,]
   14,]
15,]
16,]
            0"
                                          3"
            8"
                                        "
   [17,]
   .
[, 18
   19,]
   20,]
   21,
   22,]
23,]
24,]
            0"
                                          3"
            0"
                                          0"
                                          3"
   25,]
                                          8"
   26,]
            6"
   27,]
   28,]
   29,]
          "
   30,]
[31,]
          "
                                          1"
          "
            0"
                                          0"
                                          3"
  [32,]
[33,]
                                        " 8"
 [reached getOption("max.print") -- omitted 1437 rows ]
#drop(scale(new_attrition,center=center, scale=scale)%*%attr_pca_done$rotat
ion[,1])
> predict(attr_pca_done)[,2]
[1] -1.805296680  0.381073595 -1.413301606  0.682294015 -0.965438549  6192828 -2.344142438  0.310022541
                                                                                           1.47
[9] 1.213005861 -0.208584655 0.961999888 1.760186112 1.023377864 0.60 1874393 0.292702788 1.686663324 [17] 1.132058901 0.684977918 -1.060188116 -0.518252552 1.416074395 -1.01
          1.312303531 1.127496005
0.070998887 -1.187855044
                                                         0.517960123 1.068632778 -2.59
                                          1.487707345
4944348 -0.598109160 -0.506577343
[33] 1.290594877 -0.878346751 0002398 -1.947119717 0.269317986
                                          0.497391245
                                                          0.042990012 -0.382172652
                                                                                           0.52
  [41] 0.231335668 0.699871648
                                          0.709039810
                                                         1.355663630 1.607572626
                                                                                           1.07
8091201 1.653442819 -0.926896408
  0311397 -0.955185144
                          1.814109184
          1.103897503 0.058005177 0.857390902 0.774824505 1.922306493
5679343 -1.151655660 -0.755218265
```

```
1.946298043 -2.427444222
                                 0.194433528 -2.235551626 -0.244778958 -0.02
  Γ651
4496709 -3.049510452
                     1.199023366
  [73]
       0.353967605
                    1.166637222 -0.497612851 1.320776948 1.812350789 -2.25
8070681 -1.427059293 -2.441897724
  [81]
       0.807194469
                   0.584129288 -2.585230554 -0.141167810 0.218580349 -2.89
        0.296723552 -0.954905426
5430481
       2.241429270
                   0.576023363
                                 0.887965015 -0.042960092
  Г891
                                                          1.380522111 0.35
6013463
        1.079549026 -3.413896182
       0.914909460
  Г971
                    1.261721220 -0.434370191 -1.169248554 -0.568926672
                                                                       0.12
                     2.027920770
9102948
        1.011087824
 [105] -1.948838372 -4.702450356 -2.298624579 0.839192498
                                                          0.669627564
                                                                       0.89
5286352
        0.077625437
                     0.891821802
                    1.280947911 -1.497945925 -0.429277187
 [113] -1.597047470
                                                          1.224072878
                                                                       1.02
0308582 -0.957789430
                     0.880262420
 [121]
       1.353815226
                    1.191138861 -2.058379440 0.529500165
                                                          0.751679496
                                                                       1.33
5263326
        0.671199838
                     0.982963851
 [129]
       1.045174946
                    1.174952007 -1.368344149 -1.863951177
                                                          0.022177967 -0.26
        2.036444725 -1.141406936
4011818
                   0.575714072
 [137] -1.829267033
                                 0.355998339 1.719478916 -0.717497517 -0.91
1991127 -0.552194752
                     1.056369733
 Γ145<u>]</u>
       1.374272905 -0.221398169
                                 0.984904608 -1.015512767 -0.170499565 0.87
0864126
        1.323777612 0.842682999
 [153] -0.130298641 -0.105131907
                                 1.179951656 1.186521001 -1.542771737 -2.15
0763323 -0.281846005 -0.473514038
       1.442829624 -0.246305750
                                 1.013239689 -1.617706706 0.316334689 -1.90
 [161]
8112085
        0.459857669
                     1.028425912
 [169] -0.503335039 0.520151016
                                 1.016160016 1.138364241 0.275200700 2.43
5407419 -0.740295345 -1.959211019
       0.657391803
                   1.312314683
                                 1.475401478 0.313869373 -1.186616073
1497956
        0.176563050 -0.650092650
 [185] -0.653420939
                    1.530587781
                                 0.650794334 -1.496934318 1.121355381 -1.55
7550077 1.217522098
                     1.167325207
 [193] -0.706157496 -0.338535155 -1.601562460 1.171786028 -0.380339605 -0.23
2375365 -2.690539375
                    0.586173357
 [201] -0.379354454 -0.099598881
                                 0.685503217 -1.309110283 -2.277533882
5549600 1.141579640 0.855506760
 [209] -1.740164487 -2.419827577
                                 5292143 -0.091748705 -1.969695384
 [217] -0.328858475   0.920927227 -0.356579427 -1.158333264 -0.336179804 -0.57
        0.590940088
                    2.077646912
4363551
 [225] 0.996531429 -1.393185423
                                 0.946643526 1.313998196 0.820141343 0.71
6831172 -1.920647021 2.015699008
[233] -2.596950603 -2.868673366 -0.270110430 -0.456100687 -0.106858898 0135161 0.296073467 0.790979516
 [241] -1.594967526 0.704070565
                                -1.187363115 1.105805165 -0.759239466 -2.12
5592581
        0.442831846
                     0.326168549
 [249] -0.870100460 -1.372383853 -2.079610765
                                              1.289365861 1.134590189 -1.17
                     1.135983263
1984649 -0.012491244
       [257]
                                              1.292640892
                                                          0.236595751
                                                                       0.18
        0.096507056 -1.186671020
2429198
       0.134266014 -0.514082583
 [265]
                                 1.277490688
                                             1.069225272
                                                          0.547145926
                                                                       2.60
        0.008092276
1335417
                    0.769896066
 Γ2731
       0.993772287 -0.553756106
                                 0.977359671 -1.083806073 -0.753986277
1988007
        0.963924380 -2.091565779
 [281] -2.252752216
                    1.708700830
                                 1.594191407 -0.119955338
                                                          1.098683465
                                                                       1.68
3621266 -1.691363538 -2.036793449
 [289]
       0.525600519
                   0.892866704 -3.711227520 0.104349489
                                                          1.031413296
                                                                       1.52
0857872
        0.473115865 -0.791143696
       1.009848060
                   1.710231468 -0.707554545 -2.050277481 -0.120838847
 Г2971
                                                                       1.08
        1.213645850 0.852701192
7088224
       1.254855369 -0.130287571
                                 1.430153491 -0.960837004 -1.275995353
 [305]
                                                                       0.83
1525254 -0.489933412 1.149837686
 <sup>-</sup>3137
       1.161399149 -0.150550244
                                 5916530 0.687582276 2.247438397
```

```
[321]
        0.987656073  0.342069059  -0.510910929  -0.314411292  1.498546319  1.82
3274743
         0.425938296 -1.411326957
 Г3291
        0.631088025 -2.748517333
                                  0.151196917  0.923918009 -1.444700203 -2.72
3449105 -0.386767126 -0.469344410
                     1.116045123
 [337]
       1.800778713
                                  1.218205478 1.506695120 -1.423296616
                                                                        1.22
        1.554219085
0046981
                     1.418490592
       1.422286260
                    0.884577024 -1.104769407 -1.506959695 -1.837521719
 Γ345]
                                                                         0.66
1610739
        0.239309897
                      0.928176528
 [353] -2.227861990
                    0.188797707 -0.642782258 1.841730098 -1.502857977
                                                                         1.18
4556891 -0.858822239
                      0.616062127
 [361] -1.605018266
                    0.374095875
                                  1.511082210  0.383587594 -1.244265844 -1.11
9350322
        1.260148516 -2.451461096
        0.098990208
 [369]
                     1.342061333
                                  0.575022769 -1.028549141 -2.185260871
                                                                        0.60
1978395
        1.064107598 -3.420182356
 [377] -1.064441925 -0.315474220 -1.191197774 -2.906444217 0.873531932
                                                                         0.43
5598169
        1.390570963
                     1.052637686
       1.131817389 -1.122396375
                                  2.243123477 -1.108810210 -0.376939255 -1.09
 [385]
4049070 0.676465003 -2.072444087
                                  2.541414826 -1.408016991 -0.904561550
 [393] -2.952980072 -1.733601519
                                                                        1.01
3603065 1.190655067 0.783768941
 [401] -0.041346691 -3.428786411
                                  1.255444619 0.446196792 0.890068359 -0.06
1714372 -1.465377380 -0.580728506
 [409] -2.435734307 -0.601369210
                                  0.101486379 -0.900598516 -0.162110635 0.63
7918222
        1.058720506
                     0.812458954
 [417] -0.015721666
                    0.961063130
                                  0.934464599 0.059114215 0.249811227 -0.28
8511717
        0.985203863
                     1.962127218
 [425] -3.271781082
                    0.741342234
                                  1.982873795 0.357718898 -1.892575171 -3.16
        1.127853389 -2.991612702
2984341
       0.477860732 -1.276710916
                                  1.295048452 -0.900028552 -0.639744203
 Γ4331
1176922 -0.575224933 -1.066429549
 [441] -2.004491780 -0.945631187
                                  1.074115541 -0.042114063 0.431105701 -1.74
7435280 -0.629659088 -0.392221803
 [449] -0.489213167 0.703218734 -0.041305760 1.534024810 0.942095249
                                                                         1.30
5404827 -0.074743009 -1.288912304
 [457] -1.880987143
                     1.018577148 -1.743417373
                                               0.525502638 -0.282247149
                                                                         0.66
1390613 1.467297359
                     0.660096978
 [465] -0.730678144 -2.501114946 -0.240121414
                                               1.206961303 -0.122389417 -1.41
        1.578950914 -1.780168899
4121432
 [473] -0.613244511 -0.090095234
                                  1.379110753
                                               1.288840097 0.689298139 -0.42
2310162
        1.299011519
                     1.125474075
 [481]
       0.424664278
                    0.702773906
                                  0.008538431 -0.362734228  0.861434591  1.45
6977872 -1.473659609
                     0.592223933
        0.202230874 - 2.449653448 - 0.669277167 0.207261192 - 3.187812330 - 1.57
 Г4891
        1.193612042
0551426
                     0.846565869
 [497]
        0.997581144 -2.839341919
                                  1.469610530
                                               0.273807866 0.587776293
                                                                         0.34
                      2.048574287
3800441 -0.689478142
                                  1.304045278
 [505] -0.535791637
                    0.727709690
                                               0.648517571
                                                            1.812971264
                                                                         1.04
6879714 -0.836301038 -0.658787991
 [513]
       0.771001162
                     1.146318038
                                  1.928955363
                                               0.256594939
                                                            0.804239916
                                                                         1.15
7540139
        1.171926355
                      1.732972326
 [521] -1.354477478
                     0.929237421 -0.860887766
                                              0.798830043
                                                            1.185347467 -1.15
0257736 1.726978084
                      1.120745269
 [529] -1.339746556
                     1.138393610
                                  1.414437451 0.876373017 -0.162318832 0.27
1367405 -2.738029715
                     -0.091663186
 [537] -2.991236675
                     1.707548241
                                  0.178242634 -1.595790568 0.506659573 -1.50
6043181 -1.285683679
                     0.243620926
 [545] -1.318280939
                     0.168529203
                                  0.588126756 -1.213417381 -0.618505583 -0.25
2927477 1.272428101 -1.275156250
                    0.322549566 -0.536973345  0.687516163 -1.135138991 -0.91
 [553] -3.276158804
2647683 1.468767498 -1.589209789
                                  2.029806672 1.412630784 0.341711974 1.01
 [561] -0.346714086 0.188580145
9488772 -0.866931380
                     0.892785071
 [569] -3.323311627
                    0.711553285 -0.215143734 0.222354399 0.171714269 -0.24
2100920 0.126947395 -2.366260589
```

```
[577]
        0.733512097  0.842631663
                                  0.096019534  0.859774673  0.293462481 -0.17
8604462
         1.088444853 -0.974131320
        0.896449250
 Γ5851
                     0.765114617
                                  0.585712764 -2.206069723 -2.976740322 0.46
4113624
         1.262231295 -0.623600008
 [593] -0.046320896 0.913777612
                                  1.345206146 -1.392450621 -0.322637564 -1.81
4111742 -0.509469707 -0.359358548
[601] 1.834841532 -1.419360956 -1.254008747 -0.276287348 1.293970634 -0.12 7166641 0.619666687 0.798766978
 [609] -0.636043357 -2.804028599
                                  1.379612180 -0.308564996
                                                             1.700677241
                                                                         0.51
        1.501920474
                     0.887389313
8263924
 [617] -0.103149805 -1.933067331 -0.527136480 1.504208198
                                                             0.623900019
                                                                          1.96
0415008
        0.404418761 -1.085359284
 [625] -3.507392490 -1.817490014 -0.554828082 -2.238368802 -1.257404256
                                                                          0.73
1357136 -0.229697559 -0.516114842
 [633] -1.037509231 0.767057993
                                  1.017088487 2.035863533
                                                             1.466797865
                                                                          0.70
        0.692892542 -0.780112077
9647631
 [641]
        1.424217571
                     1.354487526
                                  0.538840289 -1.049729876
                                                             0.188099574 -0.45
8596590 -3.178695989
                     0.727446360
 [649] -0.869691363 -2.108792812 -1.025070774
                                               1.083894103
                                                             0.526972971 0.10
6547585 -1.579128575 0.065329357
 Γ657]
        0.362530777 -0.177879268
                                  0.598067693
                                               0.418378237 -2.902964529 -1.23
0015642
         1.243788376
                     0.859241204
        1.654441086 -0.292713246
                                  1.368412168 -0.659675458 -0.190981199 -1.23
 [665]
9029629
        [673] -1.080826985 -0.268560449 -2.160340763 0.800037634 0.966701327 -0.50
0732388 -1.696270774
                     0.499792694
        0.084230184
                     1.154382836 -0.731843360 0.679340328 -1.310150122
 Γ681T
                                                                          1.45
         2.066599285
6904777
                      0.848466379
 Γ6891
        1.273738663
                    0.892292380
                                  1.743700198 -1.989868837
                                                             1.036180508
                                                                          1.21
0608773
         0.533118397 -0.249391121
                     0.690692543
 [697]
        0.697966169
                                  0.213663152 -1.056586184 -1.909022558 -0.95
         0.503572421
4658182
                      0.132231545
 [705] -0.192053690 1.036734221 -2.563733572 0.719381064 -0.144036597 0.91
270536 0.252931707 -0.684606751
2270536
 [713]
        0.136546310 -0.737521649 -3.995057539 0.403012092
                                                             0.545256731 -0.88
         0.975659441 -0.295213590
1191625
                                  0.106698207 -1.299295889
 [721]
        0.094592538 -0.919723252
                                                             1.182820530
                                                                          0.46
6544476
        0.460641236
                     1.117911893
 [729] -2.379598710
                     1.276309417
                                  1.302119593 0.652201964
                                                             0.960109684
                                                                          1.31
2218520 1.292043938 -1.326227574
 [737] -1.479578319 -1.111836490
                                  1.106182705 1.091951949 0.635498360 -3.04
1335367 -1.496481562 -2.603776947
 [745] -1.677375775 -0.293546413
                                  1.074951565 -2.617511762 -0.581796000 0.11
9321105
        0.462492662
                     0.694623823
        3.049980309 0.577345739
 Γ753]
                                  0.610029980 -2.089980114 -0.161876417
                                                                          0.66
                      0.428826248
5944831 -2.040609880
 [761] -0.118533283 -1.631148320 -0.237885343 0.015757724 0.556103411 -0.25
4237024 -1.907949301 -0.169166448
                     1.104786805 -3.880338858 -1.806915487 -1.160531838
 [769]
        0.896046442
                                                                          1.48
8108118 -2.906441123 -2.002030974
        1.255015121
                     1.172039821 -0.903007564 -2.204968495
 [777]
                                                             1.314794885
                                                                          1.06
         0.264396426
                      0.913158107
5786785
 [785]
        1.262887991
                     0.094824595
                                  0.817248085 -2.336743504
                                                             1.208718320 -1.96
7371922
        -0.630803993
                      1.037714783
        1.750661157
                     1.060593112
                                  0.345906410 -0.669580728
 [793]
                                                             2.015411488
                                                                          0.47
6849284 -0.092840055
                      0.874742084
 [801]
        0.502614487 -1.494061418
                                  0.712997018 -0.615738226 -2.092470529
                                                                          1.20
2090305 -2.355768143
                     1.013557580
        0.278271263
                     1.442868021 -0.554104808 -1.967516548 -2.306238589 -0.49
 Г8091
        0.090958740
4975233
                     1.323404706
 [817] -1.694717488 0.443213958
                                  0.987312263  0.886539334  0.209260156 -1.76
4583449 -0.080849348
                      1.050100682
 [825] -1.294323856
                    0.871036310
                                  0.852224049 0.634126880 0.918854147 0.41
7536233 -0.624551328
                     1.020767232
```

```
[833] -1.088651944 0.978270876
                                    0.647594872  0.632415006  1.976245376  -1.04
         2.020071014 -0.879779154
 [841] -0.593110595 -0.337341915
                                    0.391539946
                                                1.326394378
                                                                0.845217248 - 1.31
         0.218156670
1688564
                       1.576609572
 [849]
        0.435458968 -1.794870287
                                    0.193258943 -3.299758216 1.544260981 1.28
7126204 -1.345361400
                       1.366509702
 [857]
        1.112169475
                     0.063993033 -1.547828834 1.029721549
                                                               1.185256107 -0.63
6884579 -0.498717142
                       0.846163046
 [865] -1.694006753 -0.930261463 -1.625781834 -2.565543396
                                                                1.143691500 -2.90
                       0.774776820
0696534 -0.188629805
 [873]
        0.769710196
                      1.366970161
                                    2.205826944 2.912812860
                                                                1.476151058 -0.53
1774967 -1.512547826
                       0.255021570
 [881]
        0.863329108
                      0.493868424
                                    0.566730435 2.571738400 -1.402021735 0.97
4544158
         1.879496181 -1.817146074
                      2.140026931 -3.186542503 1.011376168
 Г8891
        0.282595032
                                                                1.101740089 0.82
1801343 -2.154799129
                       0.281011823
 [897]
        1.284042243 -1.958870135 -1.667331648 -2.888220529
                                                                1.352165617 -1.72
9894773
         0.946347812
                      0.119271676
 [905] -3.589861627 0.205507718
                                    0.320568170 -1.157182430
                                                                1.218452381
                                                                             1.08
1773710
         0.936087694
                       1.052826050
 Г913Т
        1.265668267 - 0.253877062 - 0.117743653 1.278727250 - 1.175011090
3400158 -0.245288304 -2.167305191
        1.003050594 1.058588976
                                    0.948234680 0.721555833 0.796882461 -1.99
 [921]
6086917
         1.459244489
                      0.474921323
        0.213835796 0.913024261
 Г9291
                                    0.825876322 -0.261549249
                                                                1.311149791 0.57
         1.135871854
2968919
                       1.388433823
 [937] -2.460102481 -0.446967250 -0.746971777 0.348847161
                                                                0.320911276
                                                                             1.58
6772180
         0.377149133 -0.525933102
 Γ9451
        1.896676090 -2.824252329 -0.462978817 -1.677706981
                                                                0.297657326
                                                                             1.56
3448209
         1.761526611 1.245765405
        0.739778837 -0.962039268
 Г9531
                                    0.435410396 -0.382159830 -2.897456049 -1.98
0587913
         0.859705214
                      1.369469220
 [961]
        0.714977119  0.705616525  -0.250102356  0.223683709
                                                                1.776657658
                                                                             0.65
6231086 -2.135907972 -0.207573580
 [969]
        1.608540593
                      0.274435098 -1.191804496 -2.807291532 0.971948342
                                                                              0.44
3529382 -0.033995378 -1.567980309
 [977] -0.371907292 0.397392501
                                    0.364272767  0.728723037 -1.152437211
                                                                             0.43
7515868
         0.314790710
                      1.831260375
 Г985]
        0.725716171 1.153724997 -0.126986304 -1.142008579 -0.445127086 -0.89
8134615 -1.142960124
                      0.796077351
[993] -0.619061781 0.326989090 -1.759930469 0.652537049 1.165257302 4508000 1.195786083 0.416643969 [reached getOption("max.print") -- omitted 470 entries ]
> #The aboved two gives us the same thing, predict is a good function to know
> out <- sapply(10:14, function(i){plot(attr$Attrition,attr_pca_done$x[,i],xlab=paste("PC",i,sep=""),ylab="Attrition")})
> out
      [,1]
                   [,2]
                                [,3]
                                             [,4]
                                                          [,5]
                   Numeric, 10
                                Numeric, 10
                                                         Numeric, 10
stats Numeric,10
                                            Numeric, 10
                   Numeric,2
                                            Numeric,2
                                                         Numeric,2
      Numeric,2
                                Numeric,2
conf
      Numeric,4
                   Numeric,4
                                Numeric,4
                                            Numeric,4
                                                         Numeric,4
                               Numeric,233 Numeric,66
Numeric,233 Numeric,66
      Numeric,59
                   Numeric,31
out
                                                         Numeric,68
group Numeric,59
                   Numeric,31
                                                         Numeric,68
names Character, 2 Character, 2 Character, 2 Character, 2 Character, 2
```



> pairs(attr_pca_donex[,10:14], ylim = c(-6,4),xlim = c(-6,4),panel=function (x,y,...){text(x,y,attrattrition)}

