CSV Data Analysis in R - project00- dataset HR-attrition

```
setwd("/Users/sinapc/Desktop/Aidapt/project00/2-R project")
options(repos = c(CRAN = "https://cloud.r-project.org/"))

install.packages("tidyverse")
```

```
The downloaded binary packages are in
    /var/folders/hc/kctppyk503b3hrhnh27w5qmw0000gn/T//RtmpNwAYWa/downloaded_packages
```

```
install.packages("summarytools")
```

```
The downloaded binary packages are in
    /var/folders/hc/kctppyk503b3hrhnh27w5qmw0000gn/T//RtmpNwAYWa/downloaded_packages
```

```
install.packages("knitr")
```

```
The downloaded binary packages are in
    /var/folders/hc/kctppyk503b3hrhnh27w5qmw0000gn/T//RtmpNwAYWa/downloaded_packages
```

```
install.packages("corrplot")
```

```
The downloaded binary packages are in
    /var/folders/hc/kctppyk503b3hrhnh27w5qmw0000gn/T//RtmpNwAYWa/downloaded_packages
```

```r
library(tidyverse)
```

```
-- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
v dplyr     1.1.4     v readr     2.1.5
v forcats   1.0.0     v stringr   1.5.1
v ggplot2   3.5.2     v tibble    3.2.1
v lubridate 1.9.4     v tidyr     1.3.1
v purrr     1.0.4
-- Conflicts ------------------------------------------ tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to becor
```

```r
library(summarytools)
```

```
Attaching package: 'summarytools'

The following object is masked from 'package:tibble':

    view
```

```r
library(knitr)

data <- read_csv("original.csv")
```

```
Rows: 1470 Columns: 35
-- Column specification --------------------------------------------------------
Delimiter: ","
chr  (9): Attrition, BusinessTravel, Department, EducationField, Gender, Job...
dbl (26): Age, DailyRate, DistanceFromHome, Education, EmployeeCount, Employ...

i Use `spec()` to retrieve the full column specification for this data.
i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```r
#dim(data)
#head(data, 10)
glimpse(data)
```

```
Rows: 1,470
Columns: 35
$ Age                       <dbl> 41, 49, 37, 33, 27, 32, 59, 30, 38, 36, 35, 2~
$ Attrition                 <chr> "Yes", "No", "Yes", "No", "No", "No", "No", "~
$ BusinessTravel            <chr> "Travel_Rarely", "Travel_Frequently", "Travel~
$ DailyRate                 <dbl> 1102, 279, 1373, 1392, 591, 1005, 1324, 1358,~
$ Department                <chr> "Sales", "Research & Development", "Research ~
$ DistanceFromHome          <dbl> 1, 8, 2, 3, 2, 2, 3, 24, 23, 27, 16, 15, 26, ~
$ Education                 <dbl> 2, 1, 2, 4, 1, 2, 3, 1, 3, 3, 3, 2, 1, 2, 3, ~
$ EducationField            <chr> "Life Sciences", "Life Sciences", "Other", "L~
$ EmployeeCount             <dbl> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, ~
$ EmployeeNumber            <dbl> 1, 2, 4, 5, 7, 8, 10, 11, 12, 13, 14, 15, 16,~
$ EnvironmentSatisfaction   <dbl> 2, 3, 4, 4, 1, 4, 3, 4, 4, 3, 1, 4, 1, 2, 3, ~
$ Gender                    <chr> "Female", "Male", "Male", "Female", "Male", "~
$ HourlyRate                <dbl> 94, 61, 92, 56, 40, 79, 81, 67, 44, 94, 84, 4~
$ JobInvolvement            <dbl> 3, 2, 2, 3, 3, 3, 4, 3, 2, 3, 4, 2, 3, 3, 2, ~
$ JobLevel                  <dbl> 2, 2, 1, 1, 1, 1, 1, 1, 3, 2, 1, 2, 1, 1, 1, ~
$ JobRole                   <chr> "Sales Executive", "Research Scientist", "Lab~
$ JobSatisfaction           <dbl> 4, 2, 3, 3, 2, 4, 1, 3, 3, 3, 2, 3, 3, 4, 3, ~
$ MaritalStatus             <chr> "Single", "Married", "Single", "Married", "Ma~
$ MonthlyIncome             <dbl> 5993, 5130, 2090, 2909, 3468, 3068, 2670, 269~
$ MonthlyRate               <dbl> 19479, 24907, 2396, 23159, 16632, 11864, 9964~
$ NumCompaniesWorked        <dbl> 8, 1, 6, 1, 9, 0, 4, 1, 0, 6, 0, 0, 1, 0, 5, ~
$ Over18                    <chr> "Y", "Y", "Y", "Y", "Y", "Y", "Y", "Y", "Y", ~
$ OverTime                  <chr> "Yes", "No", "Yes", "Yes", "No", "No", "Yes",~
$ PercentSalaryHike         <dbl> 11, 23, 15, 11, 12, 13, 20, 22, 21, 13, 13, 1~
$ PerformanceRating         <dbl> 3, 4, 3, 3, 3, 3, 4, 4, 4, 3, 3, 3, 3, 3, 3, ~
$ RelationshipSatisfaction <dbl> 1, 4, 2, 3, 4, 3, 1, 2, 2, 2, 3, 4, 4, 3, 2, ~
$ StandardHours             <dbl> 80, 80, 80, 80, 80, 80, 80, 80, 80, 80, 80, 8~
$ StockOptionLevel          <dbl> 0, 1, 0, 0, 1, 0, 3, 1, 0, 2, 1, 0, 1, 1, 0, ~
$ TotalWorkingYears         <dbl> 8, 10, 7, 8, 6, 8, 12, 1, 10, 17, 6, 10, 5, 3~
$ TrainingTimesLastYear     <dbl> 0, 3, 3, 3, 3, 2, 3, 2, 2, 3, 5, 3, 1, 2, 4, ~
$ WorkLifeBalance           <dbl> 1, 3, 3, 3, 3, 2, 2, 3, 3, 2, 3, 3, 2, 3, 3, ~
$ YearsAtCompany            <dbl> 6, 10, 0, 8, 2, 7, 1, 1, 9, 7, 5, 9, 5, 2, 4,~
$ YearsInCurrentRole        <dbl> 4, 7, 0, 7, 2, 7, 0, 0, 7, 7, 4, 5, 2, 2, 2, ~
$ YearsSinceLastPromotion   <dbl> 0, 1, 0, 3, 2, 3, 0, 0, 1, 7, 0, 0, 4, 1, 0, ~
$ YearsWithCurrManager      <dbl> 5, 7, 0, 0, 2, 6, 0, 0, 8, 7, 3, 8, 3, 2, 3, ~
```

```
#str(data)
summary(data) #descriptive statistics
```

```
      Age          Attrition         BusinessTravel       DailyRate
```

```
Min.   :18.00   Length:1470        Length:1470        Min.   : 102.0
1st Qu.:30.00   Class :character   Class :character   1st Qu.: 465.0
Median :36.00   Mode  :character   Mode  :character   Median : 802.0
Mean   :36.92                                         Mean   : 802.5
3rd Qu.:43.00                                         3rd Qu.:1157.0
Max.   :60.00                                         Max.   :1499.0
 Department        DistanceFromHome   Education     EducationField
Length:1470        Min.   : 1.000   Min.   :1.000   Length:1470
Class :character   1st Qu.: 2.000   1st Qu.:2.000   Class :character
Mode  :character   Median : 7.000   Median :3.000   Mode  :character
                   Mean   : 9.193   Mean   :2.913
                   3rd Qu.:14.000   3rd Qu.:4.000
                   Max.   :29.000   Max.   :5.000
EmployeeCount EmployeeNumber   EnvironmentSatisfaction    Gender
Min.   :1     Min.   :   1.0   Min.   :1.000           Length:1470
1st Qu.:1     1st Qu.: 491.2   1st Qu.:2.000           Class :character
Median :1     Median :1020.5   Median :3.000           Mode  :character
Mean   :1     Mean   :1024.9   Mean   :2.722
3rd Qu.:1     3rd Qu.:1555.8   3rd Qu.:4.000
Max.   :1     Max.   :2068.0   Max.   :4.000
  HourlyRate     JobInvolvement    JobLevel       JobRole
Min.   : 30.00   Min.   :1.00   Min.   :1.000   Length:1470
1st Qu.: 48.00   1st Qu.:2.00   1st Qu.:1.000   Class :character
Median : 66.00   Median :3.00   Median :2.000   Mode  :character
Mean   : 65.89   Mean   :2.73   Mean   :2.064
3rd Qu.: 83.75   3rd Qu.:3.00   3rd Qu.:3.000
Max.   :100.00   Max.   :4.00   Max.   :5.000
JobSatisfaction MaritalStatus      MonthlyIncome    MonthlyRate
Min.   :1.000   Length:1470        Min.   : 1009   Min.   : 2094
1st Qu.:2.000   Class :character   1st Qu.: 2911   1st Qu.: 8047
Median :3.000   Mode  :character   Median : 4919   Median :14236
Mean   :2.729                      Mean   : 6503   Mean   :14313
3rd Qu.:4.000                      3rd Qu.: 8379   3rd Qu.:20462
Max.   :4.000                      Max.   :19999   Max.   :26999
NumCompaniesWorked    Over18            OverTime         PercentSalaryHike
Min.   :0.000      Length:1470        Length:1470        Min.   :11.00
1st Qu.:1.000      Class :character   Class :character   1st Qu.:12.00
Median :2.000      Mode  :character   Mode  :character   Median :14.00
Mean   :2.693                                           Mean   :15.21
3rd Qu.:4.000                                           3rd Qu.:18.00
Max.   :9.000                                           Max.   :25.00
PerformanceRating RelationshipSatisfaction StandardHours StockOptionLevel
Min.   :3.000     Min.   :1.000            Min.   :80    Min.   :0.0000
```

```
 1st Qu.:3.000     1st Qu.:2.000           1st Qu.:80    1st Qu.:0.0000
 Median :3.000     Median :3.000           Median :80    Median :1.0000
 Mean   :3.154     Mean   :2.712           Mean   :80    Mean   :0.7939
 3rd Qu.:3.000     3rd Qu.:4.000           3rd Qu.:80    3rd Qu.:1.0000
 Max.   :4.000     Max.   :4.000           Max.   :80    Max.   :3.0000
 TotalWorkingYears TrainingTimesLastYear WorkLifeBalance YearsAtCompany
 Min.   : 0.00     Min.   :0.000         Min.   :1.000   Min.   : 0.000
 1st Qu.: 6.00     1st Qu.:2.000         1st Qu.:2.000   1st Qu.: 3.000
 Median :10.00     Median :3.000         Median :3.000   Median : 5.000
 Mean   :11.28     Mean   :2.799         Mean   :2.761   Mean   : 7.008
 3rd Qu.:15.00     3rd Qu.:3.000         3rd Qu.:3.000   3rd Qu.: 9.000
 Max.   :40.00     Max.   :6.000         Max.   :4.000   Max.   :40.000
 YearsInCurrentRole YearsSinceLastPromotion YearsWithCurrManager
 Min.   : 0.000     Min.   : 0.000          Min.   : 0.000
 1st Qu.: 2.000     1st Qu.: 0.000          1st Qu.: 2.000
 Median : 3.000     Median : 1.000          Median : 3.000
 Mean   : 4.229     Mean   : 2.188          Mean   : 4.123
 3rd Qu.: 7.000     3rd Qu.: 3.000          3rd Qu.: 7.000
 Max.   :18.000     Max.   :15.000          Max.   :17.000
```

```
#names(data)
```

```
# categorical value check with Knitr:Kable frames

data %>% distinct(Attrition) %>% kable()
```

Attrition
Yes
No

```
data %>% distinct(BusinessTravel) %>% kable()
```

BusinessTravel
Travel_Rarely
Travel_Frequently
Non-Travel

```
data %>% distinct(Department) %>% kable()
```

Department
Sales
Research & Development
Human Resources

```
data %>% distinct(Education) %>% kable()
```

Education
2
1
4
3
5

```
data %>% distinct(EducationField) %>% kable()
```

EducationField
Life Sciences
Other
Medical
Marketing
Technical Degree
Human Resources

```
data %>% distinct(EmployeeCount) %>% kable()
```

EmployeeCount
1

```
data %>% distinct(Gender) %>% kable()
```

Gender
Female
Male

```
data %>% distinct(JobRole) %>% kable()
```

JobRole
Sales Executive
Research Scientist
Laboratory Technician
Manufacturing Director
Healthcare Representative
Manager
Sales Representative
Research Director
Human Resources

```
data %>% distinct(MaritalStatus) %>% kable()
```

MaritalStatus
Single
Married
Divorced

```
data %>% distinct(Over18) %>% kable()
```

Over18
Y

```
data %>% distinct(OverTime) %>% kable()
```

OverTime
Yes
No

```
data %>% distinct(PerformanceRating) %>% kable()
```

PerformanceRating
3
4

```
data %>% distinct(StandardHours) %>% kable()
```

StandardHours
80

```
#missing value check
colSums(is.na(data))
```

```
                    Age                 Attrition            BusinessTravel
                      0                         0                         0
              DailyRate                Department          DistanceFromHome
                      0                         0                         0
              Education             EducationField            EmployeeCount
                      0                         0                         0
         EmployeeNumber  EnvironmentSatisfaction                    Gender
                      0                         0                         0
             HourlyRate           JobInvolvement                  JobLevel
                      0                         0                         0
                JobRole          JobSatisfaction           MaritalStatus
                      0                         0                         0
          MonthlyIncome              MonthlyRate       NumCompaniesWorked
                      0                         0                         0
                Over18                 OverTime        PercentSalaryHike
                      0                         0                         0
       PerformanceRating RelationshipSatisfaction            StandardHours
                      0                         0                         0
       StockOptionLevel        TotalWorkingYears    TrainingTimesLastYear
                      0                         0                         0
        WorkLifeBalance           YearsAtCompany       YearsInCurrentRole
                      0                         0                         0
 YearsSinceLastPromotion     YearsWithCurrManager
                      0                         0
```

```r
#comprehensive overveiw of data from package
dfSummary(data)
```

```
Data Frame Summary
data
Dimensions: 1470 x 35
Duplicates: 0

-----------------------------------------------------------------------------------------------
No   Variable                  Stats / Values                Freqs (% of Valid)     Graph
---- ------------------------- ----------------------------- ---------------------- -------
1    Age                       Mean (sd) : 36.9 (9.1)        43 distinct values
     [numeric]                 min < med < max:                                         :
                               18 < 36 < 60                                             :
                               IQR (CV) : 13 (0.2)                                    . :
                                                                                    . : :

2    Attrition                 1. No                         1233 (83.9%)           IIIIII
     [character]               2. Yes                         237 (16.1%)           III

3    BusinessTravel            1. Non-Travel                  150 (10.2%)           II
     [character]               2. Travel_Frequently           277 (18.8%)           III
                               3. Travel_Rarely              1043 (71.0%)           IIIIII

4    DailyRate                 Mean (sd) : 802.5 (403.5)     886 distinct values    .
     [numeric]                 min < med < max:                                     : : :
                               102 < 802 < 1499                                     : : :
                               IQR (CV) : 692 (0.5)                                 : : :
                                                                                    : : :

5    Department                1. Human Resources             63 ( 4.3%)
     [character]               2. Research & Development     961 (65.4%)           IIIIII
                               3. Sales                      446 (30.3%)           IIIIII

6    DistanceFromHome          Mean (sd) : 9.2 (8.1)         29 distinct values     :
     [numeric]                 min < med < max:                                     :
                               1 < 7 < 29                                           :   .
                               IQR (CV) : 12 (0.9)                                  : : :
                                                                                    : : :

7    Education                 Mean (sd) : 2.9 (1)           1 : 170 (11.6%)        II
     [numeric]                 min < med < max:              2 : 282 (19.2%)        III
```

		1 < 3 < 5	3 : 572 (38.9%)	IIIIIII
		IQR (CV) : 2 (0.4)	4 : 398 (27.1%)	IIIII
			5 : 48 (3.3%)	
8	EducationField	1. Human Resources	27 (1.8%)	
	[character]	2. Life Sciences	606 (41.2%)	IIIIIII
		3. Marketing	159 (10.8%)	II
		4. Medical	464 (31.6%)	IIIIII
		5. Other	82 (5.6%)	I
		6. Technical Degree	132 (9.0%)	I
9	EmployeeCount	1 distinct value	1 : 1470 (100.0%)	IIIIIII
	[numeric]			
10	EmployeeNumber	Mean (sd) : 1024.9 (602)	1470 distinct values	: . :
	[numeric]	min < med < max:		: : :
		1 < 1020.5 < 2068		: : :
		IQR (CV) : 1064.5 (0.6)		: : :
				: : :
11	EnvironmentSatisfaction	Mean (sd) : 2.7 (1.1)	1 : 284 (19.3%)	III
	[numeric]	min < med < max:	2 : 287 (19.5%)	III
		1 < 3 < 4	3 : 453 (30.8%)	IIIIII
		IQR (CV) : 2 (0.4)	4 : 446 (30.3%)	IIIIII
12	Gender	1. Female	588 (40.0%)	IIIIIII
	[character]	2. Male	882 (60.0%)	IIIIIII
13	HourlyRate	Mean (sd) : 65.9 (20.3)	71 distinct values	. . .
	[numeric]	min < med < max:		: : :
		30 < 66 < 100		: : :
		IQR (CV) : 35.8 (0.3)		: : :
				: : :
14	JobInvolvement	Mean (sd) : 2.7 (0.7)	1 : 83 (5.6%)	I
	[numeric]	min < med < max:	2 : 375 (25.5%)	IIIII
		1 < 3 < 4	3 : 868 (59.0%)	IIIIIII
		IQR (CV) : 1 (0.3)	4 : 144 (9.8%)	I
15	JobLevel	Mean (sd) : 2.1 (1.1)	1 : 543 (36.9%)	IIIIIII
	[numeric]	min < med < max:	2 : 534 (36.3%)	IIIIIII
		1 < 2 < 5	3 : 218 (14.8%)	II
		IQR (CV) : 2 (0.5)	4 : 106 (7.2%)	I

			5 : 69 (4.7%)	
16	JobRole [character]	1. Healthcare Representative 2. Human Resources 3. Laboratory Technician 4. Manager 5. Manufacturing Director 6. Research Director 7. Research Scientist 8. Sales Executive 9. Sales Representative	131 (8.9%) 52 (3.5%) 259 (17.6%) 102 (6.9%) 145 (9.9%) 80 (5.4%) 292 (19.9%) 326 (22.2%) 83 (5.6%)	I III I I I III IIII I
17	JobSatisfaction [numeric]	Mean (sd) : 2.7 (1.1) min < med < max: 1 < 3 < 4 IQR (CV) : 2 (0.4)	1 : 289 (19.7%) 2 : 280 (19.0%) 3 : 442 (30.1%) 4 : 459 (31.2%)	III III IIIIII IIIIII
18	MaritalStatus [character]	1. Divorced 2. Married 3. Single	327 (22.2%) 673 (45.8%) 470 (32.0%)	IIII IIIIIII IIIIII
19	MonthlyIncome [numeric]	Mean (sd) : 6502.9 (4708) min < med < max: 1009 < 4919 < 19999 IQR (CV) : 5468 (0.7)	1349 distinct values	: : : : : : : : : : : : : :
20	MonthlyRate [numeric]	Mean (sd) : 14313.1 (7117.8) min < med < max: 2094 < 14235.5 < 26999 IQR (CV) : 12414.5 (0.5)	1427 distinct values	. : : : : : : : : : : : : : :
21	NumCompaniesWorked [numeric]	Mean (sd) : 2.7 (2.5) min < med < max: 0 < 2 < 9 IQR (CV) : 3 (0.9)	0 : 197 (13.4%) 1 : 521 (35.4%) 2 : 146 (9.9%) 3 : 159 (10.8%) 4 : 139 (9.5%) 5 : 63 (4.3%) 6 : 70 (4.8%) 7 : 74 (5.0%) 8 : 49 (3.3%) 9 : 52 (3.5%)	II IIIIIII I II I I

22	Over18 [character]	1. Y	1470 (100.0%)	IIIIIII
23	OverTime [character]	1. No 2. Yes	1054 (71.7%) 416 (28.3%)	IIIIIII IIIII
24	PercentSalaryHike [numeric]	Mean (sd) : 15.2 (3.7) min < med < max: 11 < 14 < 25 IQR (CV) : 6 (0.2)	15 distinct values	: : . : . : : : : : : :
25	PerformanceRating [numeric]	Min : 3 Mean : 3.2 Max : 4	3 : 1244 (84.6%) 4 : 226 (15.4%)	IIIIIII III
26	RelationshipSatisfaction [numeric]	Mean (sd) : 2.7 (1.1) min < med < max: 1 < 3 < 4 IQR (CV) : 2 (0.4)	1 : 276 (18.8%) 2 : 303 (20.6%) 3 : 459 (31.2%) 4 : 432 (29.4%)	III IIII IIIIII IIIII
27	StandardHours [numeric]	1 distinct value	80 : 1470 (100.0%)	IIIIIII
28	StockOptionLevel [numeric]	Mean (sd) : 0.8 (0.9) min < med < max: 0 < 1 < 3 IQR (CV) : 1 (1.1)	0 : 631 (42.9%) 1 : 596 (40.5%) 2 : 158 (10.7%) 3 : 85 (5.8%)	IIIIIII IIIIIII II I
29	TotalWorkingYears [numeric]	Mean (sd) : 11.3 (7.8) min < med < max: 0 < 10 < 40 IQR (CV) : 9 (0.7)	40 distinct values	: : . : : : . : : :
30	TrainingTimesLastYear [numeric]	Mean (sd) : 2.8 (1.3) min < med < max: 0 < 3 < 6 IQR (CV) : 1 (0.5)	0 : 54 (3.7%) 1 : 71 (4.8%) 2 : 547 (37.2%) 3 : 491 (33.4%) 4 : 123 (8.4%) 5 : 119 (8.1%) 6 : 65 (4.4%)	 IIIIIII IIIIIII I I

```
31   WorkLifeBalance          Mean (sd) : 2.8 (0.7)          1 :  80 ( 5.4%)       I
     [numeric]                min < med < max:               2 : 344 (23.4%)       IIII
                              1 < 3 < 4                      3 : 893 (60.7%)       IIIIIII
                              IQR (CV) : 1 (0.3)             4 : 153 (10.4%)       II

32   YearsAtCompany           Mean (sd) : 7 (6.1)            37 distinct values    :
     [numeric]                min < med < max:                                     :
                              0 < 5 < 40                                           : :
                              IQR (CV) : 6 (0.9)                                   : :
                                                                                   : : .

33   YearsInCurrentRole       Mean (sd) : 4.2 (3.6)          19 distinct values    :
     [numeric]                min < med < max:                                     :
                              0 < 3 < 18                                           :
                              IQR (CV) : 5 (0.9)                                   : :
                                                                                   : : .

34   YearsSinceLastPromotion  Mean (sd) : 2.2 (3.2)          16 distinct values    :
     [numeric]                min < med < max:                                     :
                              0 < 1 < 15                                           :
                              IQR (CV) : 3 (1.5)                                   :
                                                                                   : : .

35   YearsWithCurrManager     Mean (sd) : 4.1 (3.6)          18 distinct values    :
     [numeric]                min < med < max:                                     :
                              0 < 3 < 17                                           :
                              IQR (CV) : 5 (0.9)                                   : :
                                                                                   : : .
-------------------------------------------------------------------------------------------
```

```r
#mean(data$MonthlyIncome, na.rm = TRUE)

# Summary of all numeric columns
summary_table <- data %>%
  summarise(across(where(is.numeric),list(mean = mean,median = median, sd = sd), na.rm = TRU
```

```
Warning: There was 1 warning in `summarise()`.
i In argument: `across(...)`.
Caused by warning:
! The `...` argument of `across()` is deprecated as of dplyr 1.1.0.
Supply arguments directly to `.fns` through an anonymous function instead.
```

```
  # Previously
  across(a:b, mean, na.rm = TRUE)

  # Now
  across(a:b, \(x) mean(x, na.rm = TRUE))
```

```
# write a summary table in format_csv()
summary_table %>%
  summarise(across(where(is.numeric), list(mean = mean,median = median, sd = sd), na.rm = TRU
```

```
# A tibble: 1 x 234
  Age_mean_mean Age_mean_median Age_mean_sd Age_median_mean Age_median_median
          <dbl>           <dbl>       <dbl>           <dbl>              <dbl>
1          36.9            36.9          NA              36                 36
# i 229 more variables: Age_median_sd <dbl>, Age_sd_mean <dbl>,
#   Age_sd_median <dbl>, Age_sd_sd <dbl>, DailyRate_mean_mean <dbl>,
#   DailyRate_mean_median <dbl>, DailyRate_mean_sd <dbl>,
#   DailyRate_median_mean <dbl>, DailyRate_median_median <dbl>,
#   DailyRate_median_sd <dbl>, DailyRate_sd_mean <dbl>,
#   DailyRate_sd_median <dbl>, DailyRate_sd_sd <dbl>,
#   DistanceFromHome_mean_mean <dbl>, DistanceFromHome_mean_median <dbl>, ...
```

```
write_csv(summary_table, "summary_table.csv")
```

```
# Attrition rate by Job Role
data %>%
  group_by(JobRole, Attrition) %>%
  summarise(Count = n()) %>%
  mutate(Percent = round(Count / sum(Count) * 100, 1))
```

```
`summarise()` has grouped output by 'JobRole'. You can override using the
`.groups` argument.
```

```
# A tibble: 18 x 4
# Groups:   JobRole [9]
   JobRole                   Attrition Count Percent
   <chr>                     <chr>     <int>   <dbl>
 1 Healthcare Representative No          122    93.1
 2 Healthcare Representative Yes           9     6.9
```

```
 3 Human Resources           No           40    76.9
 4 Human Resources           Yes          12    23.1
 5 Laboratory Technician     No          197    76.1
 6 Laboratory Technician     Yes          62    23.9
 7 Manager                   No           97    95.1
 8 Manager                   Yes           5     4.9
 9 Manufacturing Director    No          135    93.1
10 Manufacturing Director    Yes          10     6.9
11 Research Director         No           78    97.5
12 Research Director         Yes           2     2.5
13 Research Scientist        No          245    83.9
14 Research Scientist        Yes          47    16.1
15 Sales Executive           No          269    82.5
16 Sales Executive           Yes          57    17.5
17 Sales Representative      No           50    60.2
18 Sales Representative      Yes          33    39.8
```

```r
# Select numeric variables
num_data <- data %>% select(where(is.numeric))

# Correlation matrix
cor_matrix <- cor(num_data)
```

```
Warning in cor(num_data): the standard deviation is zero
```

```r
round(cor_matrix, 2)
```

```
                          Age DailyRate DistanceFromHome Education
Age                      1.00      0.01             0.00      0.21
DailyRate                0.01      1.00             0.00     -0.02
DistanceFromHome         0.00      0.00             1.00      0.02
Education                0.21     -0.02             0.02      1.00
EmployeeCount              NA        NA               NA        NA
EmployeeNumber          -0.01     -0.05             0.03      0.04
EnvironmentSatisfaction  0.01      0.02            -0.02     -0.03
HourlyRate               0.02      0.02             0.03      0.02
JobInvolvement           0.03      0.05             0.01      0.04
JobLevel                 0.51      0.00             0.01      0.10
JobSatisfaction          0.00      0.03             0.00     -0.01
MonthlyIncome            0.50      0.01            -0.02      0.09
MonthlyRate              0.03     -0.03             0.03     -0.03
```

NumCompaniesWorked	0.30	0.04	-0.03	0.13
PercentSalaryHike	0.00	0.02	0.04	-0.01
PerformanceRating	0.00	0.00	0.03	-0.02
RelationshipSatisfaction	0.05	0.01	0.01	-0.01
StandardHours	NA	NA	NA	NA
StockOptionLevel	0.04	0.04	0.04	0.02
TotalWorkingYears	0.68	0.01	0.00	0.15
TrainingTimesLastYear	-0.02	0.00	-0.04	-0.03
WorkLifeBalance	-0.02	-0.04	-0.03	0.01
YearsAtCompany	0.31	-0.03	0.01	0.07
YearsInCurrentRole	0.21	0.01	0.02	0.06
YearsSinceLastPromotion	0.22	-0.03	0.01	0.05
YearsWithCurrManager	0.20	-0.03	0.01	0.07

	EmployeeCount	EmployeeNumber	EnvironmentSatisfaction
Age	NA	-0.01	0.01
DailyRate	NA	-0.05	0.02
DistanceFromHome	NA	0.03	-0.02
Education	NA	0.04	-0.03
EmployeeCount	1	NA	NA
EmployeeNumber	NA	1.00	0.02
EnvironmentSatisfaction	NA	0.02	1.00
HourlyRate	NA	0.04	-0.05
JobInvolvement	NA	-0.01	-0.01
JobLevel	NA	-0.02	0.00
JobSatisfaction	NA	-0.05	-0.01
MonthlyIncome	NA	-0.01	-0.01
MonthlyRate	NA	0.01	0.04
NumCompaniesWorked	NA	0.00	0.01
PercentSalaryHike	NA	-0.01	-0.03
PerformanceRating	NA	-0.02	-0.03
RelationshipSatisfaction	NA	-0.07	0.01
StandardHours	NA	NA	NA
StockOptionLevel	NA	0.06	0.00
TotalWorkingYears	NA	-0.01	0.00
TrainingTimesLastYear	NA	0.02	-0.02
WorkLifeBalance	NA	0.01	0.03
YearsAtCompany	NA	-0.01	0.00
YearsInCurrentRole	NA	-0.01	0.02
YearsSinceLastPromotion	NA	-0.01	0.02
YearsWithCurrManager	NA	-0.01	0.00

	HourlyRate	JobInvolvement	JobLevel	JobSatisfaction
Age	0.02	0.03	0.51	0.00
DailyRate	0.02	0.05	0.00	0.03

DistanceFromHome	0.03	0.01	0.01	0.00
Education	0.02	0.04	0.10	-0.01
EmployeeCount	NA	NA	NA	NA
EmployeeNumber	0.04	-0.01	-0.02	-0.05
EnvironmentSatisfaction	-0.05	-0.01	0.00	-0.01
HourlyRate	1.00	0.04	-0.03	-0.07
JobInvolvement	0.04	1.00	-0.01	-0.02
JobLevel	-0.03	-0.01	1.00	0.00
JobSatisfaction	-0.07	-0.02	0.00	1.00
MonthlyIncome	-0.02	-0.02	0.95	-0.01
MonthlyRate	-0.02	-0.02	0.04	0.00
NumCompaniesWorked	0.02	0.02	0.14	-0.06
PercentSalaryHike	-0.01	-0.02	-0.03	0.02
PerformanceRating	0.00	-0.03	-0.02	0.00
RelationshipSatisfaction	0.00	0.03	0.02	-0.01
StandardHours	NA	NA	NA	NA
StockOptionLevel	0.05	0.02	0.01	0.01
TotalWorkingYears	0.00	-0.01	0.78	-0.02
TrainingTimesLastYear	-0.01	-0.02	-0.02	-0.01
WorkLifeBalance	0.00	-0.01	0.04	-0.02
YearsAtCompany	-0.02	-0.02	0.53	0.00
YearsInCurrentRole	-0.02	0.01	0.39	0.00
YearsSinceLastPromotion	-0.03	-0.02	0.35	-0.02
YearsWithCurrManager	-0.02	0.03	0.38	-0.03

	MonthlyIncome	MonthlyRate	NumCompaniesWorked	
Age	0.50	0.03	0.30	
DailyRate	0.01	-0.03	0.04	
DistanceFromHome	-0.02	0.03	-0.03	
Education	0.09	-0.03	0.13	
EmployeeCount	NA	NA	NA	
EmployeeNumber	-0.01	0.01	0.00	
EnvironmentSatisfaction	-0.01	0.04	0.01	
HourlyRate	-0.02	-0.02	0.02	
JobInvolvement	-0.02	-0.02	0.02	
JobLevel	0.95	0.04	0.14	
JobSatisfaction	-0.01	0.00	-0.06	
MonthlyIncome	1.00	0.03	0.15	
MonthlyRate	0.03	1.00	0.02	
NumCompaniesWorked	0.15	0.02	1.00	
PercentSalaryHike	-0.03	-0.01	-0.01	
PerformanceRating	-0.02	-0.01	-0.01	
RelationshipSatisfaction	0.03	0.00	0.05	
StandardHours	NA	NA	NA	

StockOptionLevel	0.01	-0.03	0.03
TotalWorkingYears	0.77	0.03	0.24
TrainingTimesLastYear	-0.02	0.00	-0.07
WorkLifeBalance	0.03	0.01	-0.01
YearsAtCompany	0.51	-0.02	-0.12
YearsInCurrentRole	0.36	-0.01	-0.09
YearsSinceLastPromotion	0.34	0.00	-0.04
YearsWithCurrManager	0.34	-0.04	-0.11

	PercentSalaryHike	PerformanceRating
Age	0.00	0.00
DailyRate	0.02	0.00
DistanceFromHome	0.04	0.03
Education	-0.01	-0.02
EmployeeCount	NA	NA
EmployeeNumber	-0.01	-0.02
EnvironmentSatisfaction	-0.03	-0.03
HourlyRate	-0.01	0.00
JobInvolvement	-0.02	-0.03
JobLevel	-0.03	-0.02
JobSatisfaction	0.02	0.00
MonthlyIncome	-0.03	-0.02
MonthlyRate	-0.01	-0.01
NumCompaniesWorked	-0.01	-0.01
PercentSalaryHike	1.00	0.77
PerformanceRating	0.77	1.00
RelationshipSatisfaction	-0.04	-0.03
StandardHours	NA	NA
StockOptionLevel	0.01	0.00
TotalWorkingYears	-0.02	0.01
TrainingTimesLastYear	-0.01	-0.02
WorkLifeBalance	0.00	0.00
YearsAtCompany	-0.04	0.00
YearsInCurrentRole	0.00	0.03
YearsSinceLastPromotion	-0.02	0.02
YearsWithCurrManager	-0.01	0.02

	RelationshipSatisfaction	StandardHours
Age	0.05	NA
DailyRate	0.01	NA
DistanceFromHome	0.01	NA
Education	-0.01	NA
EmployeeCount	NA	NA
EmployeeNumber	-0.07	NA
EnvironmentSatisfaction	0.01	NA

HourlyRate	0.00	NA
JobInvolvement	0.03	NA
JobLevel	0.02	NA
JobSatisfaction	-0.01	NA
MonthlyIncome	0.03	NA
MonthlyRate	0.00	NA
NumCompaniesWorked	0.05	NA
PercentSalaryHike	-0.04	NA
PerformanceRating	-0.03	NA
RelationshipSatisfaction	1.00	NA
StandardHours	NA	1
StockOptionLevel	-0.05	NA
TotalWorkingYears	0.02	NA
TrainingTimesLastYear	0.00	NA
WorkLifeBalance	0.02	NA
YearsAtCompany	0.02	NA
YearsInCurrentRole	-0.02	NA
YearsSinceLastPromotion	0.03	NA
YearsWithCurrManager	0.00	NA

	StockOptionLevel	TotalWorkingYears
Age	0.04	0.68
DailyRate	0.04	0.01
DistanceFromHome	0.04	0.00
Education	0.02	0.15
EmployeeCount	NA	NA
EmployeeNumber	0.06	-0.01
EnvironmentSatisfaction	0.00	0.00
HourlyRate	0.05	0.00
JobInvolvement	0.02	-0.01
JobLevel	0.01	0.78
JobSatisfaction	0.01	-0.02
MonthlyIncome	0.01	0.77
MonthlyRate	-0.03	0.03
NumCompaniesWorked	0.03	0.24
PercentSalaryHike	0.01	-0.02
PerformanceRating	0.00	0.01
RelationshipSatisfaction	-0.05	0.02
StandardHours	NA	NA
StockOptionLevel	1.00	0.01
TotalWorkingYears	0.01	1.00
TrainingTimesLastYear	0.01	-0.04
WorkLifeBalance	0.00	0.00
YearsAtCompany	0.02	0.63

YearsInCurrentRole	0.05	0.46	
YearsSinceLastPromotion	0.01	0.40	
YearsWithCurrManager	0.02	0.46	

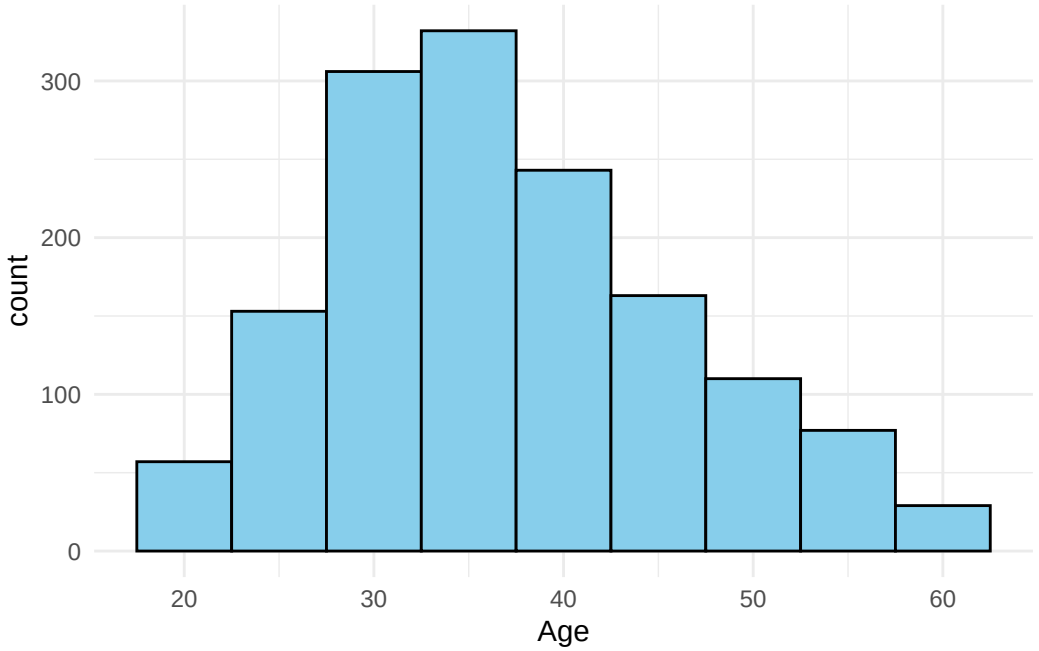
	TrainingTimesLastYear	WorkLifeBalance	YearsAtCompany
Age	-0.02	-0.02	0.31
DailyRate	0.00	-0.04	-0.03
DistanceFromHome	-0.04	-0.03	0.01
Education	-0.03	0.01	0.07
EmployeeCount	NA	NA	NA
EmployeeNumber	0.02	0.01	-0.01
EnvironmentSatisfaction	-0.02	0.03	0.00
HourlyRate	-0.01	0.00	-0.02
JobInvolvement	-0.02	-0.01	-0.02
JobLevel	-0.02	0.04	0.53
JobSatisfaction	-0.01	-0.02	0.00
MonthlyIncome	-0.02	0.03	0.51
MonthlyRate	0.00	0.01	-0.02
NumCompaniesWorked	-0.07	-0.01	-0.12
PercentSalaryHike	-0.01	0.00	-0.04
PerformanceRating	-0.02	0.00	0.00
RelationshipSatisfaction	0.00	0.02	0.02
StandardHours	NA	NA	NA
StockOptionLevel	0.01	0.00	0.02
TotalWorkingYears	-0.04	0.00	0.63
TrainingTimesLastYear	1.00	0.03	0.00
WorkLifeBalance	0.03	1.00	0.01
YearsAtCompany	0.00	0.01	1.00
YearsInCurrentRole	-0.01	0.05	0.76
YearsSinceLastPromotion	0.00	0.01	0.62
YearsWithCurrManager	0.00	0.00	0.77

	YearsInCurrentRole	YearsSinceLastPromotion
Age	0.21	0.22
DailyRate	0.01	-0.03
DistanceFromHome	0.02	0.01
Education	0.06	0.05
EmployeeCount	NA	NA
EmployeeNumber	-0.01	-0.01
EnvironmentSatisfaction	0.02	0.02
HourlyRate	-0.02	-0.03
JobInvolvement	0.01	-0.02
JobLevel	0.39	0.35
JobSatisfaction	0.00	-0.02
MonthlyIncome	0.36	0.34

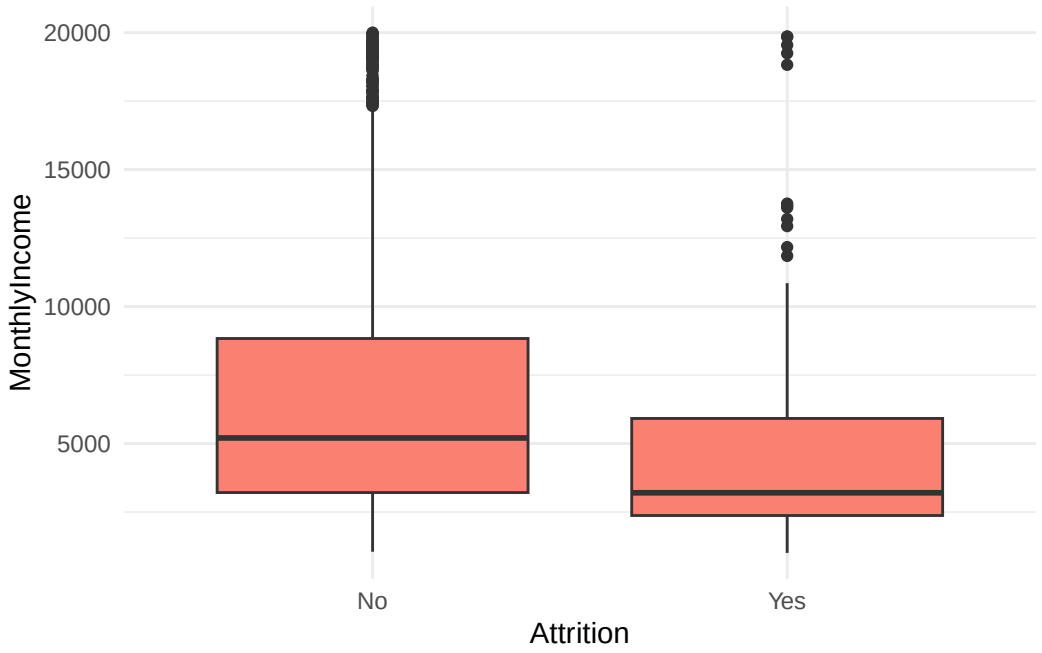
MonthlyRate	-0.01	0.00
NumCompaniesWorked	-0.09	-0.04
PercentSalaryHike	0.00	-0.02
PerformanceRating	0.03	0.02
RelationshipSatisfaction	-0.02	0.03
StandardHours	NA	NA
StockOptionLevel	0.05	0.01
TotalWorkingYears	0.46	0.40
TrainingTimesLastYear	-0.01	0.00
WorkLifeBalance	0.05	0.01
YearsAtCompany	0.76	0.62
YearsInCurrentRole	1.00	0.55
YearsSinceLastPromotion	0.55	1.00
YearsWithCurrManager	0.71	0.51

	YearsWithCurrManager
Age	0.20
DailyRate	-0.03
DistanceFromHome	0.01
Education	0.07
EmployeeCount	NA
EmployeeNumber	-0.01
EnvironmentSatisfaction	0.00
HourlyRate	-0.02
JobInvolvement	0.03
JobLevel	0.38
JobSatisfaction	-0.03
MonthlyIncome	0.34
MonthlyRate	-0.04
NumCompaniesWorked	-0.11
PercentSalaryHike	-0.01
PerformanceRating	0.02
RelationshipSatisfaction	0.00
StandardHours	NA
StockOptionLevel	0.02
TotalWorkingYears	0.46
TrainingTimesLastYear	0.00
WorkLifeBalance	0.00
YearsAtCompany	0.77
YearsInCurrentRole	0.71
YearsSinceLastPromotion	0.51
YearsWithCurrManager	1.00

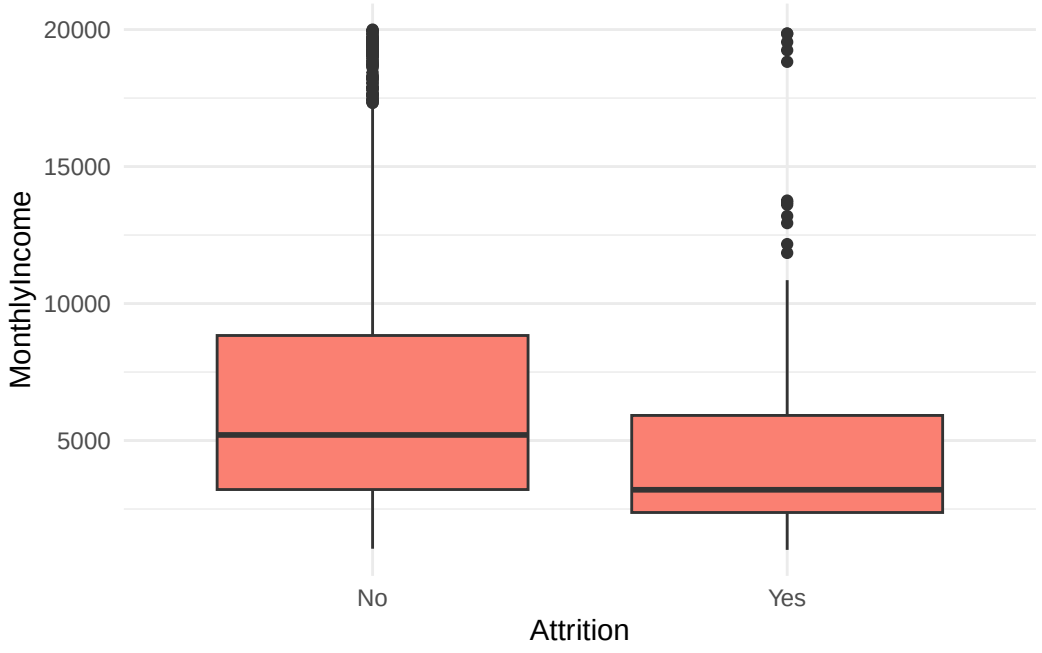
```r
ggplot(data, aes(x = Age)) +
geom_histogram(binwidth = 5, fill = "skyblue", color = "black") +
theme_minimal()
```



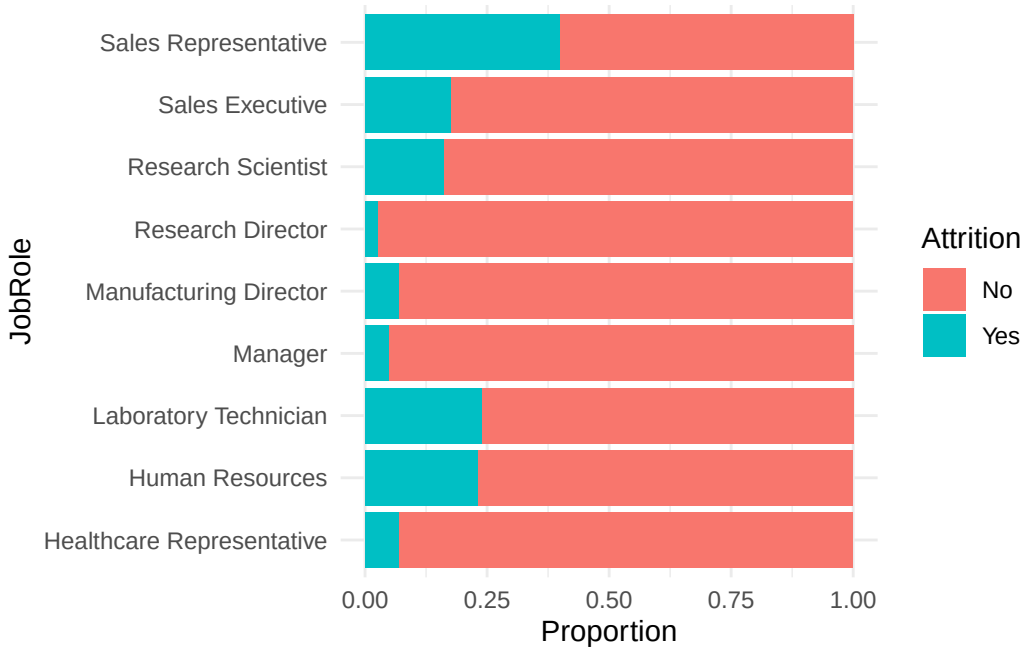

```r
ggplot(data, aes(x = Attrition, y = MonthlyIncome)) +
geom_boxplot(fill = "salmon") +
theme_minimal()
```




```
ggplot(data, aes(x = Attrition, y = MonthlyIncome)) +
geom_boxplot(fill = "salmon") +
theme_minimal()
```



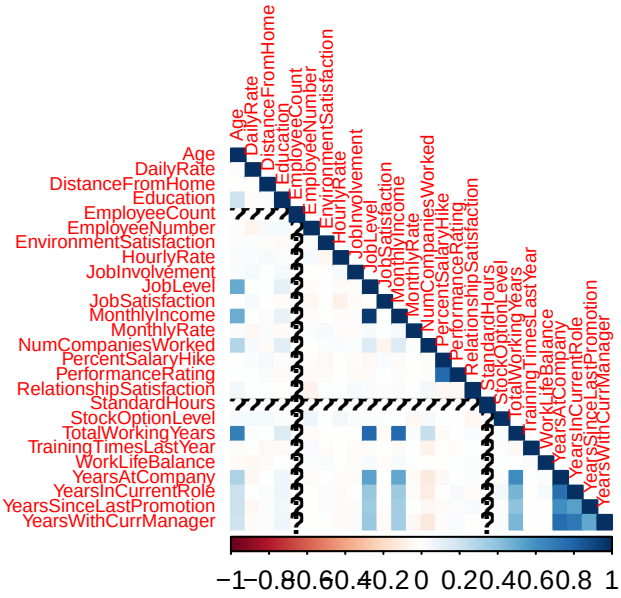
```r
ggplot(data, aes(x = JobRole, fill = Attrition)) +
geom_bar(position = "fill") +
coord_flip() +
labs(y = "Proportion") +
theme_minimal()
```




```r
library(corrplot)
```

```
corrplot 0.95 loaded
```

```r
corrplot(cor_matrix, method = "color", type = "lower", tl.cex = 0.6)
```




```r
# Convert Attrition to binary
data$Attrition <- ifelse(data$Attrition == "Yes", 1, 0)

# Basic model
model <- glm(Attrition ~ Age + JobRole + MonthlyIncome + OverTime + YearsAtCompany,
data = data, family = "binomial")

summary(model)
```

```
Call:
glm(formula = Attrition ~ Age + JobRole + MonthlyIncome + OverTime +
    YearsAtCompany, family = "binomial", data = data)

Coefficients:
                                Estimate Std. Error z value Pr(>|z|)
(Intercept)                   -1.994e+00  5.549e-01  -3.594 0.000326 ***
Age                           -3.260e-02  1.021e-02  -3.194 0.001403 **
JobRoleHuman Resources         1.465e+00  5.146e-01   2.847 0.004414 **
JobRoleLaboratory Technician   1.519e+00  4.255e-01   3.570 0.000357 ***
JobRoleManager                -3.464e-01  7.151e-01  -0.484 0.628117
JobRoleManufacturing Director -2.418e-02  4.871e-01  -0.050 0.960414
```

```
JobRoleResearch Director      -1.264e+00  8.871e-01  -1.425 0.154156
JobRoleResearch Scientist      8.113e-01  4.302e-01   1.886 0.059293 .
JobRoleSales Executive         1.006e+00  3.864e-01   2.605 0.009198 **
JobRoleSales Representative    2.103e+00  4.744e-01   4.433 9.27e-06 ***
MonthlyIncome                  4.592e-05  4.667e-05   0.984 0.325156
OverTimeYes                    1.485e+00  1.576e-01   9.423  < 2e-16 ***
YearsAtCompany                -3.891e-02  1.869e-02  -2.081 0.037395 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 1298.6  on 1469  degrees of freedom
Residual deviance: 1102.9  on 1457  degrees of freedom
AIC: 1128.9

Number of Fisher Scoring iterations: 6
```

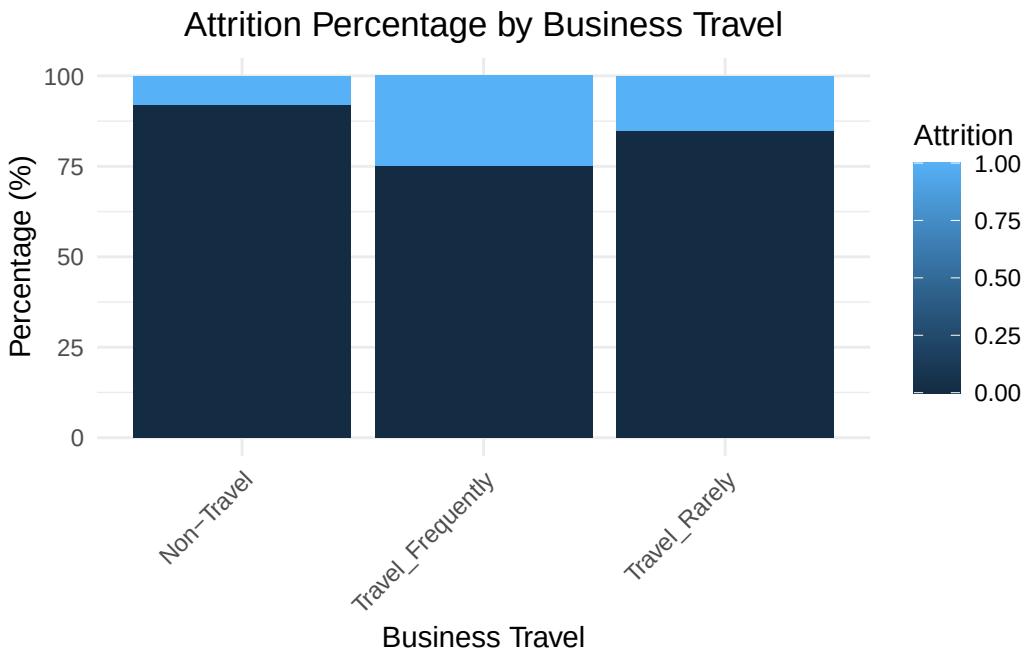
```r
# Calculate attrition percentages by BusinessTravel
attrition_by_businesstravel <- data %>%
  group_by(BusinessTravel, Attrition) %>%
  summarise(Count = n(), .groups = 'drop') %>%
  group_by(BusinessTravel) %>%
  mutate(Percentage = round(Count / sum(Count) * 100, 1))

# Display table
attrition_by_businesstravel %>% kable()
```

BusinessTravel	Attrition	Count	Percentage
Non-Travel	0	138	92.0
Non-Travel	1	12	8.0
Travel_Frequently	0	208	75.1
Travel_Frequently	1	69	24.9
Travel_Rarely	0	887	85.0
Travel_Rarely	1	156	15.0

```r
# Visualize attrition by BusinessTravel
ggplot(attrition_by_businesstravel, aes(x = BusinessTravel, y = Percentage, fill = Attrition)
  geom_bar(stat = "identity", position = "stack") +
  labs(title = "Attrition Percentage by Business Travel",
       x = "Business Travel",
```

```
       y = "Percentage (%)") +
  theme_minimal() +
  theme(axis.text.x = element_text(angle = 45, hjust = 1), # Rotate labels for readability
        plot.title = element_text(hjust = 0.5))
```



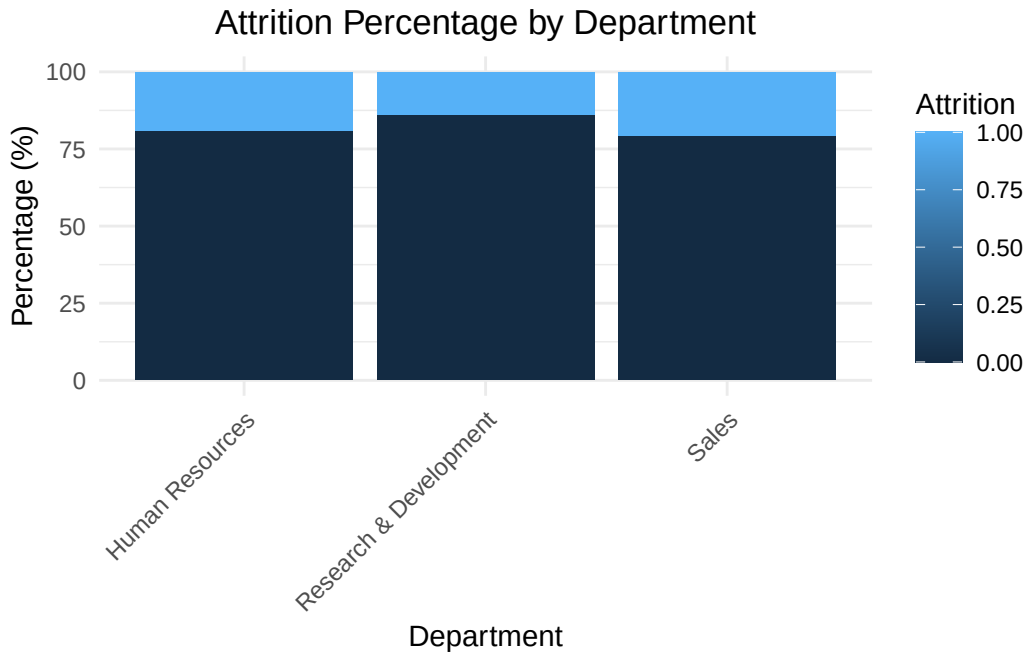

```
# Calculate attrition percentages by Department
attrition_by_department <- data %>%
  group_by(Department, Attrition) %>%
  summarise(Count = n(), .groups = 'drop') %>%
  group_by(Department) %>%
  mutate(Percentage = round(Count / sum(Count) * 100, 1))

# Display table
attrition_by_department %>% kable()
```

Department	Attrition	Count	Percentage
Human Resources	0	51	81.0
Human Resources	1	12	19.0
Research & Development	0	828	86.2
Research & Development	1	133	13.8
Sales	0	354	79.4

Department	Attrition	Count	Percentage
Sales	1	92	20.6

```
# Visualize attrition by Department
ggplot(attrition_by_department, aes(x = Department, y = Percentage, fill = Attrition)) +
  geom_bar(stat = "identity", position = "stack") +
  labs(title = "Attrition Percentage by Department",
       x = "Department",
       y = "Percentage (%)") +
  theme_minimal() +
  theme(axis.text.x = element_text(angle = 45, hjust = 1),
        plot.title = element_text(hjust = 0.5))
```

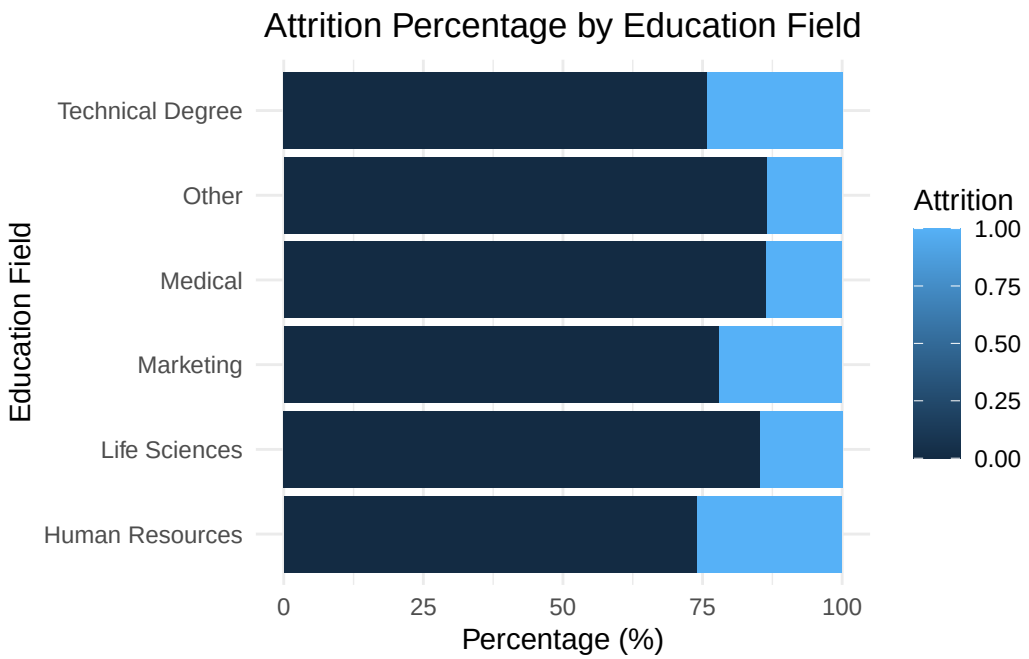



```
# Calculate attrition percentages by EducationField
attrition_by_educationfield <- data %>%
  group_by(EducationField, Attrition) %>%
  summarise(Count = n(), .groups = 'drop') %>%
  group_by(EducationField) %>%
  mutate(Percentage = round(Count / sum(Count) * 100, 1))

# Display table
attrition_by_educationfield %>% kable()
```

EducationField	Attrition	Count	Percentage
Human Resources	0	20	74.1
Human Resources	1	7	25.9
Life Sciences	0	517	85.3
Life Sciences	1	89	14.7
Marketing	0	124	78.0
Marketing	1	35	22.0
Medical	0	401	86.4
Medical	1	63	13.6
Other	0	71	86.6
Other	1	11	13.4
Technical Degree	0	100	75.8
Technical Degree	1	32	24.2

```
# Visualize attrition by EducationField
ggplot(attrition_by_educationfield, aes(x = EducationField, y = Percentage, fill = Attrition)
  geom_bar(stat = "identity", position = "stack") +
  coord_flip() + # Flip coordinates for better readability
  labs(title = "Attrition Percentage by Education Field",
       x = "Education Field",
       y = "Percentage (%)") +
  theme_minimal() +
  theme(plot.title = element_text(hjust = 0.5))
```



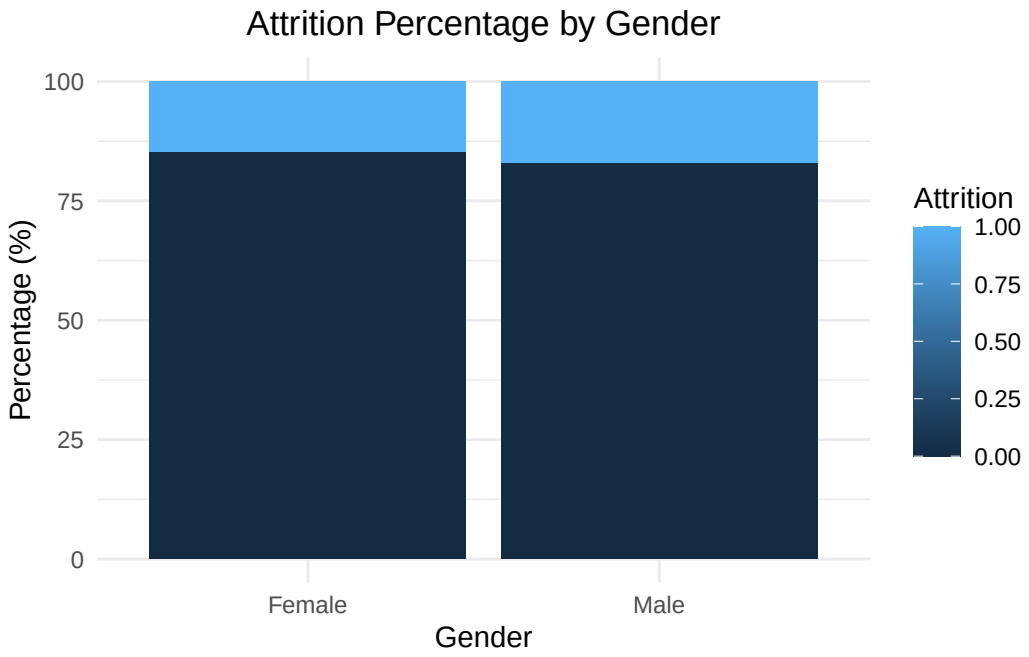

```
#Calculate attrition percentages by Gender
attrition_by_gender <- data %>%
group_by(Gender, Attrition) %>%
summarise(Count = n(), .groups = 'drop') %>%
group_by(Gender) %>%
mutate(Percentage = round(Count / sum(Count) * 100, 1))

# Display table
attrition_by_gender %>% kable()
```

Gender	Attrition	Count	Percentage
Female	0	501	85.2
Female	1	87	14.8
Male	0	732	83.0
Male	1	150	17.0

```
# Visualize attrition by Gender
ggplot(attrition_by_gender, aes(x = Gender, y = Percentage, fill = Attrition)) +
geom_bar(stat = "identity", position = "stack") +
labs(title = "Attrition Percentage by Gender",
x = "Gender",
```

```
y = "Percentage (%)") +
theme_minimal() +
theme(plot.title = element_text(hjust = 0.5))
```



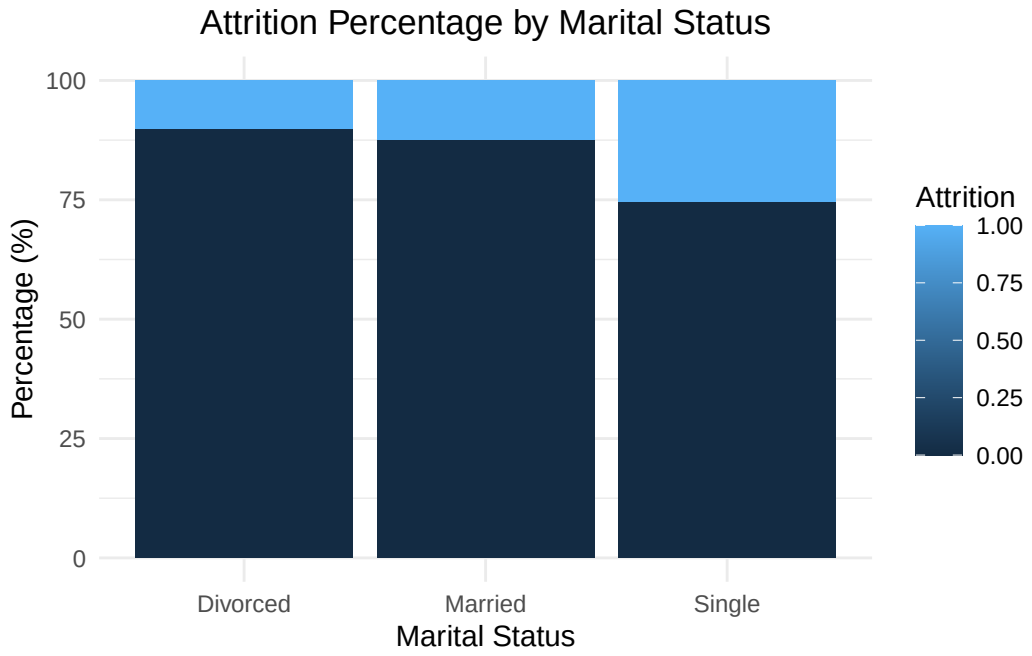

```
# Calculate attrition percentages by MaritalStatus}
attrition_by_maritalstatus <- data %>%
  group_by(MaritalStatus, Attrition) %>%
  summarise(Count = n(), .groups = 'drop') %>%
  group_by(MaritalStatus) %>%
  mutate(Percentage = round(Count / sum(Count) * 100, 1))

# Display table
attrition_by_maritalstatus %>% kable()
```

MaritalStatus	Attrition	Count	Percentage
Divorced	0	294	89.9
Divorced	1	33	10.1
Married	0	589	87.5
Married	1	84	12.5
Single	0	350	74.5
Single	1	120	25.5

MaritalStatus	Attrition	Count	Percentage

```
# Visualize attrition by MaritalStatus
ggplot(attrition_by_maritalstatus, aes(x = MaritalStatus, y = Percentage, fill = Attrition)) +
  geom_bar(stat = "identity", position = "stack") +
  labs(title = "Attrition Percentage by Marital Status",
       x = "Marital Status",
       y = "Percentage (%)") +
  theme_minimal() +
  theme(plot.title = element_text(hjust = 0.5))
```




```
# Calculate attrition percentages by OverTime
attrition_by_overtime <- data %>%
  group_by(OverTime, Attrition) %>%
  summarise(Count = n(), .groups = 'drop') %>%
  group_by(OverTime) %>%
  mutate(Percentage = round(Count / sum(Count) * 100, 1))

# Display table
attrition_by_overtime %>% kable()
```

OverTime	Attrition	Count	Percentage
No	0	944	89.6
No	1	110	10.4
Yes	0	289	69.5
Yes	1	127	30.5

```
# Visualize attrition by OverTime
ggplot(attrition_by_overtime, aes(x = OverTime, y = Percentage, fill = Attrition)) +
  geom_bar(stat = "identity", position = "stack") +
  labs(title = "Attrition Percentage by OverTime",
       x = "OverTime",
       y = "Percentage (%)") +
  theme_minimal() +
  theme(plot.title = element_text(hjust = 0.5))
```