R Project Report

Description of Dataset: There was 80 instances in the dataset of pregnant patient where attributes are Patient_id, Age, Gender, weight.kg., Delivery_number, Delivery_time, Blood, Heart, Caesarian. Here, **Caesarian** is the **Target/Output** class. This is a **supervised** dataset. There is some duplicate value, Noisy value, missing value, outliers etc. Some value given into categorical value which should be converted into numerical value or vice versa.

Code:

library(dplyr) - Used for data manipulation.

library(Amelia) - Used for handling missing data.

library(ggplot2) - Used for data visualization

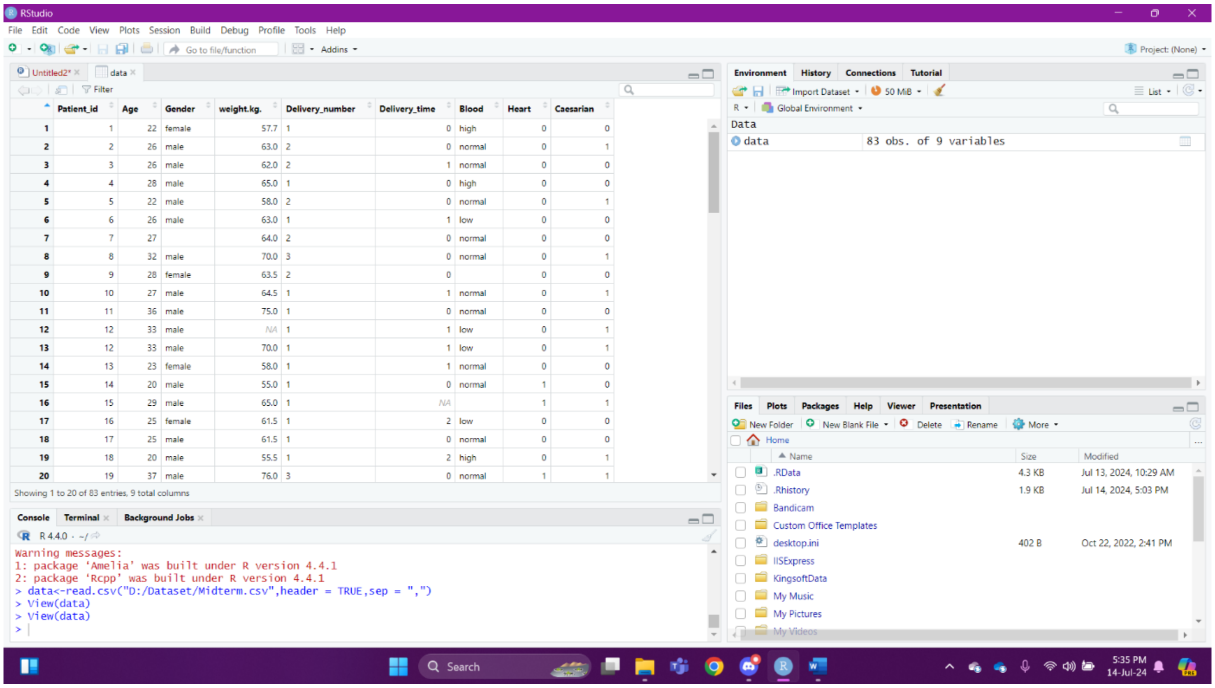
library(caret) - Contains functions to streamline the process of creating predictive models.

library(modeest) - Provides functions to compute statistical modes.

library(smotefamily) - Contains functions for oversampling and undersampling techniques.

data<-read.csv("D:/Dataset/Midterm.csv",header = TRUE,sep = ",")

- Reads the CSV file into a data frame.



	Patient_id	Age	Gender	weight.kg.	Delivery_number	Delivery_time	Blood	Heart	Caesarian
1	1	22	female	57.7	1	0	high	0	0
2	2	26	male	63.0	2	0	normal	0	1
3	3	26	male	62.0	2	1	normal	0	0
4	4	28	male	65.0	1	0	high	0	0
5	5	22	male	58.0	2	0	normal	0	1
6	6	26	male	63.0	1	1	low	0	0
7	7	27		64.0	2	0	normal	0	0
8	8	32	male	70.0	3	0	normal	0	1
9	9	28	female	63.5	2	0		0	0
10	10	27	male	64.5	1	1	normal	0	1
11	11	36	male	75.0	1	0	normal	0	0
12	12	33	male	NA	1	1	low	0	1
13	12	33	male	70.0	1	1	low	0	1
14	13	23	female	58.0	1	1	normal	0	0
15	14	20	male	55.0	1	0	normal	1	0
16	15	29	male	65.0	1	NA		1	1
17	16	25	female	61.5	1	2	low	0	0
18	17	25	male	61.5	1	0	normal	0	0
19	18	20	male	55.5	1	2	high	0	1
20	19	37	male	76.0	3	0	normal	1	1

Showing 1 to 20 of 83 entries, 9 total columns

Data
data 83 obs. of 9 variables

Name	Size	Modified
.RData	4.3 KB	Jul 13, 2024, 10:29 AM
.Rhistory	1.9 KB	Jul 14, 2024, 5:03 PM
Bandicam		
Custom Office Templates		
desktop.ini	402 B	Oct 22, 2022, 2:41 PM
IISExpress		
KingsoftData		
My Music		
My Pictures		
My Videos		

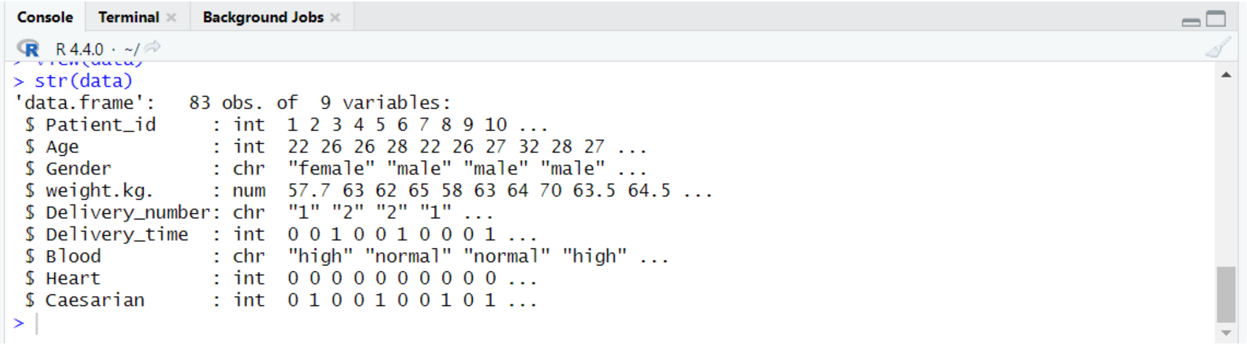
Console Terminal Background Jobs

R 4.4.0 · ~/

```
Warning messages:
1: package ‘Amelia’ was built under R version 4.4.1
2: package ‘Rcpp’ was built under R version 4.4.1
> data<-read.csv("D:/Dataset/Midterm.csv",header = TRUE,sep = ",")
> View(data)
> View(data)
> 
```

str(data)

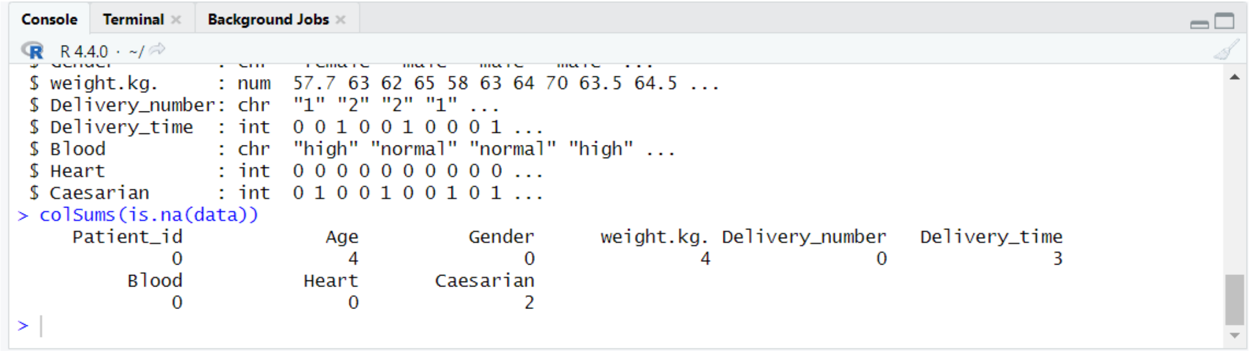
- To see Data Type of variables in Data frame



```
> str(data)
'data.frame':	83 obs. of  9 variables:
 $ Patient_id     : int  1 2 3 4 5 6 7 8 9 10 ...
 $ Age            : int  22 26 26 28 22 26 27 32 28 27 ...
 $ Gender         : chr  "female" "male" "male" "male" ...
 $ weight.kg.     : num  57.7 63 62 65 58 63 64 70 63.5 64.5 ...
 $ Delivery_number: chr  "1" "2" "2" "1" ...
 $ Delivery_time  : int  0 0 1 0 0 1 0 0 0 1 ...
 $ Blood          : chr  "high" "normal" "normal" "high" ...
 $ Heart          : int  0 0 0 0 0 0 0 0 0 0 ...
 $ Caesarian      : int  0 1 0 0 1 0 0 1 0 1 ...
> 
```

colSums(is.na(data))

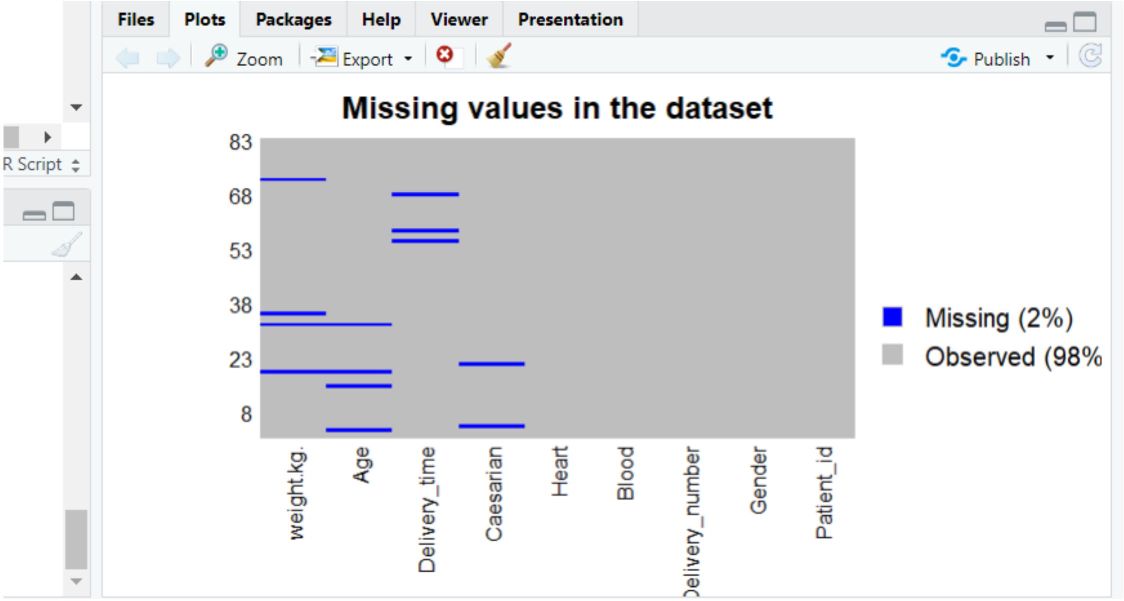
– Checks missing value in each column



```
$ weight.kg.      : num  57.7 63 62 65 58 63 64 70 63.5 64.5 ...
$ Delivery_number: chr  "1" "2" "2" "1" ...
$ Delivery_time  : int  0 0 1 0 0 1 0 0 0 1 ...
$ Blood          : chr  "high" "normal" "normal" "high" ...
$ Heart          : int  0 0 0 0 0 0 0 0 0 0 ...
$ Caesarian      : int  0 1 0 0 1 0 0 1 0 1 ...
> colSums(is.na(data))
     Patient_id             Age          Gender      weight.kg. Delivery_number   Delivery_time 
              0               4               0               4               0               3 
          Blood           Heart       Caesarian 
              0               0               2 
> 
```

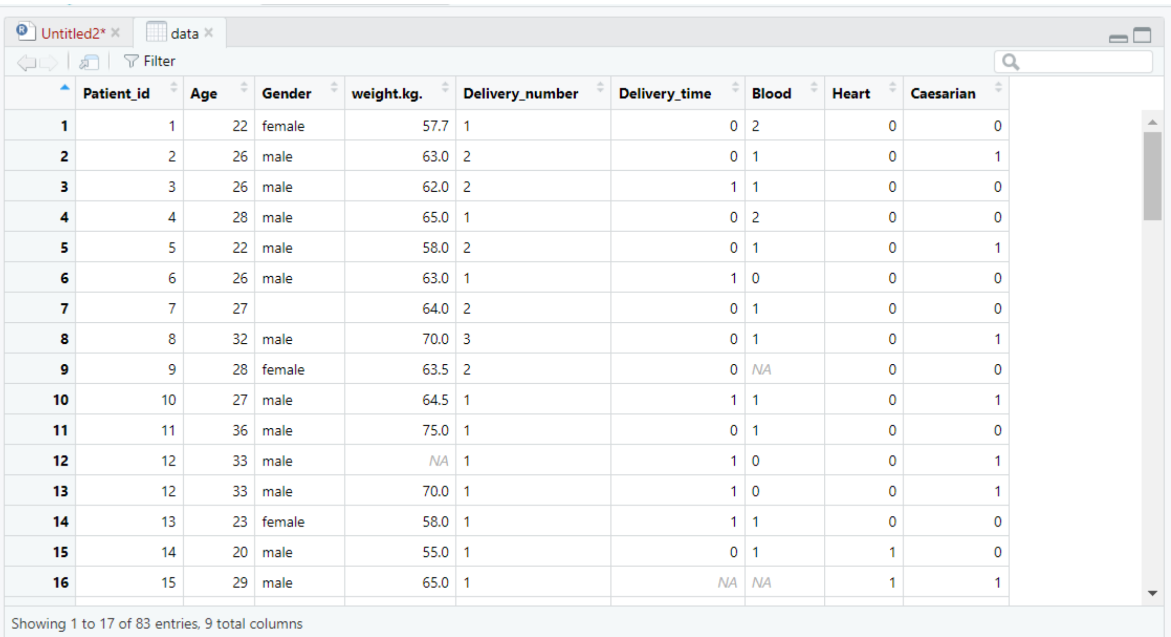
missmap(data, main = "Missing values in the dataset", col = c("blue", "grey"), legend = TRUE)

- Visualization of missing value in a graph.



data$Blood <- factor(data$Blood, levels = c('low', 'normal', 'high'), labels = c(0, 1, 2))

- Converting Blood pressure into Categorical to Numerical value to find NA.

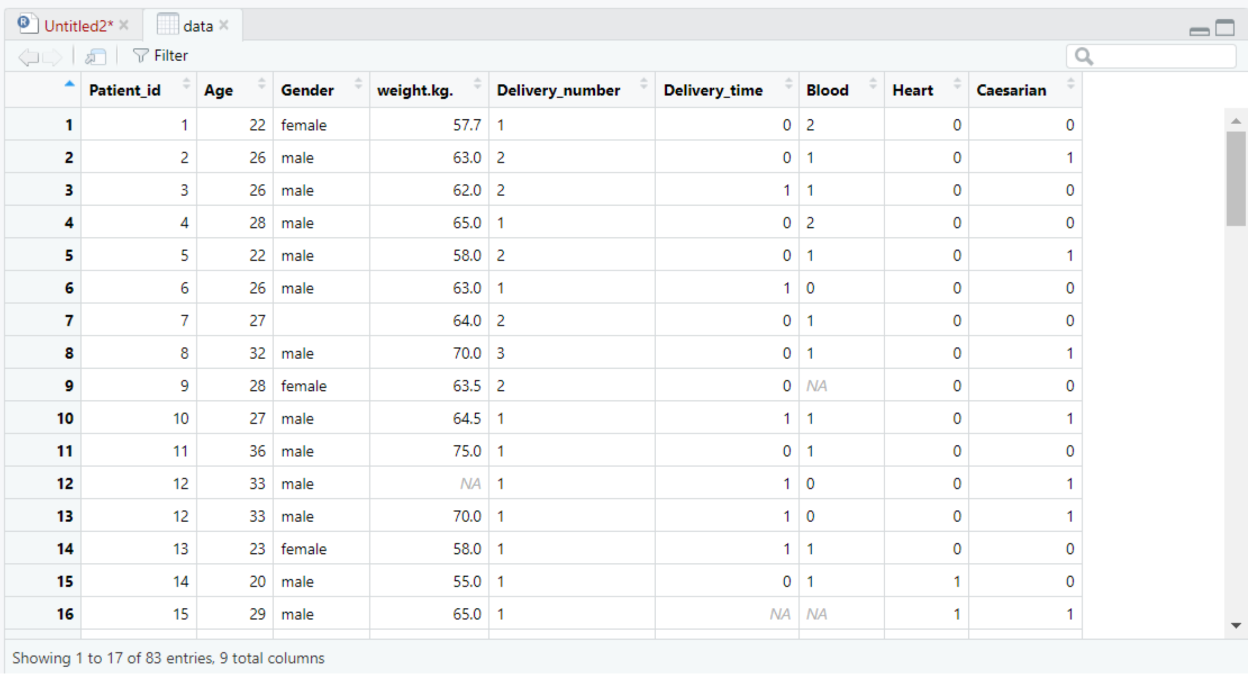


	Patient_id	Age	Gender	weight.kg.	Delivery_number	Delivery_time	Blood	Heart	Caesarian
1	1	22	female	57.7	1	0	2	0	0
2	2	26	male	63.0	2	0	1	0	1
3	3	26	male	62.0	2	1	1	0	0
4	4	28	male	65.0	1	0	2	0	0
5	5	22	male	58.0	2	0	1	0	1
6	6	26	male	63.0	1	1	0	0	0
7	7	27		64.0	2	0	1	0	0
8	8	32	male	70.0	3	0	1	0	1
9	9	28	female	63.5	2	0	NA	0	0
10	10	27	male	64.5	1	1	1	0	1
11	11	36	male	75.0	1	0	1	0	0
12	12	33	male	NA	1	1	0	0	1
13	12	33	male	70.0	1	1	0	0	1
14	13	23	female	58.0	1	1	1	0	0
15	14	20	male	55.0	1	0	1	1	0
16	15	29	male	65.0	1	NA	NA	1	1

Showing 1 to 17 of 83 entries, 9 total columns

```
data$Delivery_number <- factor(data$Delivery_number, levels = c('1', '2', '3', '4'), labels = c(1, 2, 3, 4))
```

- Converting No. of Delivery into Categorical to Numerical value to find NA.

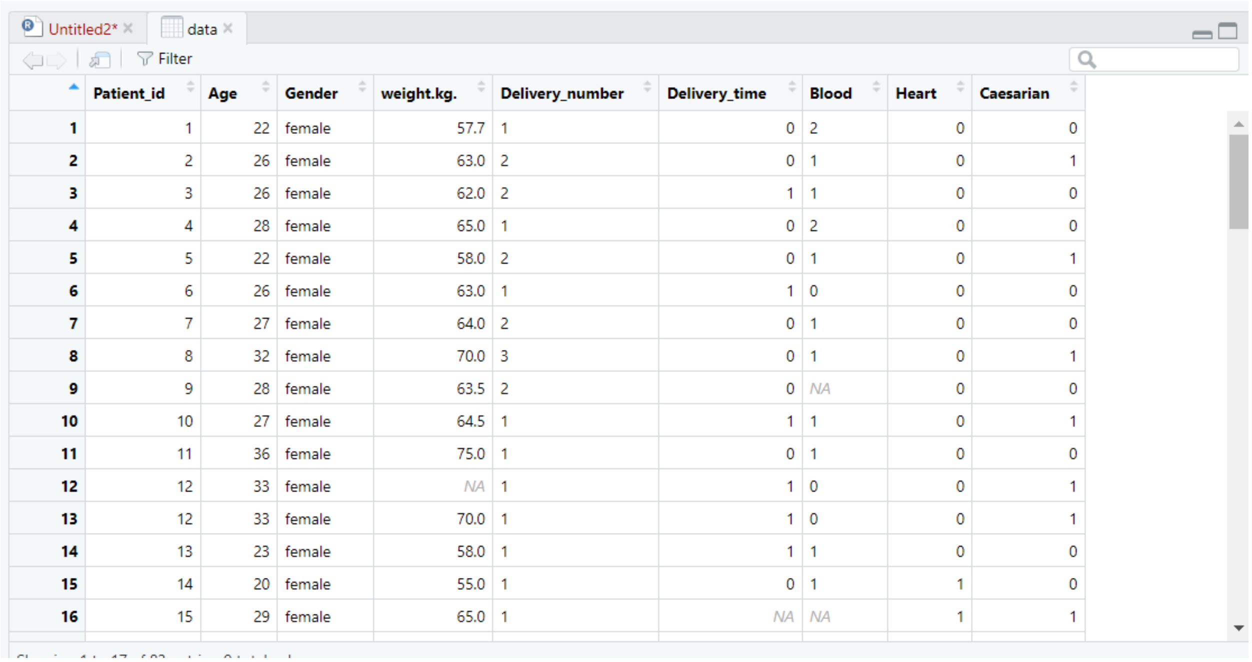


	Patient_id	Age	Gender	weight.kg.	Delivery_number	Delivery_time	Blood	Heart	Caesarian
1	1	22	female	57.7	1	0	2	0	0
2	2	26	male	63.0	2	0	1	0	1
3	3	26	male	62.0	2	1	1	0	0
4	4	28	male	65.0	1	0	2	0	0
5	5	22	male	58.0	2	0	1	0	1
6	6	26	male	63.0	1	1	0	0	0
7	7	27		64.0	2	0	1	0	0
8	8	32	male	70.0	3	0	1	0	1
9	9	28	female	63.5	2	0	NA	0	0
10	10	27	male	64.5	1	1	1	0	1
11	11	36	male	75.0	1	0	1	0	0
12	12	33	male	NA	1	1	0	0	1
13	12	33	male	70.0	1	1	0	0	1
14	13	23	female	58.0	1	1	1	0	0
15	14	20	male	55.0	1	0	1	1	0
16	15	29	male	65.0	1	NA	NA	1	1

Showing 1 to 17 of 83 entries, 9 total columns

```
data$Gender <- 'female'
```

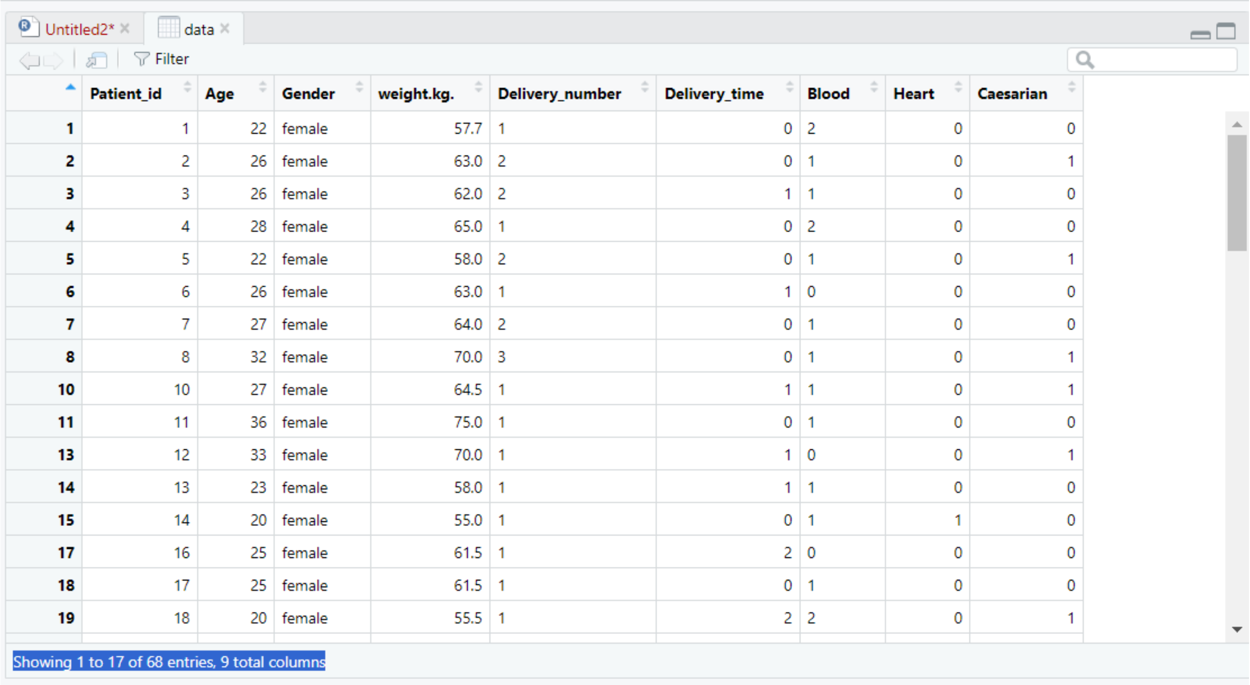
- Handling Noisy Value in Dataset



	Patient_id	Age	Gender	weight.kg.	Delivery_number	Delivery_time	Blood	Heart	Caesarian
1	1	22	female	57.7	1	0	2	0	0
2	2	26	female	63.0	2	0	1	0	1
3	3	26	female	62.0	2	1	1	0	0
4	4	28	female	65.0	1	0	2	0	0
5	5	22	female	58.0	2	0	1	0	1
6	6	26	female	63.0	1	1	0	0	0
7	7	27	female	64.0	2	0	1	0	0
8	8	32	female	70.0	3	0	1	0	1
9	9	28	female	63.5	2	0	NA	0	0
10	10	27	female	64.5	1	1	1	0	1
11	11	36	female	75.0	1	0	1	0	0
12	12	33	female	NA	1	1	0	0	1
13	12	33	female	70.0	1	1	0	0	1
14	13	23	female	58.0	1	1	1	0	0
15	14	20	female	55.0	1	0	1	1	0
16	15	29	female	65.0	1	NA	NA	1	1

data <- na.omit(data)

- Removing rows with at least one missing value

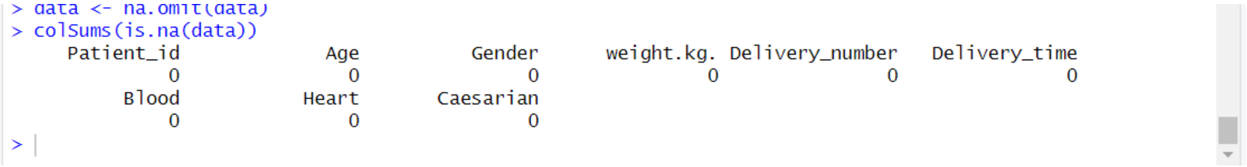


	Patient_id	Age	Gender	weight.kg.	Delivery_number	Delivery_time	Blood	Heart	Caesarian
1	1	22	female	57.7	1	0	2	0	0
2	2	26	female	63.0	2	0	1	0	1
3	3	26	female	62.0	2	1	1	0	0
4	4	28	female	65.0	1	0	2	0	0
5	5	22	female	58.0	2	0	1	0	1
6	6	26	female	63.0	1	1	0	0	0
7	7	27	female	64.0	2	0	1	0	0
8	8	32	female	70.0	3	0	1	0	1
10	10	27	female	64.5	1	1	1	0	1
11	11	36	female	75.0	1	0	1	0	0
13	12	33	female	70.0	1	1	0	0	1
14	13	23	female	58.0	1	1	1	0	0
15	14	20	female	55.0	1	0	1	1	0
17	16	25	female	61.5	1	2	0	0	0
18	17	25	female	61.5	1	0	1	0	0
19	18	20	female	55.5	1	2	2	0	1

Showing 1 to 17 of 68 entries, 9 total columns

colSums(is.na(data))

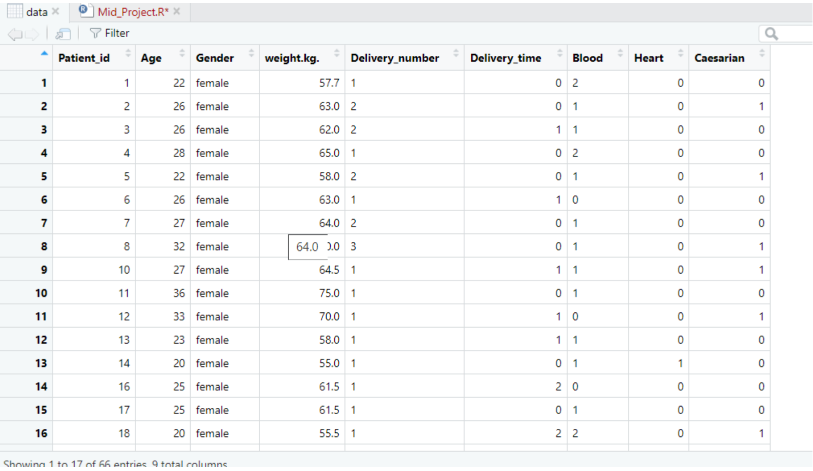
- After handling all the missing values, the NA count of All Column is 0.



```
> data <- na.omit(data)
> colSums(is.na(data))
     Patient_id            Age         Gender     weight.kg. Delivery_number   Delivery_time
              0              0              0              0               0               0
          Blood          Heart      Caesarian
              0              0              0
> 
```

data <- data <- distinct(data)

- Handling duplicate values in dataset.

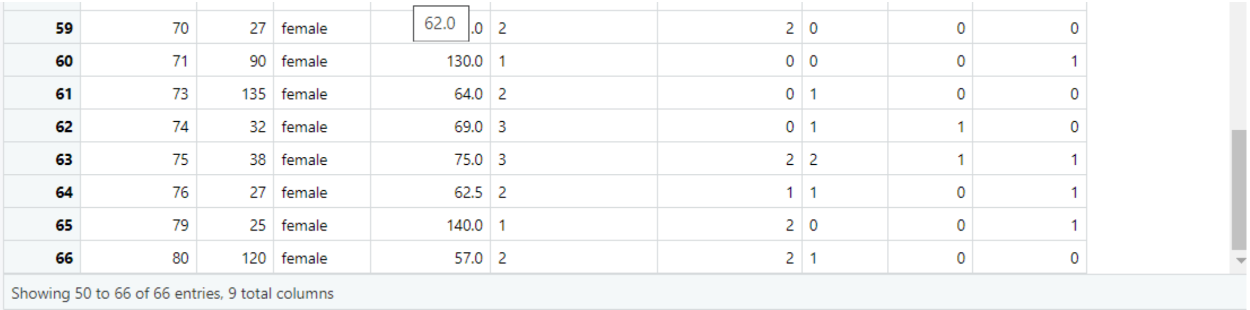


	Patient_id	Age	Gender	weight.kg.	Delivery_number	Delivery_time	Blood	Heart	Caesarian
1	1	22	female	57.7	1	0	2	0	0
2	2	26	female	63.0	2	0	1	0	1
3	3	26	female	62.0	2	1	1	0	0
4	4	28	female	65.0	1	0	2	0	0
5	5	22	female	58.0	2	0	1	0	1
6	6	26	female	63.0	1	1	0	0	0
7	7	27	female	64.0	2	0	1	0	0
8	8	32	female	64.0 0.0	3	0	1	0	1
9	10	27	female	64.5	1	1	1	0	1
10	11	36	female	75.0	1	0	1	0	0
11	12	33	female	70.0	1	1	0	0	1
12	13	23	female	58.0	1	1	1	0	0
13	14	20	female	55.0	1	0	1	1	0
14	16	25	female	61.5	1	2	0	0	0
15	17	25	female	61.5	1	0	1	0	0
16	18	20	female	55.5	1	2	2	0	1

Showing 1 to 17 of 66 entries, 9 total columns

data <- subset(data, Age >= 18 & Age <= 45 & weight.kg. >= 50 & weight.kg. <= 90)

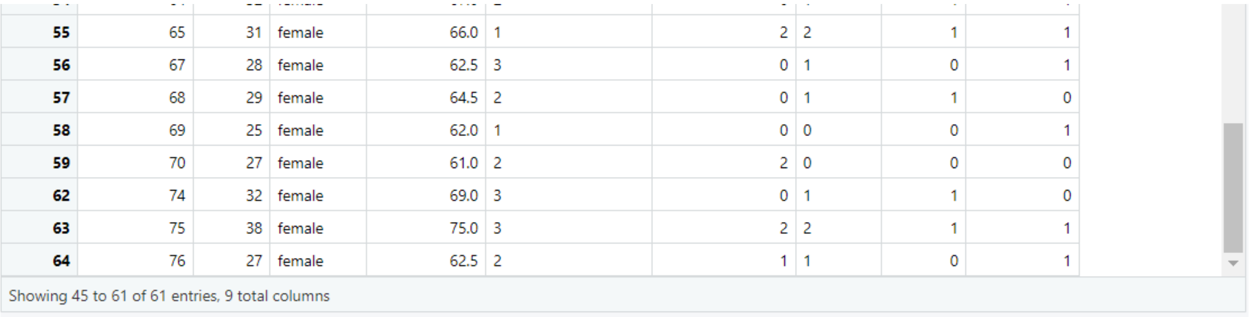
- Filtering the outliers which are irrelevant



59	70	27	female	62.0 .0	2	2	0	0	0
60	71	90	female	130.0	1	0	0	0	1
61	73	135	female	64.0	2	0	1	0	0
62	74	32	female	69.0	3	0	1	1	0
63	75	38	female	75.0	3	2	2	1	1
64	76	27	female	62.5	2	1	1	0	1
65	79	25	female	140.0	1	2	0	0	1
66	80	120	female	57.0	2	2	1	0	0

Showing 50 to 66 of 66 entries, 9 total columns

Then,



55	65	31	female	66.0	1	2	2	1	1
56	67	28	female	62.5	3	0	1	0	1
57	68	29	female	64.5	2	0	1	1	0
58	69	25	female	62.0	1	0	0	0	1
59	70	27	female	61.0	2	2	0	0	0
62	74	32	female	69.0	3	0	1	1	0
63	75	38	female	75.0	3	2	2	1	1
64	76	27	female	62.5	2	1	1	0	1

Showing 45 to 61 of 61 entries, 9 total columns

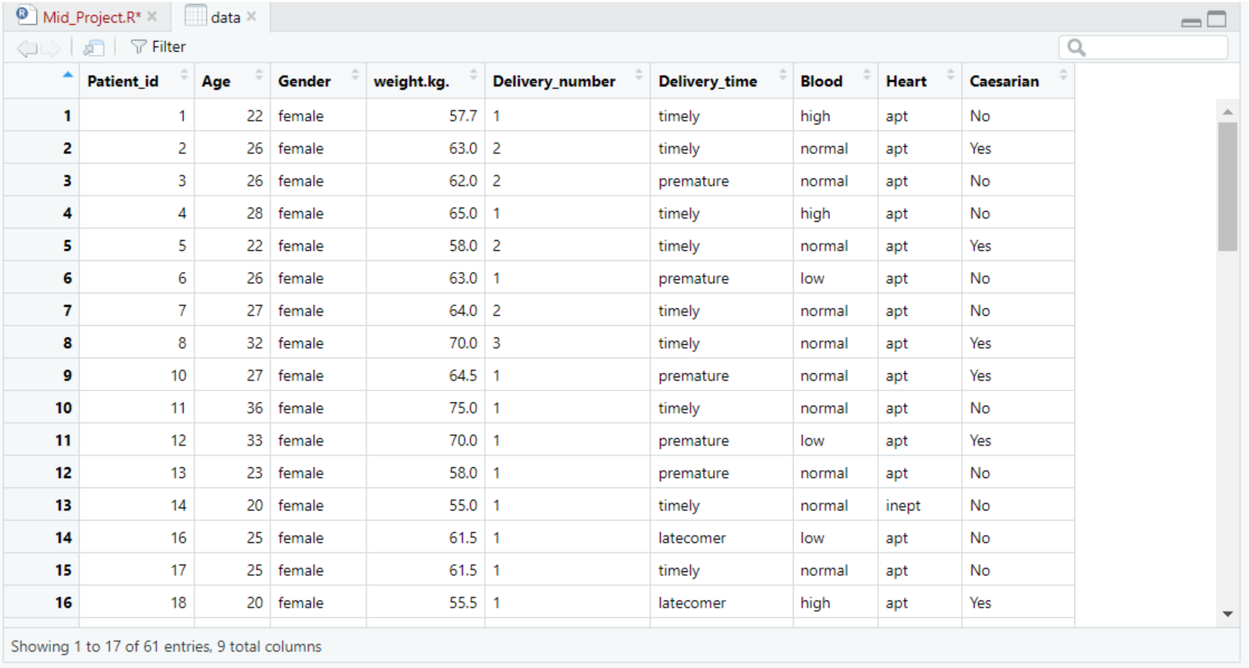
data$Caesarian <- factor(data$Caesarian, levels = c(0, 1), labels = c("No", "Yes"))

data$Heart <- factor(data$Heart, levels = c(0, 1), labels = c("apt", "inept"))

data$Delivery_time <- factor(data$Delivery_time, levels = c(0, 1, 2), labels = c("timely", "premature", "latecomer"))

data$Blood <- factor(data$Blood, levels = c(0, 1, 2), labels = c("low", "normal", "high"))

- Converting Caesarian, Heart Condition, Delivery time and Blood pressure into Numerical to Catagorical values as per Data frame.



	Patient_id	Age	Gender	weight.kg.	Delivery_number	Delivery_time	Blood	Heart	Caesarian
1	1	22	female	57.7	1	timely	high	apt	No
2	2	26	female	63.0	2	timely	normal	apt	Yes
3	3	26	female	62.0	2	premature	normal	apt	No
4	4	28	female	65.0	1	timely	high	apt	No
5	5	22	female	58.0	2	timely	normal	apt	Yes
6	6	26	female	63.0	1	premature	low	apt	No
7	7	27	female	64.0	2	timely	normal	apt	No
8	8	32	female	70.0	3	timely	normal	apt	Yes
9	10	27	female	64.5	1	premature	normal	apt	Yes
10	11	36	female	75.0	1	timely	normal	apt	No
11	12	33	female	70.0	1	premature	low	apt	Yes
12	13	23	female	58.0	1	premature	normal	apt	No
13	14	20	female	55.0	1	timely	normal	inept	No
14	16	25	female	61.5	1	latecomer	low	apt	No
15	17	25	female	61.5	1	timely	normal	apt	No
16	18	20	female	55.5	1	latecomer	high	apt	Yes

Showing 1 to 17 of 61 entries, 9 total columns

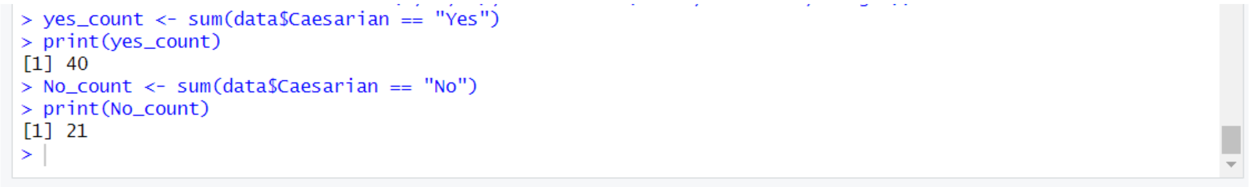
yes_count <- sum(data$Caesarian == "Yes")

print(yes_count)

No_count <- sum(data$Caesarian == "No")

print(No_count)

- Couting number of Caesarian and Non-Caesarian Patient in Dataset



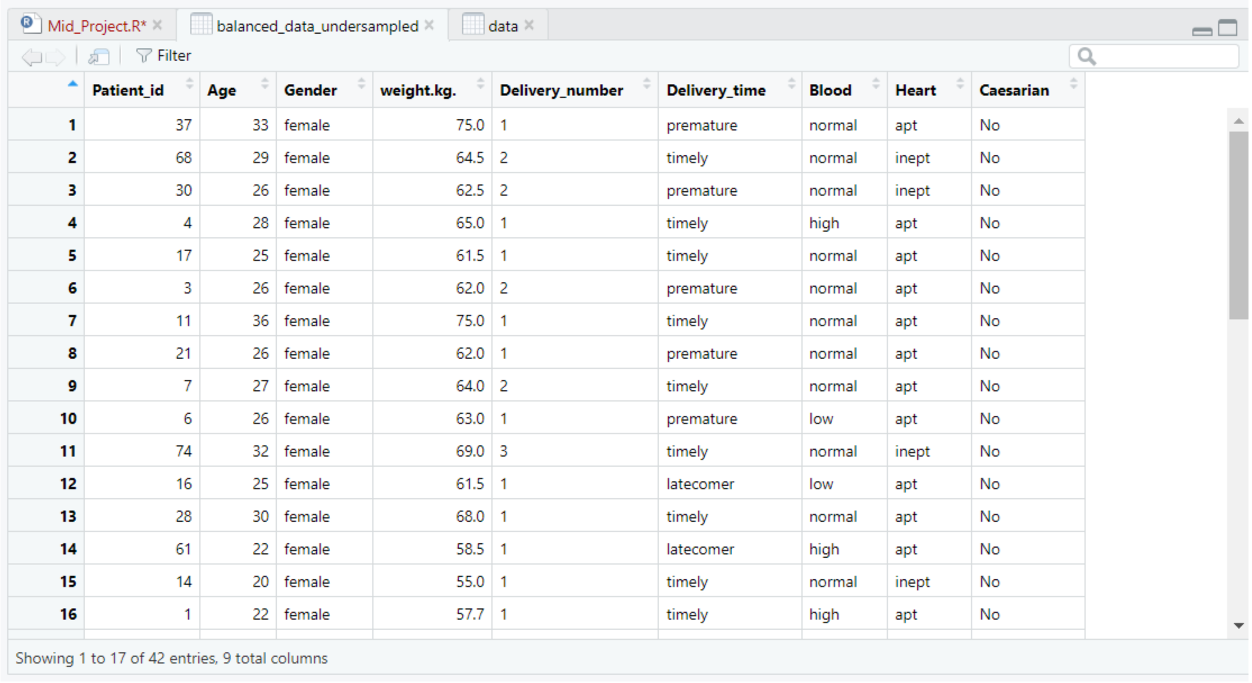
```
> yes_count <- sum(data$Caesarian == "Yes")
> print(yes_count)
[1] 40
> No_count <- sum(data$Caesarian == "No")
> print(No_count)
[1] 21
> 
```

set.seed(123)

balanced_data_undersampled <- downSample(x = data[, -which(names(data) == "Caesarian")],

y = data$Caesarian, yname = "Caesarian")

- Reproducing the data and balancing the dataset using Under sampling method where we decrease the majority class to be equal to minority class.



	Patient_id	Age	Gender	weight.kg.	Delivery_number	Delivery_time	Blood	Heart	Caesarian
1	37	33	female	75.0	1	premature	normal	apt	No
2	68	29	female	64.5	2	timely	normal	inept	No
3	30	26	female	62.5	2	premature	normal	inept	No
4	4	28	female	65.0	1	timely	high	apt	No
5	17	25	female	61.5	1	timely	normal	apt	No
6	3	26	female	62.0	2	premature	normal	apt	No
7	11	36	female	75.0	1	timely	normal	apt	No
8	21	26	female	62.0	1	premature	normal	apt	No
9	7	27	female	64.0	2	timely	normal	apt	No
10	6	26	female	63.0	1	premature	low	apt	No
11	74	32	female	69.0	3	timely	normal	inept	No
12	16	25	female	61.5	1	latecomer	low	apt	No
13	28	30	female	68.0	1	timely	normal	apt	No
14	61	22	female	58.5	1	latecomer	high	apt	No
15	14	20	female	55.0	1	timely	normal	inept	No
16	1	22	female	57.7	1	timely	high	apt	No

Showing 1 to 17 of 42 entries, 9 total columns

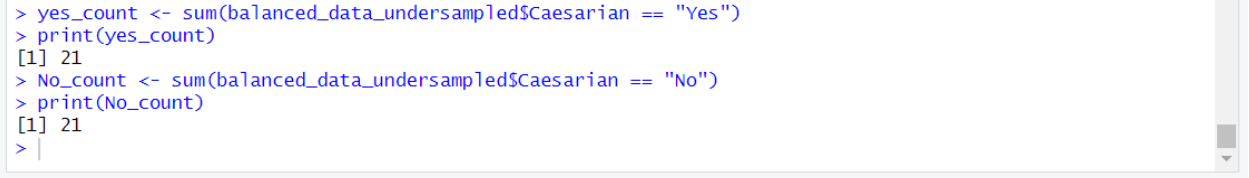
New, yes and no counter

yes_count <- sum(balanced_data_undersampled$Caesarian == "Yes")

print(yes_count)

No_count <- sum(balanced_data_undersampled$Caesarian == "No")

print(No_count)



```
> yes_count <- sum(balanced_data_undersampled$Caesarian == "Yes")
> print(yes_count)
[1] 21
> No_count <- sum(balanced_data_undersampled$Caesarian == "No")
> print(No_count)
[1] 21
> 
```

balanced_data_stats <- data.frame(

Variable = c("Age", "Weight"),

Mean = c(mean(balanced_data_undersampled$Age), mean(balanced_data_undersampled$weight.kg.)),

Median = c(median(balanced_data_undersampled$Age), median(balanced_data_undersampled$weight.kg.)),

Mode = c(as.numeric(names(sort(table(balanced_data_undersampled$Age), decreasing=TRUE)[1])), as.numeric(names(sort(table(balanced_data_undersampled$weight.kg.), decreasing=TRUE)[1]))),

SD = c(sd(balanced_data_undersampled$Age), sd(balanced_data_undersampled$weight.kg.)),

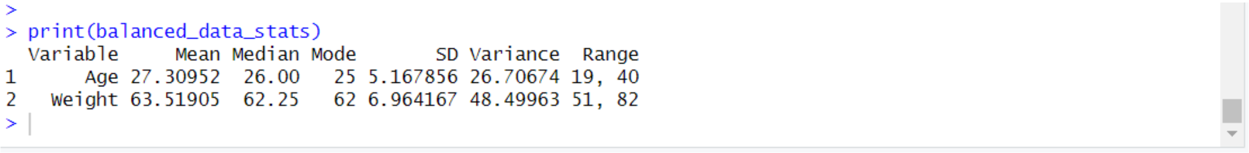
Variance = c(var(balanced_data_undersampled$Age), var(balanced_data_undersampled$weight.kg.)),

Range = I(list(range(balanced_data_undersampled$Age), range(balanced_data_undersampled$weight.kg.)))

)

print(balanced_data_stats)

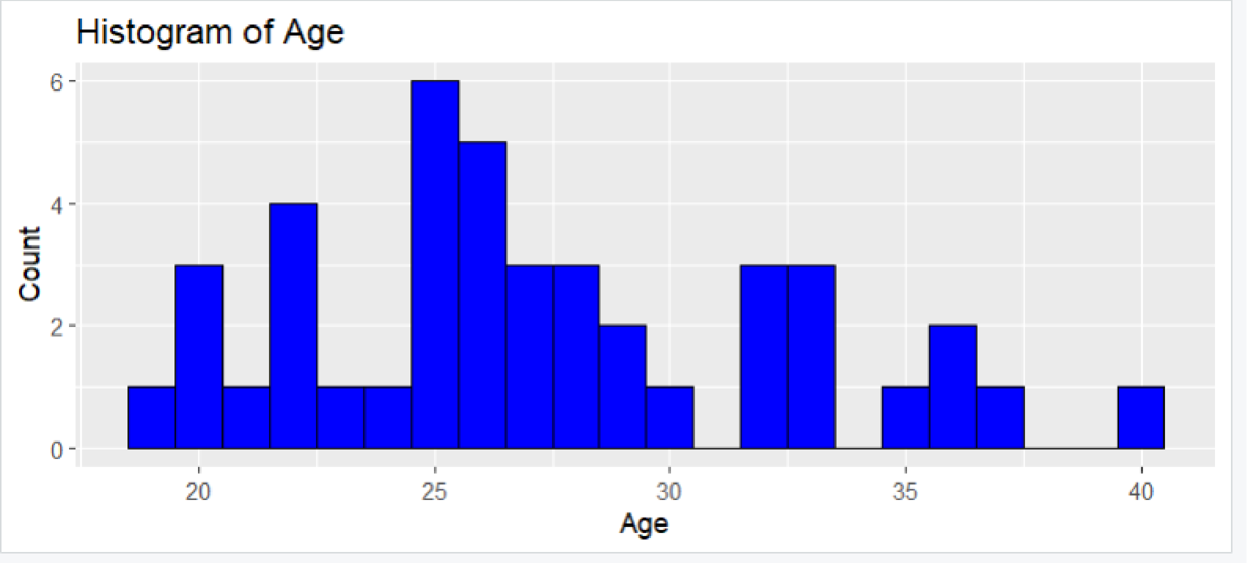
- Finding Measure of Central Tendency (Mean, Mode, Median) and Measure of Spread (Range, Standard Deviation and Variance)



```
> 
> print(balanced_data_stats)
  Variable     Mean Median Mode       SD Variance  Range
1      Age 27.30952  26.00   25 5.167856 26.70674 19, 40
2   Weight 63.51905  62.25   62 6.964167 48.49963 51, 82
> 
```

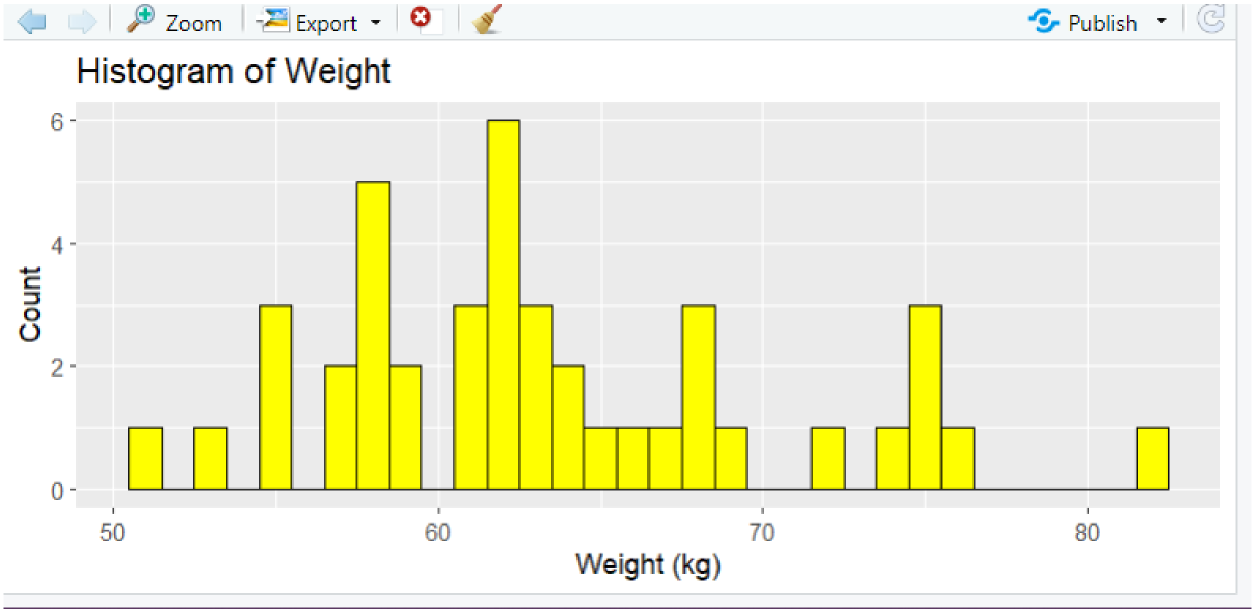
```
ggplot(balanced_data_undersampled, aes(x = Age)) + geom_histogram(binwidth = 1, fill = "skyblue", color = "black") + labs (title = "Histogram of Age", x = "Age", y = "Count")
```

- Histogram of Age which is continuous attribute



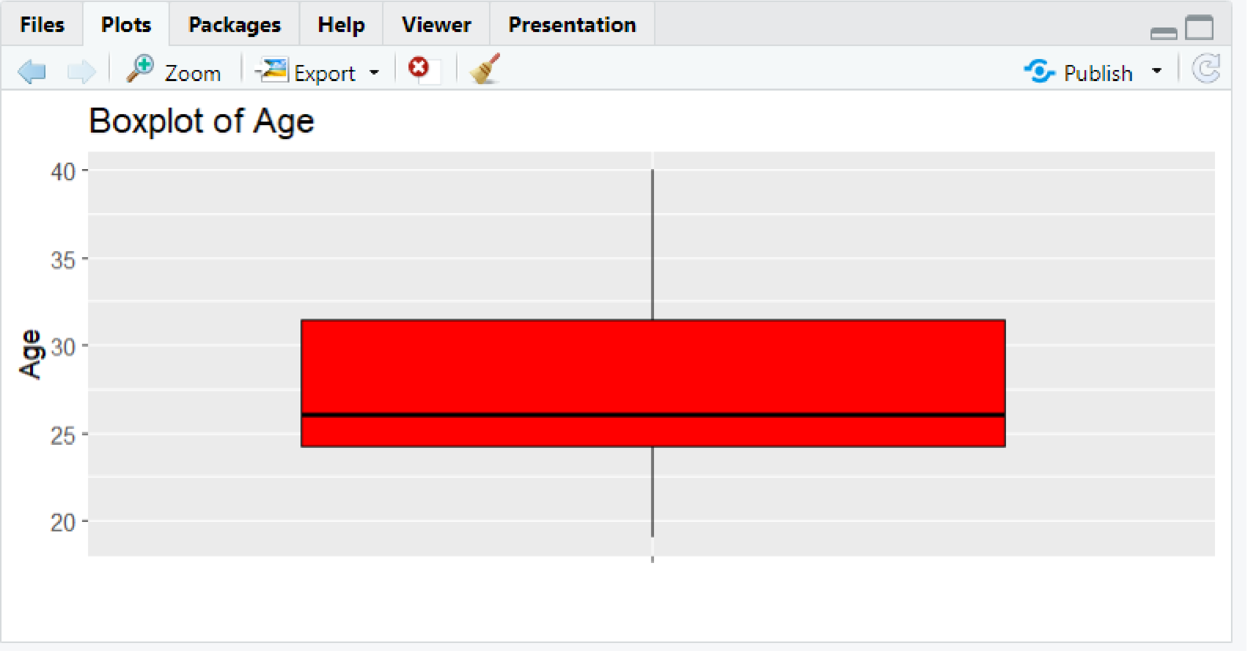
```
ggplot(balanced_data_undersampled, aes(x = weight.kg.)) + geom_histogram(binwidth = 1, fill = "yellow", color = "black") + labs(title = "Histogram of Weight", x = "Weight (kg)", y = "Count")
```

- Histogram of Weight which is continuous attribute



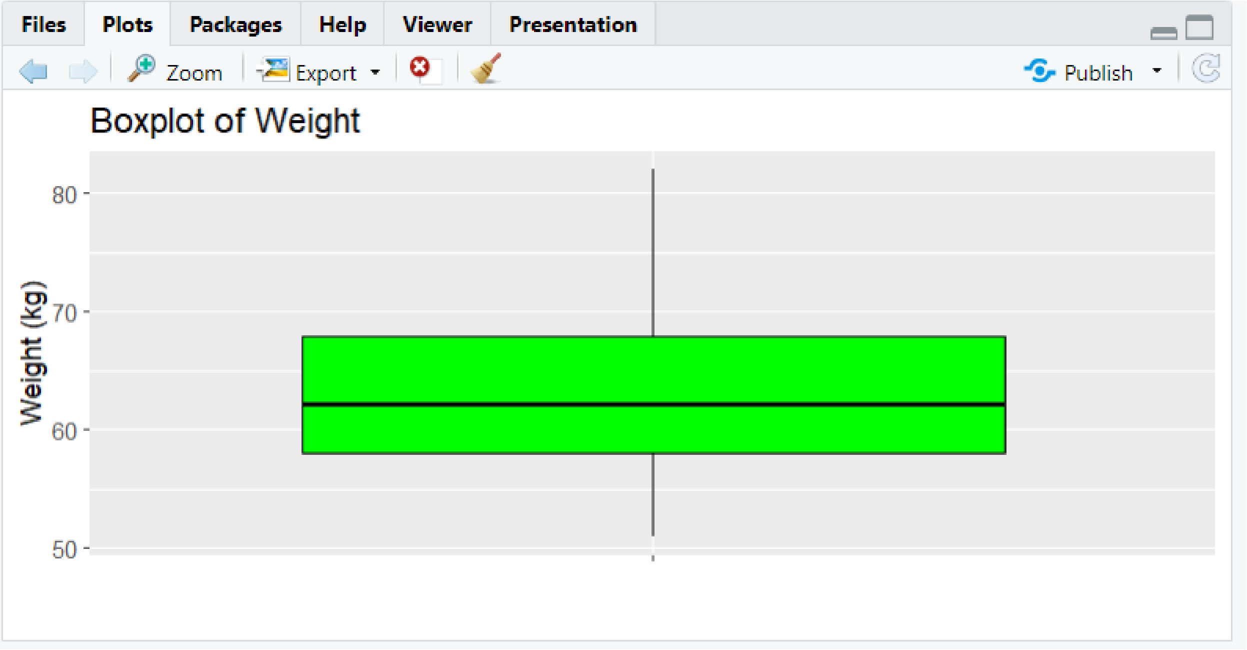
```
ggplot(balanced_data_undersampled, aes(x = "", y = Age)) + geom_boxplot(fill = "red", color = "black") +
 labs (title = "Boxplot of Age", x = "", y = "Age")
```

- Box Plot of Age which is continuous attribute



```
ggplot(balanced_data_undersampled, aes(x = "", y = weight.kg.)) + geom_boxplot(fill = "green", color =
"black") + labs(title = "Boxplot of Weight", x = "", y = "Weight (kg)")
```

- Box Plot of Wright which is continuous attribute


Files
Plots
Packages
Help
Viewer
Presentation
Zoom
Export
Publish
Boxplot of Weight
80
70
60
50
Weight (kg)