Smart Device Usage Analysis

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```r
#importing packages and loading them
#install.packages("tidyverse")
#install.packages("lubridate")
#install.packages("writexl")
#install.packages("xlsx")
#install.packages("dplyr")
#install.packages("xlsx")
#install.packages("ggplot2")
#install.packages("sqldf")
#install.packages("rmarkdown")

library(tidyverse)

## Warning: package 'tidyverse' was built under R version 4.1.3

## -- Attaching packages -------------------------------------- tidyverse
1.3.1 --

## v ggplot2 3.3.5      v purrr   0.3.4
## v tibble  3.1.6      v dplyr   1.0.8
## v tidyr   1.1.4      v stringr 1.4.0
## v readr   2.1.1      v forcats 0.5.1

## Warning: package 'ggplot2' was built under R version 4.1.3

## Warning: package 'dplyr' was built under R version 4.1.3

## -- Conflicts ----------------------------------------
tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()

library(readxl)
library(dplyr)
library(lubridate)

## Warning: package 'lubridate' was built under R version 4.1.3

##
## Attaching package: 'lubridate'

## The following objects are masked from 'package:base':
##
##     date, intersect, setdiff, union
```

```
library(writexl)

## Warning: package 'writexl' was built under R version 4.1.3

library(dplyr)
library(ggplot2)
library(sqldf)

## Warning: package 'sqldf' was built under R version 4.1.3

## Loading required package: gsubfn

## Warning: package 'gsubfn' was built under R version 4.1.3

## Loading required package: proto

## Warning: package 'proto' was built under R version 4.1.3

## Loading required package: RSQLite

## Warning: package 'RSQLite' was built under R version 4.1.3

library(rmarkdown)

## Warning: package 'rmarkdown' was built under R version 4.1.3

#=============================importing
files=====================================
getwd()

## [1] "C:/Users/ishad/Documents/Isha/RCaseStudy/RCaseStudy2/FitabaseData"

setwd("C:\\Users\\ishad\\Documents\\Isha\\RCaseStudy\\RCaseStudy2\\FitabaseDa
ta")
#------------------------------------------------------------------------
--------
dailyActivity <-

read.csv("C:\\Users\\ishad\\Documents\\Isha\\RCaseStudy\\RCaseStudy2\\Fitabas
eData\\dailyActivity_merged.csv")
#View(dailyActivity)

sleepDay <-

read.csv("C:\\Users\\ishad\\Documents\\Isha\\RCaseStudy\\RCaseStudy2\\Fitabas
eData\\sleepDay_merged.csv")
#View(sleepDay)

heartRateSec <-

read.csv("C:\\Users\\ishad\\Documents\\Isha\\RCaseStudy\\RCaseStudy2\\Fitabas
eData\\heartrate_seconds_merged.csv")
#View(heartRateSec)
```

```r
weightLog <-

read.csv("C:\\Users\\ishad\\Documents\\Isha\\RCaseStudy\\RCaseStudy2\\Fitabas
eData\\weightLogInfo_merged.csv")
#View(weightLog)

#==============================ORGANISING
DATA=================================
#STEP 1
#adding columns to dailyActivity data frame
actDate <- parse_date_time(dailyActivity$ActivityDate, "m/d/Y")

dailyActivity2 <-
mutate(dailyActivity,
       AvgDistance=(VeryActiveDistance+ModeratelyActiveDistance+
                    LightActiveDistance+SedentaryActiveDistance)/4,
       AvgActiveMin=(VeryActiveMinutes+FairlyActiveMinutes+
                     LightlyActiveMinutes)/3,
       DateOfActivity_YMD = as.Date(actDate,format="%Y/%m/%d")
      )

#changing type of Id to character from numeric
class(dailyActivity2$Id)="character"

str(dailyActivity2)

## 'data.frame':    940 obs. of  18 variables:
##  $ Id                    : chr  "1503960366" "1503960366" "1503960366"
"1503960366" ...
##  $ ActivityDate          : chr  "4/12/2016" "4/13/2016" "4/14/2016"
"4/15/2016" ...
##  $ TotalSteps            : int  13162 10735 10460 9762 12669 9705 13019
15506 10544 9819 ...
##  $ TotalDistance         : num  8.5 6.97 6.74 6.28 8.16 ...
##  $ TrackerDistance       : num  8.5 6.97 6.74 6.28 8.16 ...
##  $ LoggedActivitiesDistance: num  0 0 0 0 0 0 0 0 0 0 ...
##  $ VeryActiveDistance    : num  1.88 1.57 2.44 2.14 2.71 ...
##  $ ModeratelyActiveDistance: num  0.55 0.69 0.4 1.26 0.41 ...
##  $ LightActiveDistance   : num  6.06 4.71 3.91 2.83 5.04 ...
##  $ SedentaryActiveDistance : num  0 0 0 0 0 0 0 0 0 0 ...
##  $ VeryActiveMinutes     : int  25 21 30 29 36 38 42 50 28 19 ...
##  $ FairlyActiveMinutes   : int  13 19 11 34 10 20 16 31 12 8 ...
##  $ LightlyActiveMinutes  : int  328 217 181 209 221 164 233 264 205 211
...
##  $ SedentaryMinutes      : int  728 776 1218 726 773 539 1149 775 818
838 ...
##  $ Calories              : int  1985 1797 1776 1745 1863 1728 1921 2035
1786 1775 ...
##  $ AvgDistance           : num  2.12 1.74 1.69 1.56 2.04 ...
```

```
##  $ AvgActiveMin            : num  122 85.7 74 90.7 89 ...
##  $ DateOfActivity_YMD      : Date, format: "2016-04-12" "2016-04-13" ...
```

#STEP 2
#adding columns to sleepDay data frame
```
SlpTime = parse_date_time(sleepDay$SleepDay, "m/d/Y I:M:S p")
sleepDay2 <-
mutate(sleepDay,sleep_Date = as.Date(SlpTime,format = "%Y/%m/%d" ),
Sleep_Time =format(SlpTime,format = "%H:%M:%S") )
```


#changing type of Id to character from numeric
```
class(sleepDay2$Id)="character"

str(sleepDay2)

## 'data.frame':    413 obs. of  7 variables:
##  $ Id              : chr  "1503960366" "1503960366" "1503960366"
"1503960366" ...
##  $ SleepDay        : chr  "4/12/2016 12:00:00 AM" "4/13/2016 12:00:00
AM" "4/15/2016 12:00:00 AM" "4/16/2016 12:00:00 AM" ...
##  $ TotalSleepRecords : int  1 2 1 2 1 1 1 1 1 1 ...
##  $ TotalMinutesAsleep: int  327 384 412 340 700 304 360 325 361 430 ...
##  $ TotalTimeInBed    : int  346 407 442 367 712 320 377 364 384 449 ...
##  $ sleep_Date        : Date, format: "2016-04-12" "2016-04-13" ...
##  $ Sleep_Time        : chr  "00:00:00" "00:00:00" "00:00:00" "00:00:00"
...
```

#STEP 3
MERGING DATA FRAMES OF dailyActivity AND sleepDay
```
MergeActivitySleep <-
sqldf("select d.Id, d.TotalSteps,d.TotalDistance,
      d.TrackerDistance,d.LoggedActivitiesDistance,
      d.SedentaryMinutes,d.Calories,d.AvgDistance,
      d.AvgActiveMin,d.DateOfActivity_YMD,s.sleep_Date,
      s.Sleep_Time,s.TotalSleepRecords,s.TotalMinutesAsleep,
      s.TotalTimeInBed
      from dailyActivity2 d
      inner join sleepDay2 s
      on d.Id = s.Id
      where d.DateOfActivity_YMD == s.sleep_Date
      ")
```
#View(MergeActivitySleep)

#STEP 4
#adding columns to heartRateSec data frame
```
SleepTime = parse_date_time(heartRateSec$Time, "m/d/Y I:M:S p")
heartRateSec1 <- mutate(heartRateSec, heartRateDate_YMD =
as.Date(SleepTime,format = "%Y/%m/%d"),heartRateTime =format(SleepTime,format
= "%H:%M:%S")  )
```

```r
#changing data type of id to character from numeric
class(heartRateSec1$Id)="character"

str(heartRateSec1)

## 'data.frame':    2483658 obs. of  5 variables:
##  $ Id              : chr  "2022484408" "2022484408" "2022484408"
"2022484408" ...
##  $ Time            : chr  "4/12/2016 7:21:00 AM" "4/12/2016 7:21:05 AM"
"4/12/2016 7:21:10 AM" "4/12/2016 7:21:20 AM" ...
##  $ Value           : int  97 102 105 103 101 95 91 93 94 93 ...
##  $ heartRateDate_YMD: Date, format: "2016-04-12" "2016-04-12" ...
##  $ heartRateTime   : chr  "07:21:00" "07:21:05" "07:21:10" "07:21:20" ...

#STEP 5
# CERATING heart rate summary data frame by finding average/max/min
heartrates for each user
heartRateSmry <-
  sqldf("select Id,heartRateDate_YMD,count(Id) as HeartRateReadingCount,
      avg(Value) as AverageHeartRate,
      max(Value) as MaxHeartRate,min(Value) as MinHeartRate
      from heartRateSec1
      group by Id, heartRateDate_YMD")
#View(heartRateSmry)
colnames(heartRateSmry)

## [1] "Id"                    "heartRateDate_YMD"
"HeartRateReadingCount"
## [4] "AverageHeartRate"      "MaxHeartRate"         "MinHeartRate"

#colnames(MergeActivitySleep)

#STEP 6
#MERGING DATA FRAME FOR dailyActivity and sleep with heartratesec data frame
MergeActivitySleepHeartRate <-
  sqldf("select MergeActivitySleep.*,
      m.heartRateDate_YMD,m.HeartRateReadingCount,
      m.AverageHeartRate,m.MaxHeartRate,m.MinHeartRate
      from MergeActivitySleep
      inner join heartRateSmry m
      on MergeActivitySleep.Id = m.Id
      where MergeActivitySleep.DateOfActivity_YMD == m.heartRateDate_YMD
      ")
#View(MergeActivitySleepHeartRate)
str(MergeActivitySleepHeartRate)

## 'data.frame':    182 obs. of  20 variables:
##  $ Id              : chr  "2026352035" "2026352035" "2026352035"
"2026352035" ...
##  $ TotalSteps      : int  838 6017 7018 10685 10352 10129 10465
```

```
5472 8247 6711 ...
##  $ TotalDistance          : num  0.52 3.73 4.35 6.62 7.01 ...
##  $ TrackerDistance        : num  0.52 3.73 4.35 6.62 7.01 ...
##  $ LoggedActivitiesDistance: num  0 0 0 0 0 0 0 0 0 ...
##  $ SedentaryMinutes       : int  1053 821 716 543 676 705 720 508 678 648
...
##  $ Calories               : int  1214 1576 1690 1869 2038 2010 2133 1882
1944 2346 ...
##  $ AvgDistance            : num  0.13 0.933 1.087 1.65 1.753 ...
##  $ AvgActiveMin           : num  20 86.7 118.3 133.7 82 ...
##  $ DateOfActivity_YMD     : Date, format: "2016-04-17" "2016-04-25" ...
##  $ sleep_Date             : Date, format: "2016-04-17" "2016-04-25" ...
##  $ Sleep_Time             : chr  "00:00:00" "00:00:00" "00:00:00"
"00:00:00" ...
##  $ TotalSleepRecords      : int  1 1 1 1 1 1 1 1 1 1 ...
##  $ TotalMinutesAsleep     : int  437 506 511 531 467 445 452 556 500 465
...
##  $ TotalTimeInBed         : int  498 531 543 556 531 489 504 602 557 514
...
##  $ heartRateDate_YMD      : Date, format: "2016-04-17" "2016-04-25" ...
##  $ HeartRateReadingCount  : int  192 516 431 1351 9268 9153 9557 8990
9339 7824 ...
##  $ AverageHeartRate       : num  68.7 99.5 84.1 98.2 73.8 ...
##  $ MaxHeartRate           : int  80 125 122 123 158 154 136 134 134 195
...
##  $ MinHeartRate           : int  63 70 70 70 55 52 55 55 53 53 ...
```

```
#STEP 7
#changing data type of id and log id to character from numeric
class(weightLog$Id)="character"
class(weightLog$LogId)="character"

#adding columns to weightLog data frame
wtLogTime = parse_date_time(weightLog$Date, "m/d/Y I:M:S p")
weightLog2 <-
  mutate(weightLog,WeightLogDate_YMD = as.Date(wtLogTime,format = "%Y/%m/%d"
),
        WeightLogTime =format(wtLogTime,format = "%H:%M:%S") )
#View(weightLog2)
colnames(weightLog2)
```

```
##  [1] "Id"              "Date"            "WeightKg"
##  [4] "WeightPounds"    "Fat"             "BMI"
##  [7] "IsManualReport"  "LogId"           "WeightLogDate_YMD"
## [10] "WeightLogTime"
```

```
#MERGING DATA FROM MergeActivitySleepHeartRate AND weightLog2
MergeActivitySleepHeartRateWeight <-
  sqldf("select MergeActivitySleepHeartRate.*,
    w.WeightKg,w.WeightPounds,w.BMI,w.IsManualReport,w.LogId,
```

```
    w.WeightLogDate_YMD,w.WeightLogTime
    from MergeActivitySleepHeartRate
    inner join weightLog2 w
    on MergeActivitySleepHeartRate.Id = w.Id
    where MergeActivitySleepHeartRate.DateOfActivity_YMD ==
w.WeightLogDate_YMD")

#View(MergeActivitySleepHeartRateWeight)
str(MergeActivitySleepHeartRateWeight)

## 'data.frame':    32 obs. of  27 variables:
##  $ Id                   : chr  "4558609924" "5577150313" "6962181067"
"6962181067" ...
##  $ TotalSteps           : int  3428 12231 10199 5652 1551 5563 13217
10145 11404 10742 ...
##  $ TotalDistance        : num  2.27 9.14 6.74 3.74 1.03 ...
##  $ TrackerDistance      : num  2.27 9.14 6.74 3.74 1.03 ...
##  $ LoggedActivitiesDistance: num  0 0 0 0 0 0 0 0 0 0 ...
##  $ SedentaryMinutes     : int  1121 525 796 548 862 837 741 634 689 659
...
##  $ Calories             : int  1692 4552 1994 1718 1466 1756 2173 2027
2039 2046 ...
##  $ AvgDistance          : num  0.567 2.282 1.685 0.935 0.257 ...
##  $ AvgActiveMin         : num  63.3 132 84.3 58 28.7 ...
##  $ DateOfActivity_YMD   : Date, format: "2016-05-01" "2016-04-17" ...
##  $ sleep_Date           : Date, format: "2016-05-01" "2016-04-17" ...
##  $ Sleep_Time           : chr  "00:00:00" "00:00:00" "00:00:00"
"00:00:00" ...
##  $ TotalSleepRecords    : int  1 1 1 3 2 1 1 1 1 1 ...
##  $ TotalMinutesAsleep   : int  115 549 366 630 508 370 357 427 442 476
...
##  $ TotalTimeInBed       : int  129 583 387 679 535 386 366 446 458 535
...
##  $ heartRateDate_YMD    : Date, format: "2016-05-01" "2016-04-17" ...
##  $ HeartRateReadingCount: int  5231 8950 9196 8266 8089 8355 9880 8265
7963 8612 ...
##  $ AverageHeartRate     : num  70.8 71.1 85 80.5 70.1 ...
##  $ MaxHeartRate         : int  127 174 176 149 131 115 142 139 134 135
...
##  $ MinHeartRate         : int  53 40 47 59 55 54 55 58 55 58 ...
##  $ WeightKg             : num  69.9 90.7 62.5 62.1 61.7 ...
##  $ WeightPounds         : num  154 200 138 137 136 ...
##  $ BMI                  : num  27.3 28 24.4 24.2 24.1 ...
##  $ IsManualReport       : chr  "True" "False" "True" "True" ...
##  $ LogId                : chr  "1462147199000" "1460884675000"
"1460505599000" "1460591999000" ...
##  $ WeightLogDate_YMD    : Date, format: "2016-05-01" "2016-04-17" ...
##  $ WeightLogTime        : chr  "23:59:59" "09:17:55" "23:59:59"
"23:59:59" ...
```
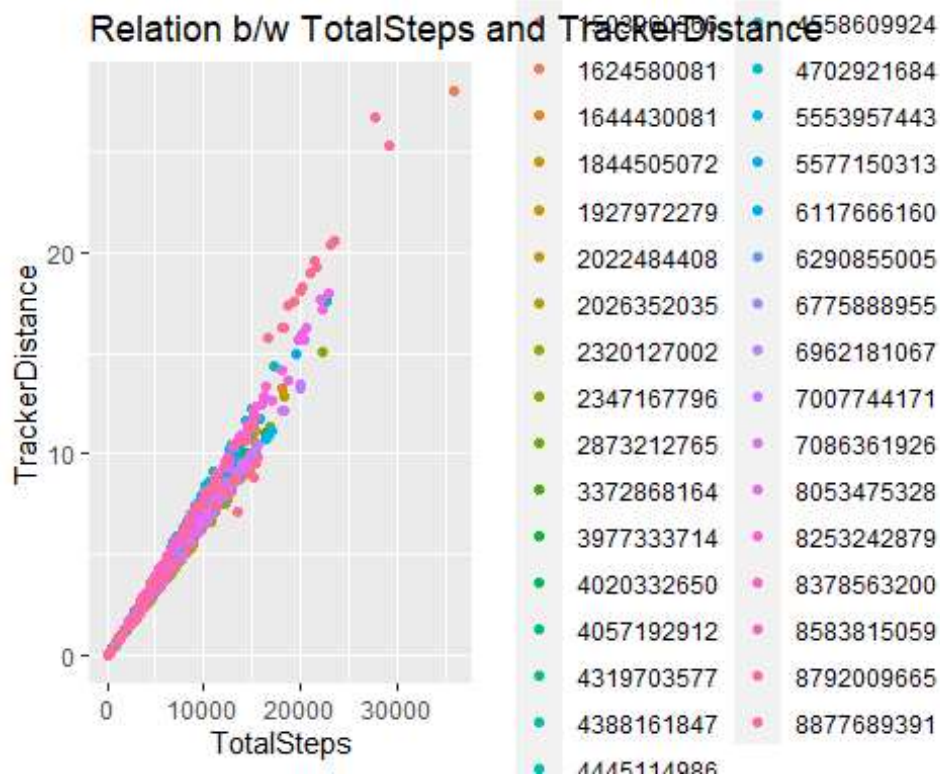
```
#========================CREATING
VISUALIZATIONS====================================

#RELATION BETWEEN TOTOL STEPS AND DISTANCE INTENSITIES
  #1 relation between steps and TrackerDistance
ggplot(dailyActivity2)+
  geom_point(mapping = aes(x=TotalSteps,y=TrackerDistance,color=Id))+
  labs(title = "Relation b/w TotalSteps and TrackerDistance")
```
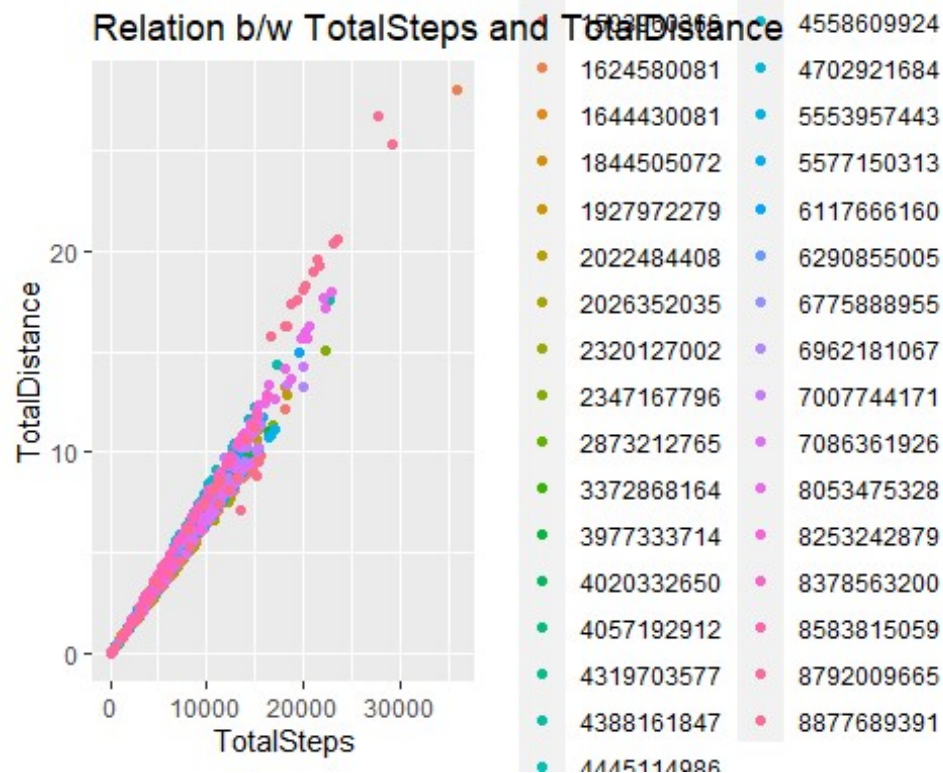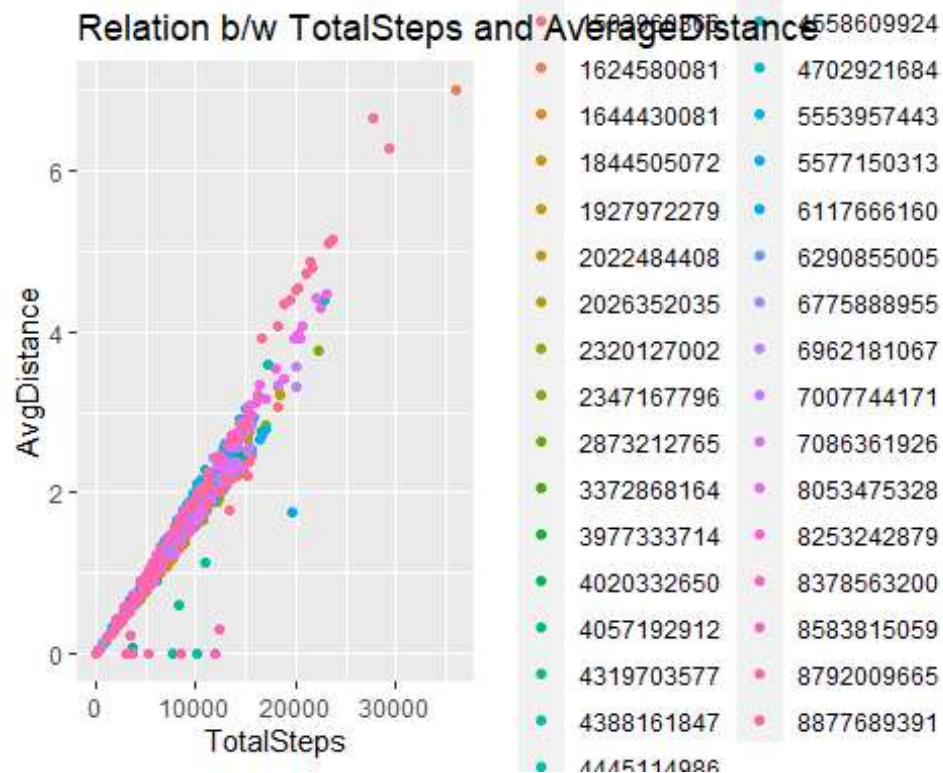

Relation b/w TotalSteps and TrackerDistance

```
  #2 relation between steps and Total Distance
ggplot(dailyActivity2)+
  geom_point(mapping = aes(x=TotalSteps,y=TotalDistance,color=Id))+
  labs(title = "Relation b/w TotalSteps and TotalDistance")
```

Relation b/w TotalSteps and TotalDistance

Legend (Id):

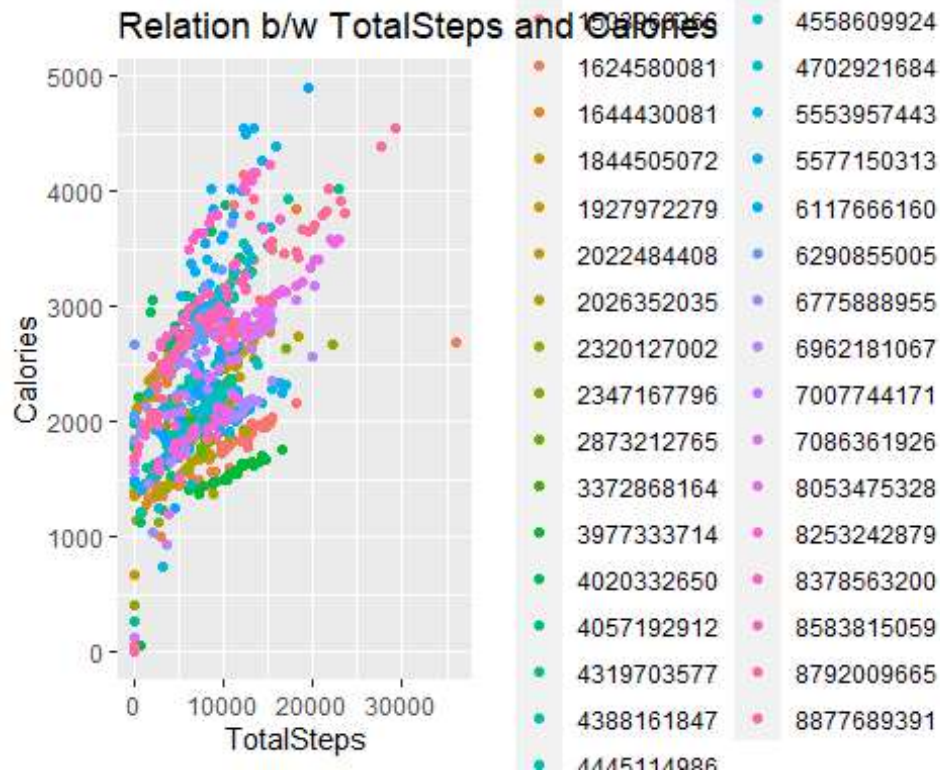|	
1503960366	4558609924
1624580081	4702921684
1644430081	5553957443
1844505072	5577150313
1927972279	6117666160
2022484408	6290855005
2026352035	6775888955
2320127002	6962181067
2347167796	7007744171
2873212765	7086361926
3372868164	8053475328
3977333714	8253242879
4020332650	8378563200
4057192912	8583815059
4319703577	8792009665
4388161847	8877689391
4445114986	

```
#3 relation between steps and average distance
ggplot(dailyActivity2)+
  geom_point(mapping = aes(x=TotalSteps,y=AvgDistance,color=Id))+
  labs(title = "Relation b/w TotalSteps and AverageDistance")
```

Relation b/w TotalSteps and AverageDistance

AvgDistance (y-axis): 0, 2, 4, 6
TotalSteps (x-axis): 0, 10000, 20000, 30000

Legend (Id):
- 4503866058 / 4558609924
- 1624580081 / 4702921684
- 1644430081 / 5553957443
- 1844505072 / 5577150313
- 1927972279 / 6117666160
- 2022484408 / 6290855005
- 2026352035 / 6775888955
- 2320127002 / 6962181067
- 2347167796 / 7007744171
- 2873212765 / 7086361926
- 3372868164 / 8053475328
- 3977333714 / 8253242879
- 4020332650 / 8378563200
- 4057192912 / 8583815059
- 4319703577 / 8792009665
- 4388161847 / 8877689391
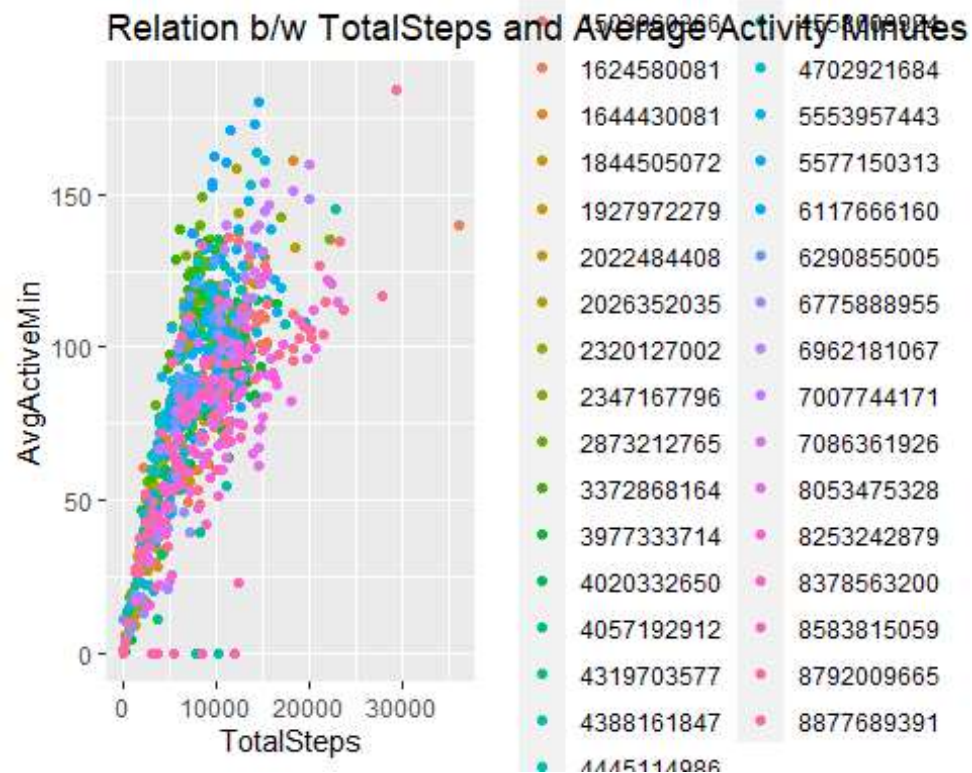- 4445114986

```r
#RELATION BETWEEN TOTAL STEPS AND CALORIES
ggplot(dailyActivity2)+
  geom_point(mapping = aes(x=TotalSteps,y=Calories,color=Id))+
  labs(title = "Relation b/w TotalSteps and Calories")
```

Relation b/w TotalSteps and Calories

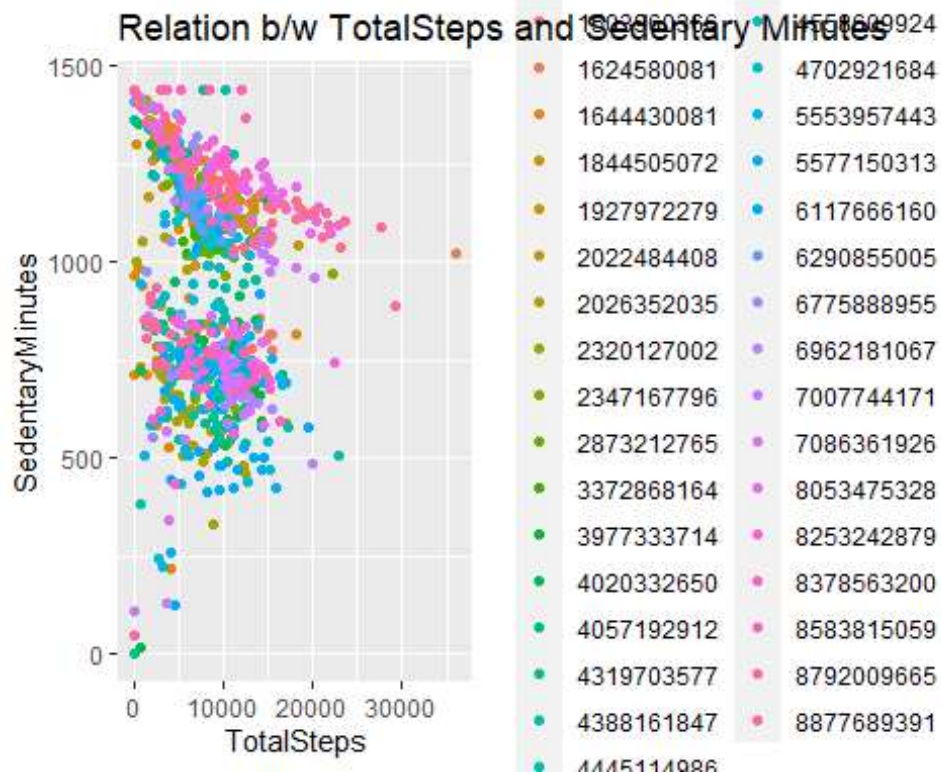| Id	
1503960366	4558609924
1624580081	4702921684
1644430081	5553957443
1844505072	5577150313
1927972279	6117666160
2022484408	6290855005
2026352035	6775888955
2320127002	6962181067
2347167796	7007744171
2873212765	7086361926
3372868164	8053475328
3977333714	8253242879
4020332650	8378563200
4057192912	8583815059
4319703577	8792009665
4388161847	8877689391
4445114986	

```r
#RELATION BETWEEN TOTAL STEPS AND ACTIVITY MINUTES
  #1 Active minutes
ggplot(dailyActivity2)+
  geom_point(mapping = aes(x=TotalSteps,y=AvgActiveMin,color=Id))+
  labs(title = "Relation b/w TotalSteps and Average Activity Minutes")
```
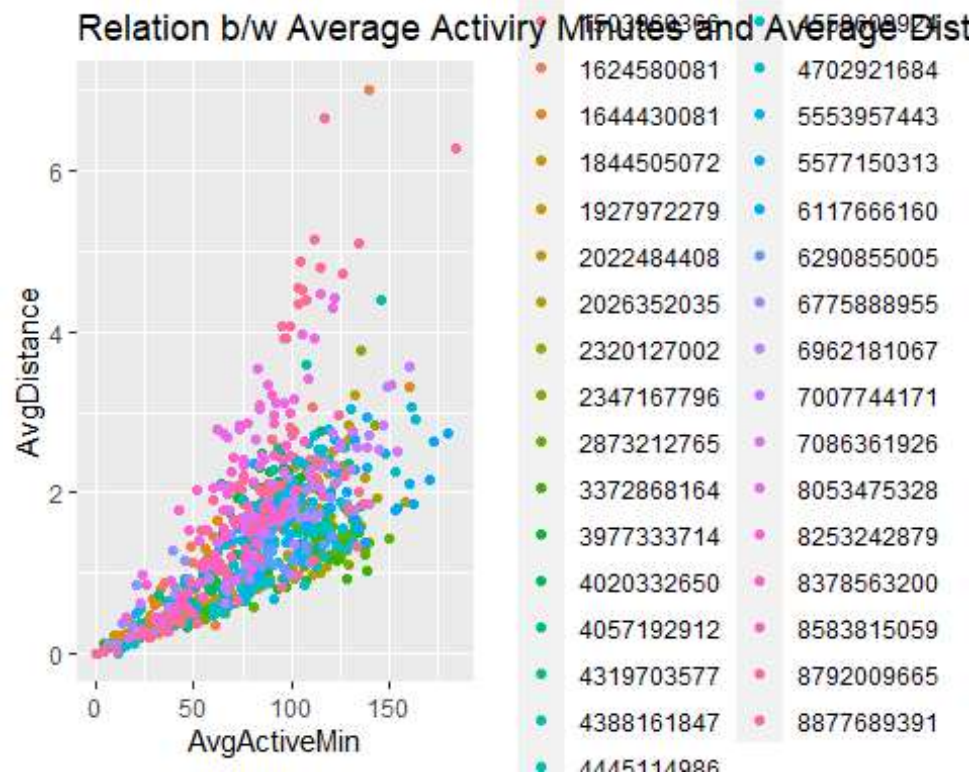
Relation b/w TotalSteps and Average Activity Minutes

Id		Id	
• 1624580081		• 4702921684	
• 1644430081		• 5553957443	
• 1844505072		• 5577150313	
• 1927972279		• 6117666160	
• 2022484408		• 6290855005	
• 2026352035		• 6775888955	
• 2320127002		• 6962181067	
• 2347167796		• 7007744171	
• 2873212765		• 7086361926	
• 3372868164		• 8053475328	
• 3977333714		• 8253242879	
• 4020332650		• 8378563200	
• 4057192912		• 8583815059	
• 4319703577		• 8792009665	
• 4388161847		• 8877689391	
• 4445114986			

```r
#2 Sedentary minutes
ggplot(dailyActivity2)+
  geom_point(mapping = aes(x=TotalSteps,y=SedentaryMinutes,color=Id))+
  labs(title = "Relation b/w TotalSteps and Sedentary Minutes")
```
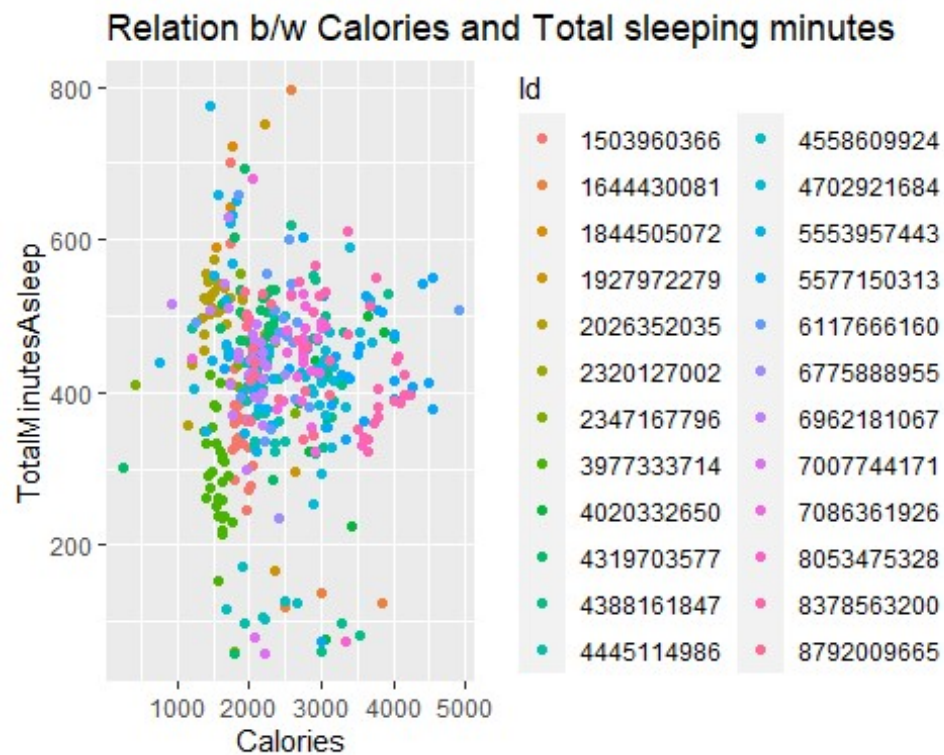
Relation b/w TotalSteps and Sedentary Minutes

Legend (Id):

1624580081	4702921684
1644430081	5553957443
1844505072	5577150313
1927972279	6117666160
2022484408	6290855005
2026352035	6775888955
2320127002	6962181067
2347167796	7007744171
2873212765	7086361926
3372868164	8053475328
3977333714	8253242879
4020332650	8378563200
4057192912	8583815059
4319703577	8792009665
4388161847	8877689391
4445114986	

```r
#RELATION BETWEEN AVERAGE ACTIVITY MINUTES AND AVERAGE DISTANCE INTENSITY
ggplot(dailyActivity2)+
  geom_point(mapping = aes(x=AvgActiveMin,y=AvgDistance,color=Id))+
  labs(title = "Relation b/w Average Activiry Minutes and Average Distance")
```

Relation b/w Average Activiry Minutes and Average Dist

Legend (Id):
1624580081, 1644430081, 1844505072, 1927972279, 2022484408, 2026352035, 2320127002, 2347167796, 2873212765, 3372868164, 3977333714, 4020332650, 4057192912, 4319703577, 4388161847, 4445114986, 4702921684, 5553957443, 5577150313, 6117666160, 6290855005, 6775888955, 6962181067, 7007744171, 7086361926, 8053475328, 8253242879, 8378563200, 8583815059, 8792009665, 8877689391

```
#RELATION BETWEEN CALORIES AND SLEEP
ggplot(MergeActivitySleep)+
  geom_point(mapping = aes(x=Calories,y=TotalMinutesAsleep,color=Id))+
  labs(title = "Relation b/w Calories and Total sleeping minutes")
```

Relation b/w Calories and Total sleeping minutes

Id

• 1503960366	• 4558609924
• 1644430081	• 4702921684
• 1844505072	• 5553957443
• 1927972279	• 5577150313
• 2026352035	• 6117666160
• 2320127002	• 6775888955
• 2347167796	• 6962181067
• 3977333714	• 7007744171
• 4020332650	• 7086361926
• 4319703577	• 8053475328
• 4388161847	• 8378563200
• 4445114986	• 8792009665

```
#RELATION BETWEEN TOTAL STEPS AND SLEEP
ggplot(MergeActivitySleep)+
  geom_point(mapping = aes(x=TotalSteps,y=TotalMinutesAsleep,color=Id))+
  labs(title = "Relation b/w TotalSteps and Total sleeping minutes")
```

Relation b/w TotalSteps and Total sleeping minutes

Id

1503960366	4558609924
1644430081	4702921684
1844505072	5553957443
1927972279	5577150313
2026352035	6117666160
2320127002	6775888955
2347167796	6962181067
3977333714	7007744171
4020332650	7086361926
4319703577	8053475328
4388161847	8378563200
4445114986	8792009665
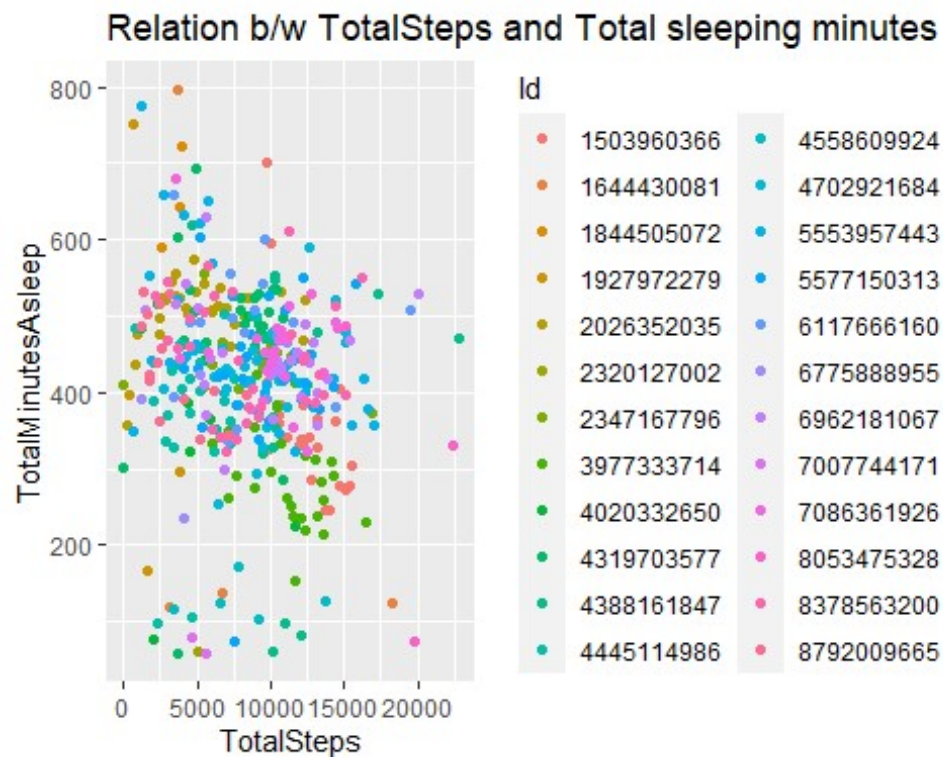
```
#RELATION BETWEEN AVERAGE DISTANCE INTENSITIES  AND SLEEP
ggplot(MergeActivitySleep)+
  geom_point(mapping = aes(x=AvgDistance,y=TotalMinutesAsleep,color=Id))+
  labs(title = "Relation b/w Average distance intensities and Total sleeping
minutes")
```

Relation b/w Average distance intensities and Total sl
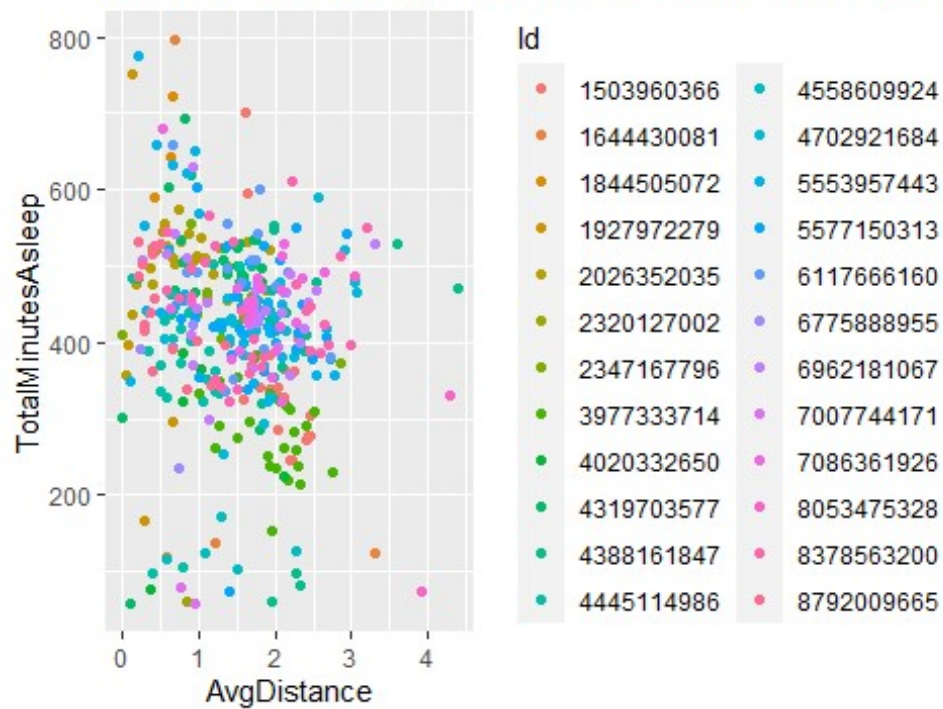

```
#RELATION BETWEEN AVERAGE ACTIVITY MINUTES AND SLEEP
ggplot(MergeActivitySleep)+
  geom_point(mapping = aes(x=AvgActiveMin,y=TotalMinutesAsleep,color=Id))+
  labs(title = "Relation b/w Average active minutes and Total sleeping
minutes")
```
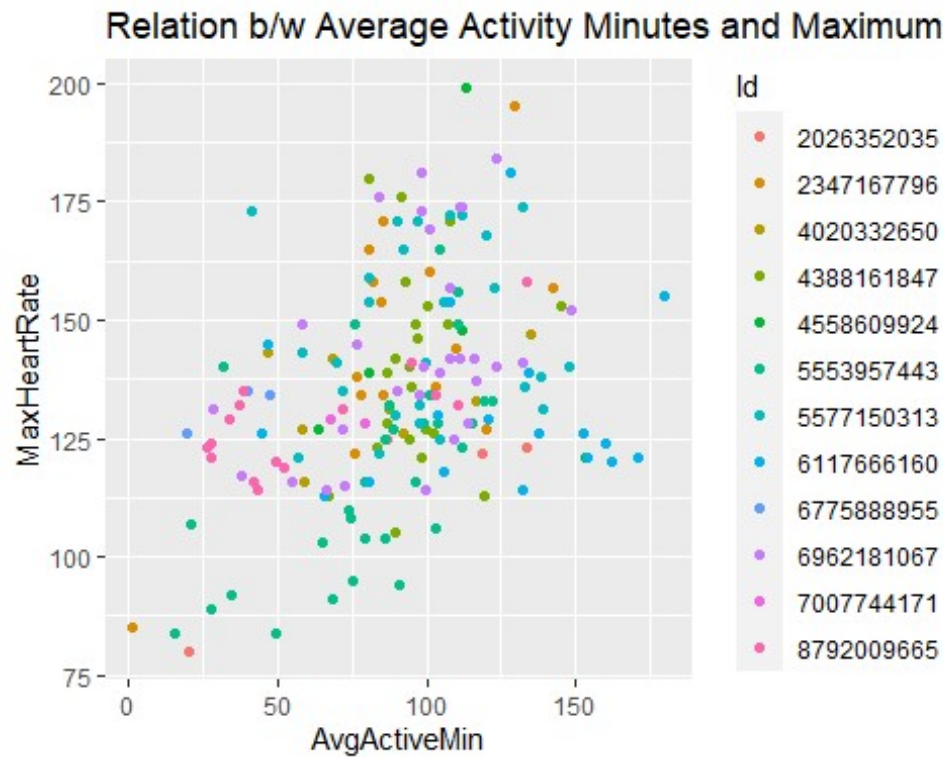
Relation b/w Average active minutes and Total sleepir
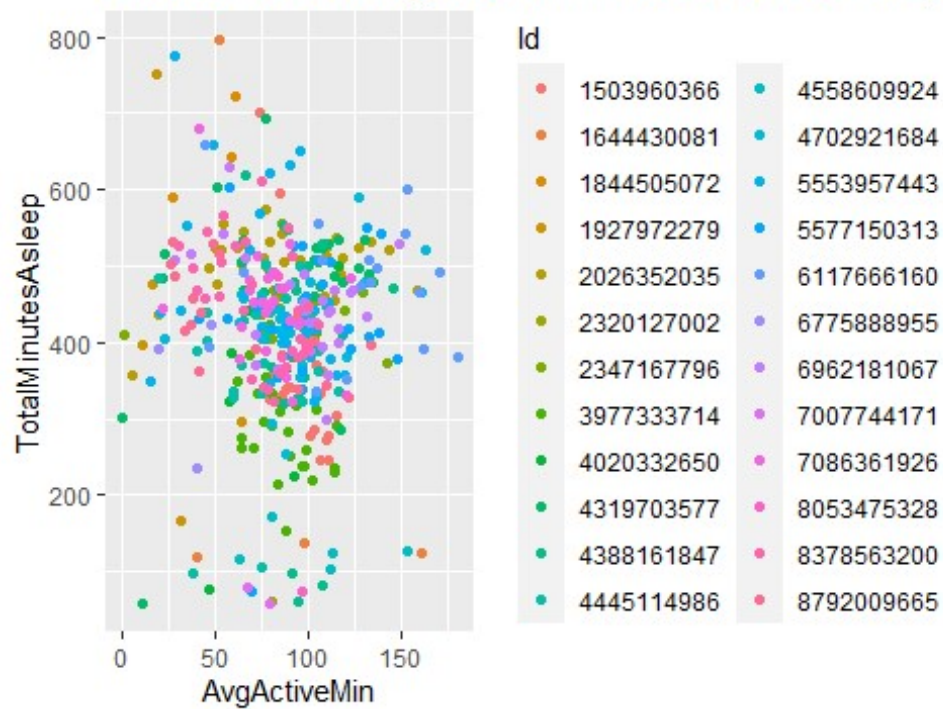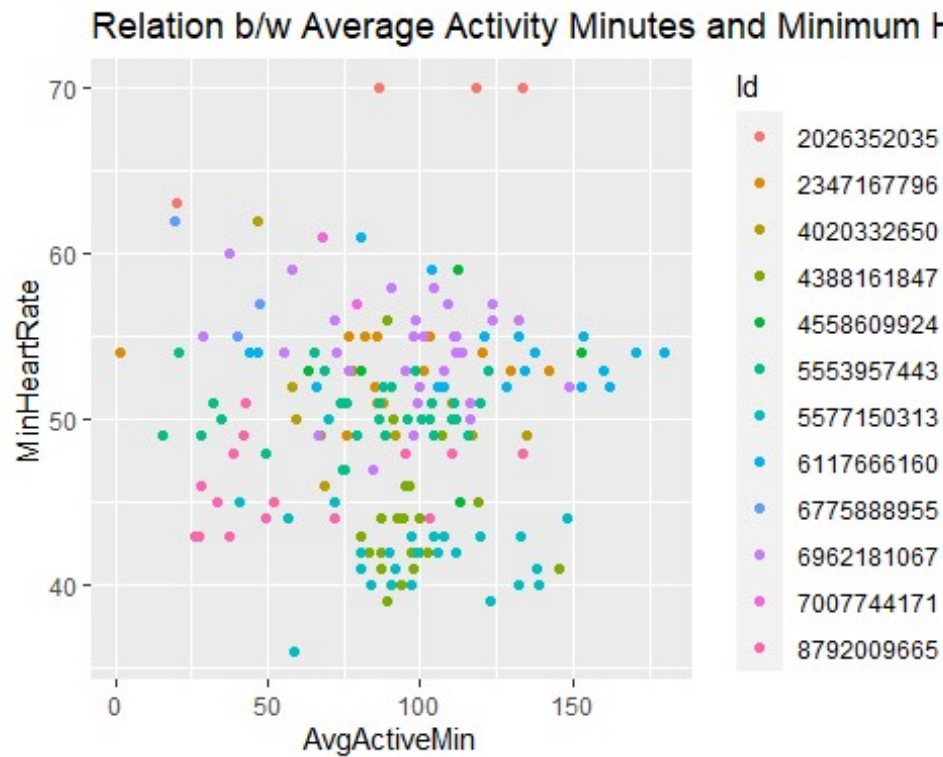
```
#RELATION BETWEEN STEPS AND HEARTRATE
  #1  Average Heart Rate
ggplot(MergeActivitySleepHeartRate)+
  geom_point(mapping = aes(x=TotalSteps,y=AverageHeartRate,color=Id))+
  labs(title = "Relation b/w Total Steps and Average Heart Rate")
```
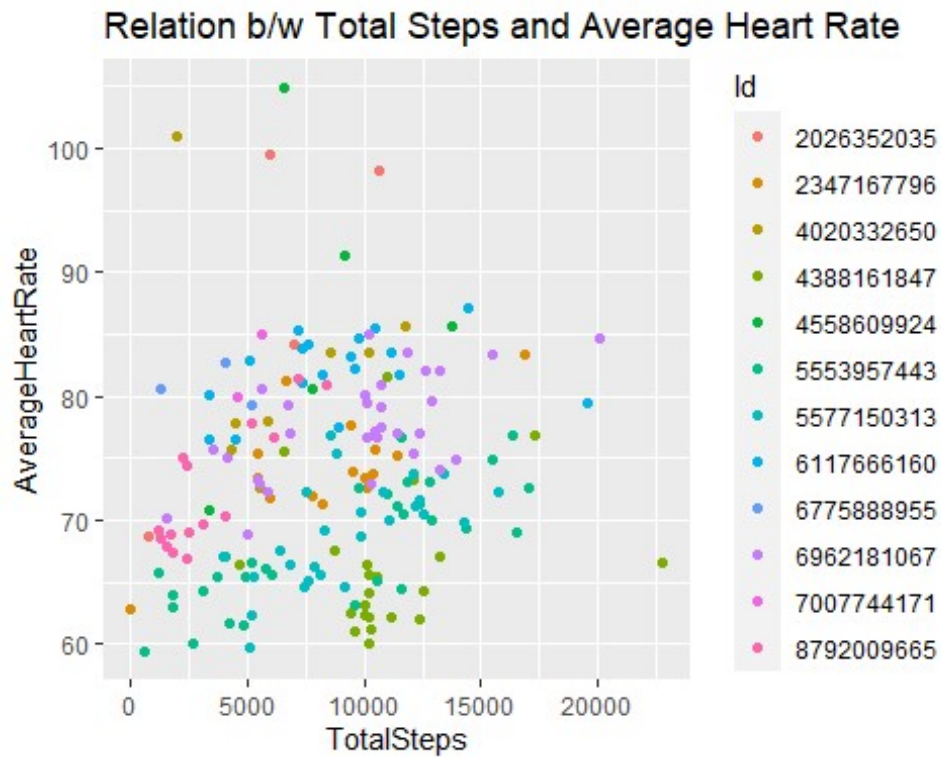
Relation b/w Total Steps and Average Heart Rate


```
#2  Maximum Heart Rate
ggplot(MergeActivitySleepHeartRate)+
  geom_point(mapping = aes(x=TotalSteps,y=MaxHeartRate,color=Id))+
  labs(title = "Relation b/w Total Steps and Maximum Heart Rate for each user
")
```
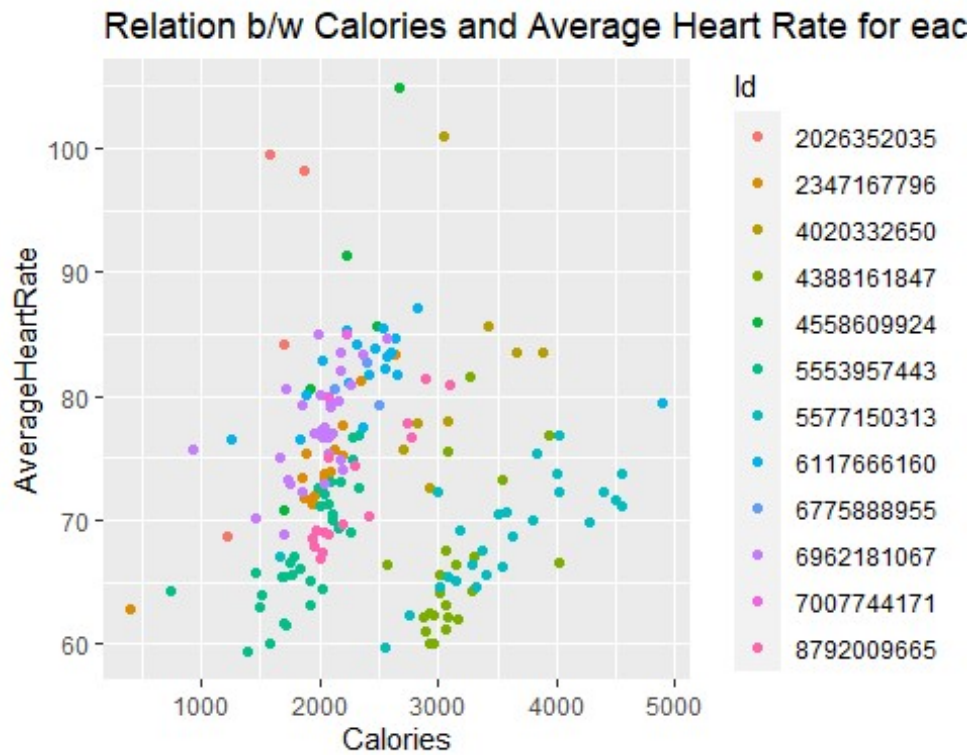
Relation b/w Total Steps and Maximum Heart Rate for
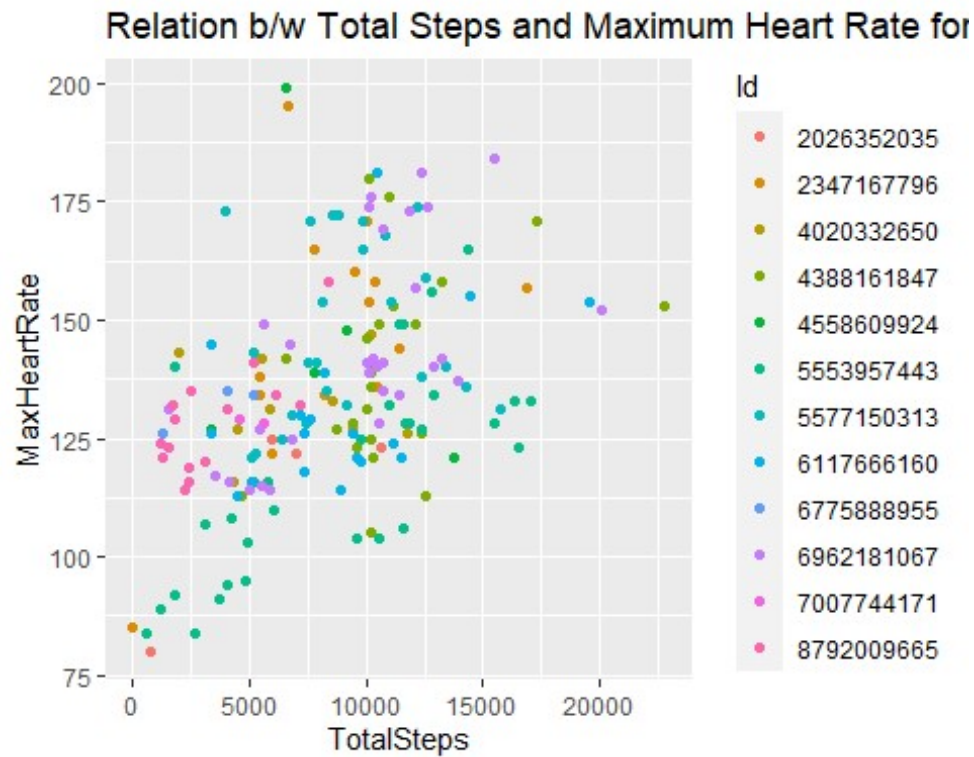
```
#3  Minimum Heart Rate
ggplot(MergeActivitySleepHeartRate)+
  geom_point(mapping = aes(x=TotalSteps,y=MinHeartRate,color=Id))+
  labs(title = "Relation b/w Total Steps and Minimum Heart Rate for each
user")
```

Relation b/w Total Steps and Minimum Heart Rate for e
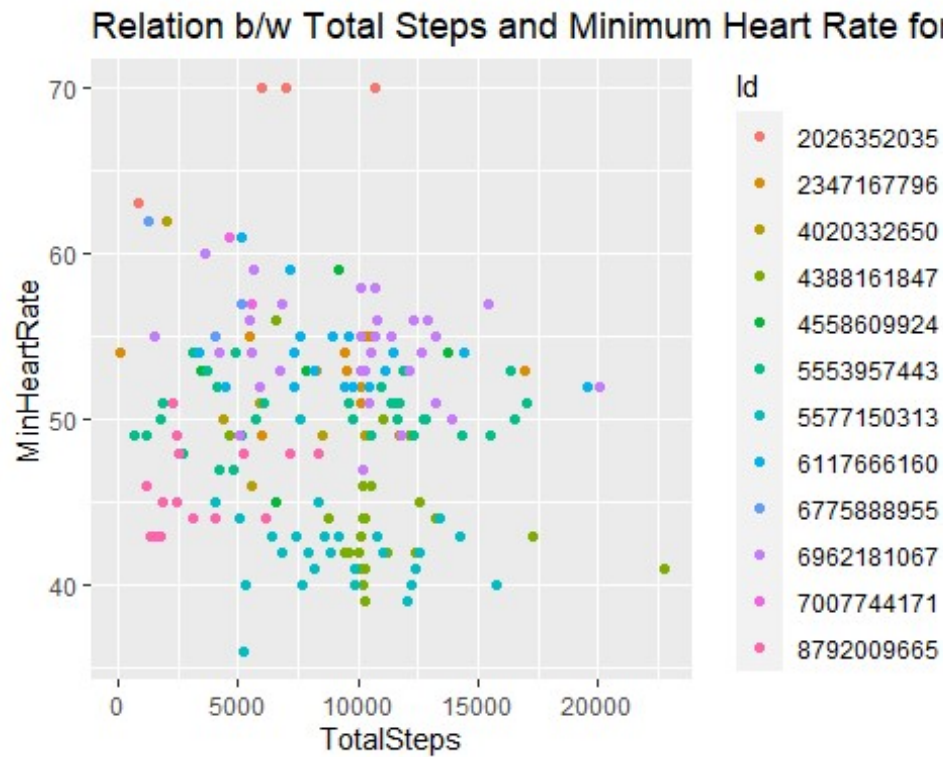
```
#RELATION BETWEEN AVERAGE ACTIVITY MINUTES AND HEARTRATE
  #1  Average Heart Rate
ggplot(MergeActivitySleepHeartRate)+
  geom_point(mapping = aes(x=AvgActiveMin,y=AverageHeartRate,color=Id))+
labs(title = "Relation b/w Average Activity Minutes and Average Heart Rate
for each user")
```
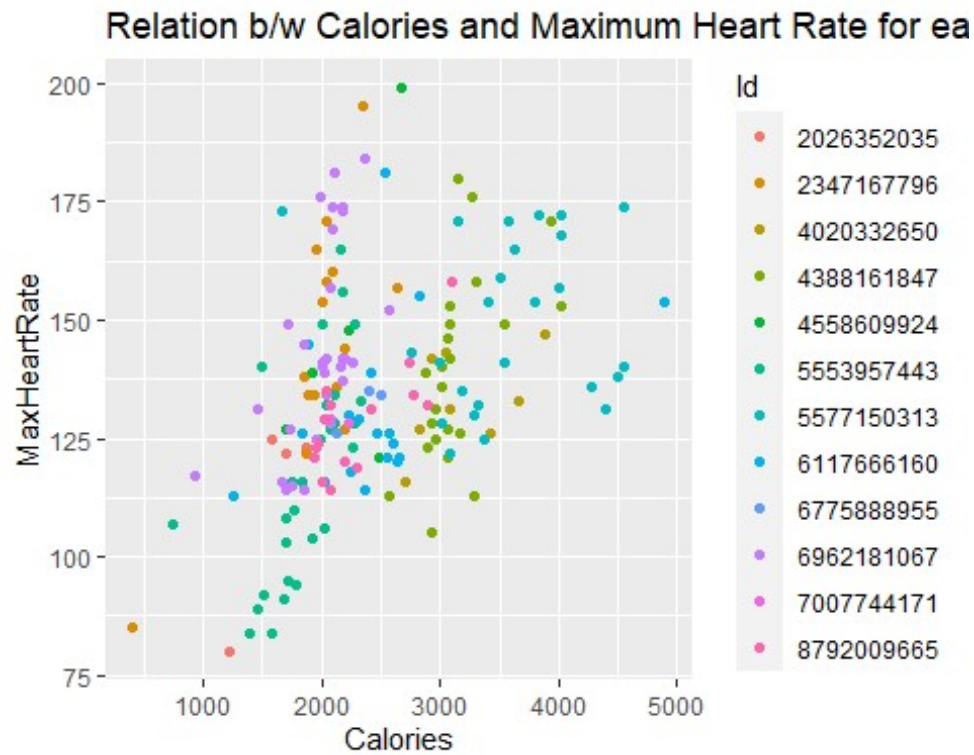
Relation b/w Average Activity Minutes and Average He[...]
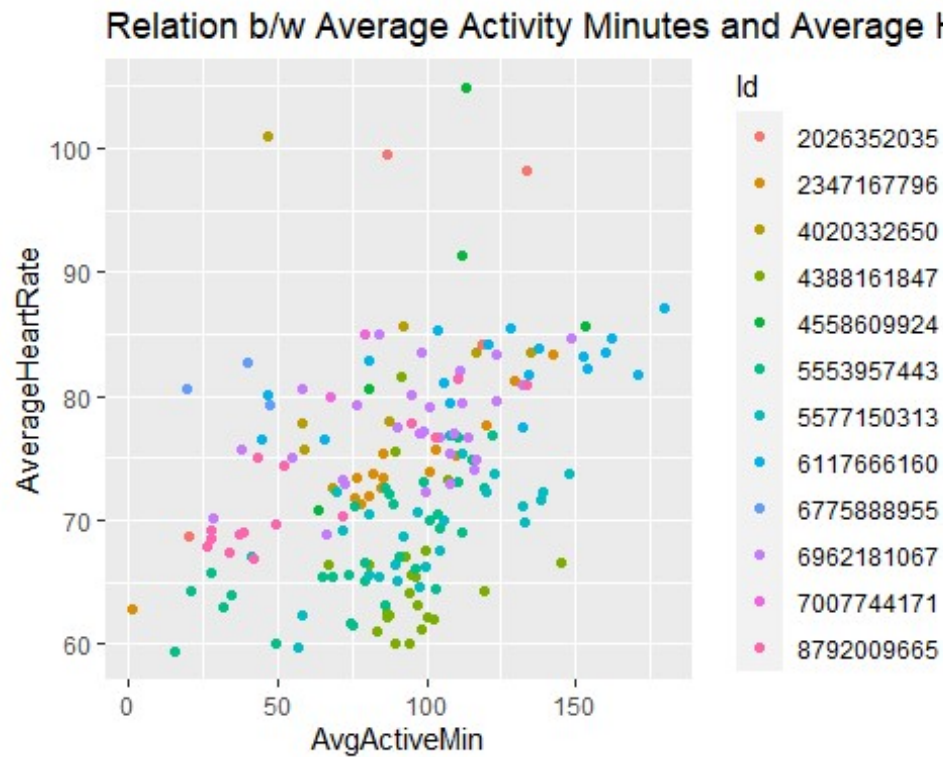
```
#2  Maximum Heart Rate
ggplot(MergeActivitySleepHeartRate)+
  geom_point(mapping = aes(x=AvgActiveMin,y=MaxHeartRate,color=Id))+
labs(title = "Relation b/w Average Activity Minutes and Maximum Heart Rate
for each user")
```

Relation b/w Average Activity Minutes and Maximum Heart Rate

```
#3  Minimum Heart Rate
ggplot(MergeActivitySleepHeartRate)+
  geom_point(mapping = aes(x=AvgActiveMin,y=MinHeartRate,color=Id))+
labs(title = "Relation b/w Average Activity Minutes and Minimum Heart Rate
for each user")
```

Relation b/w Average Activity Minutes and Minimum He

Id
- 2026352035
- 2347167796
- 4020332650
- 4388161847
- 4558609924
- 5553957443
- 5577150313
- 6117666160
- 6775888955
- 6962181067
- 7007744171
- 8792009665

```
#RELATION BETWEEN CALORIES AND HEARTRATE
#1  Average Heart Rate
ggplot(MergeActivitySleepHeartRate)+
  geom_point(mapping = aes(x=Calories,y=AverageHeartRate,color=Id))+
labs(title = "Relation b/w Calories and Average Heart Rate for each user")
```
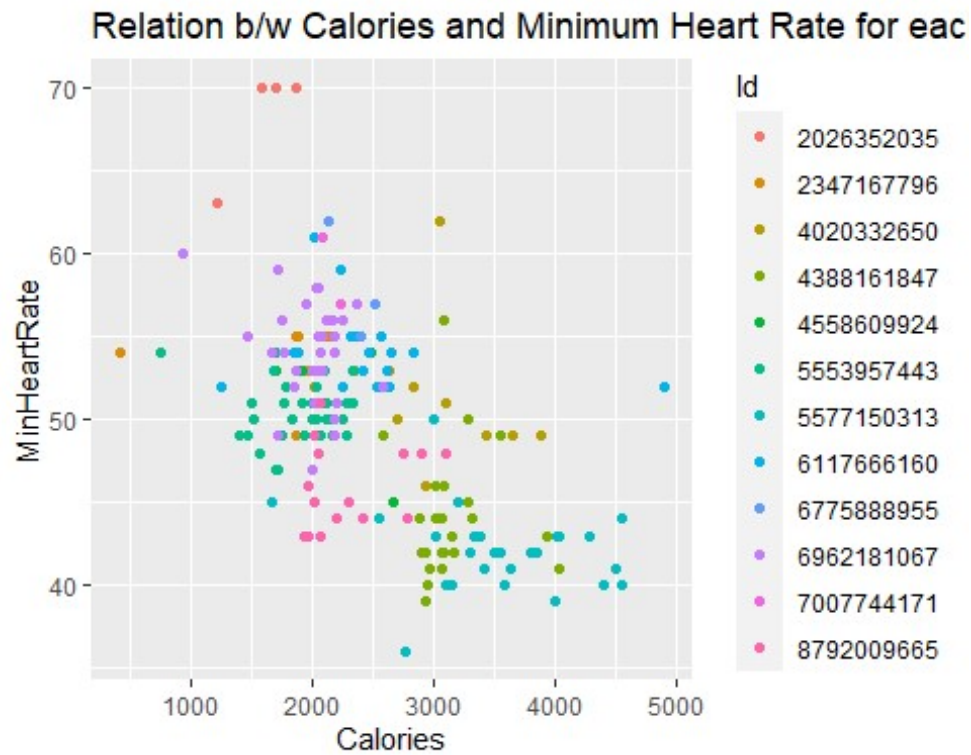
Relation b/w Calories and Average Heart Rate for eac


```
#2  Maximum Heart Rate
ggplot(MergeActivitySleepHeartRate)+
  geom_point(mapping = aes(x=Calories,y=MaxHeartRate,color=Id))+
  labs(title = "Relation b/w Calories and Maximum Heart Rate for each user")
```
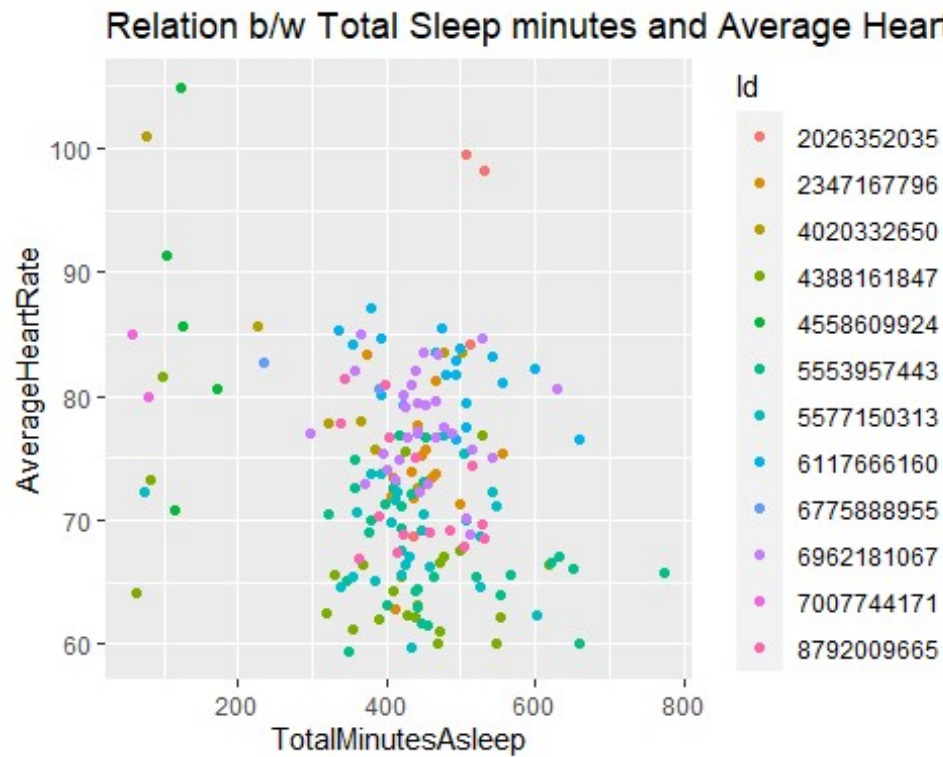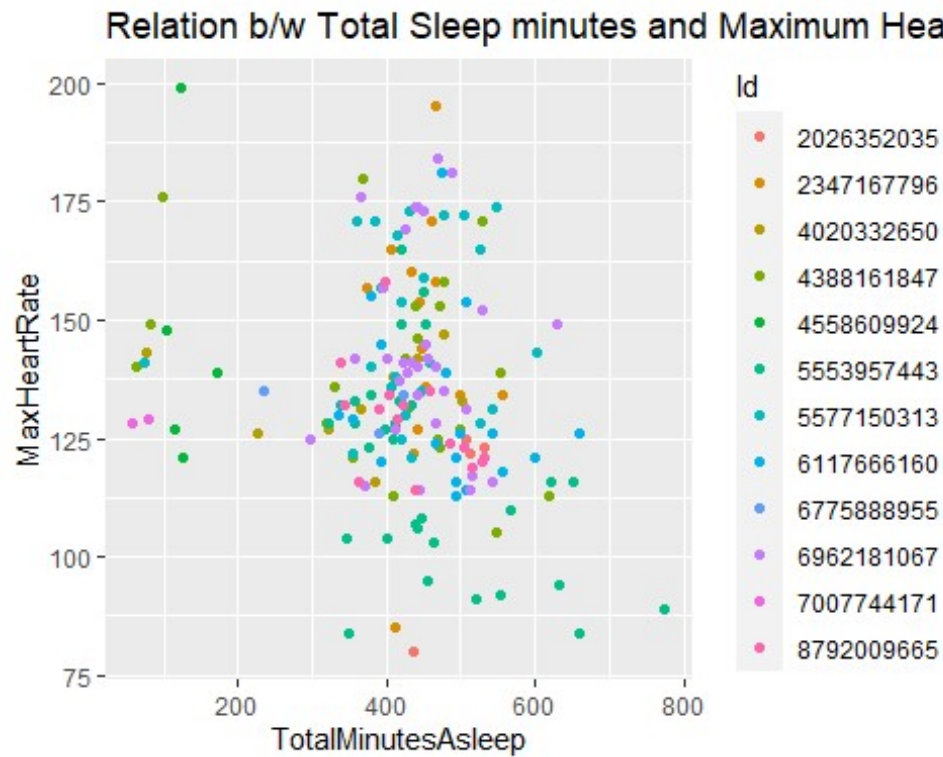
Relation b/w Calories and Maximum Heart Rate for ea


```
#3  Minimum Heart Rate
ggplot(MergeActivitySleepHeartRate)+
  geom_point(mapping = aes(x=Calories,y=MinHeartRate,color=Id))+
  labs(title = "Relation b/w Calories and Minimum Heart Rate for each user")
```

Relation b/w Calories and Minimum Heart Rate for eac

```
#RELATION BETWEEN SLEEP AND HEARTRATE
#1  Average Heart Rate
ggplot(MergeActivitySleepHeartRate)+
  geom_point(mapping =
aes(x=TotalMinutesAsleep,y=AverageHeartRate,color=Id))+
  labs(title = "Relation b/w Total Sleep minutes and Average Heart Rate for
each user")
```
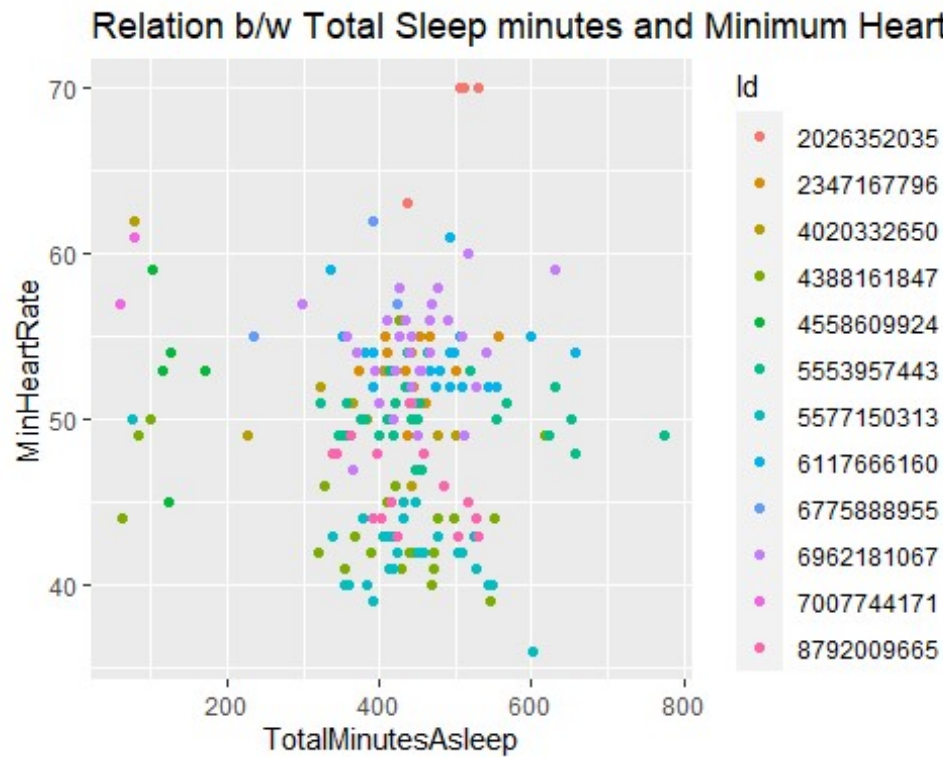
Relation b/w Total Sleep minutes and Average Heart Rate

```
#2  Maximum Heart Rate
ggplot(MergeActivitySleepHeartRate)+
  geom_point(mapping = aes(x=TotalMinutesAsleep,y=MaxHeartRate,color=Id))+
  labs(title = "Relation b/w Total Sleep minutes and Maximum Heart Rate for
each user")
```

Relation b/w Total Sleep minutes and Maximum Heart


```
#3  Minimum Heart Rate
ggplot(MergeActivitySleepHeartRate)+
  geom_point(mapping = aes(x=TotalMinutesAsleep,y=MinHeartRate,color=Id))+
labs(title = "Relation b/w Total Sleep minutes and Minimum Heart Rate for
each user")
```

Relation b/w Total Sleep minutes and Minimum Heart F


```
#RELATION BETWEEN AVERAGE HEARTRATE AND WEIGHT
ggplot(MergeActivitySleepHeartRateWeight)+
  geom_point(mapping = aes(x=WeightKg,y=AverageHeartRate,color=Id))+
  labs(title = "Relation b/w Weight in kg and Average Heart Rate for each
user")
```

Relation b/w Weight in kg and Average Heart Rate for (
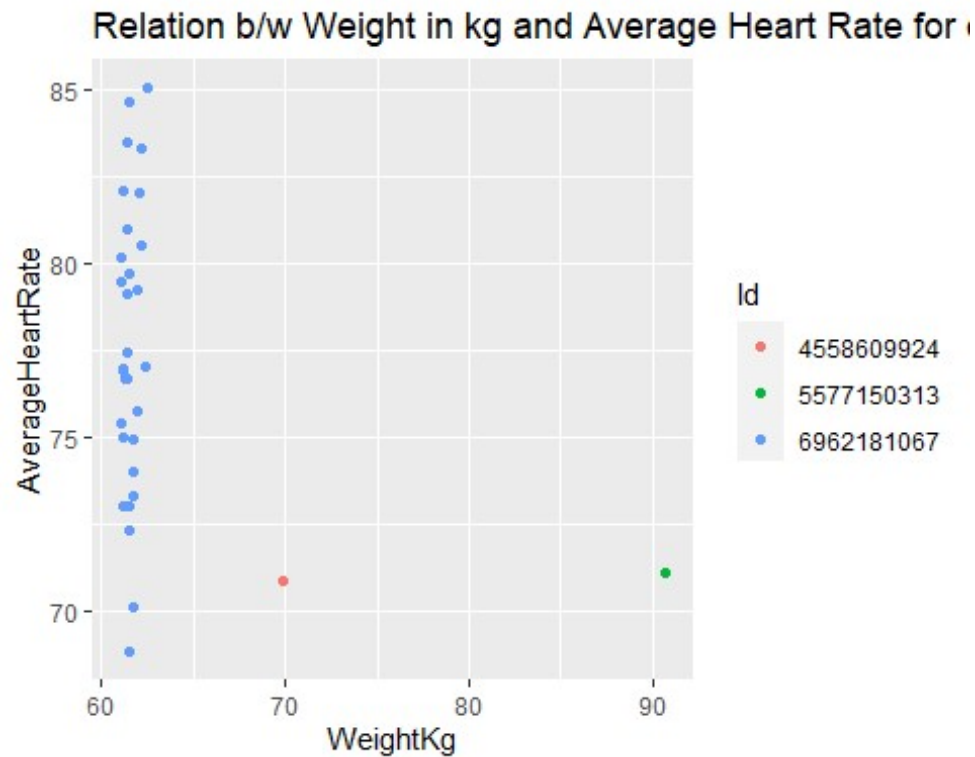
```r
#RELATION BETWEEN SLEEP AND WEIGHT
ggplot(MergeActivitySleepHeartRateWeight)+
  geom_point(mapping = aes(x=WeightKg,y=TotalMinutesAsleep,color=Id))+
  labs(title = "Relation b/w Weight in kg and Total Minutes Asleep for each
user")
```

Relation b/w Weight in kg and Total Minutes Asleep fo
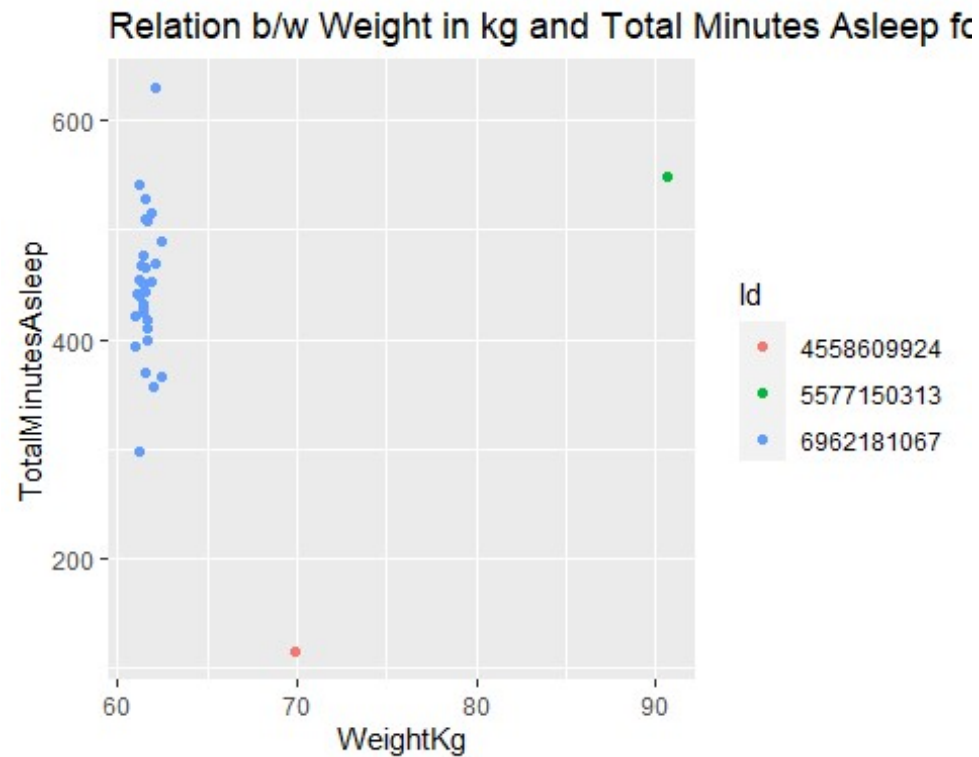

```
#RELATION BETWEEN SLEEP AND BMI
ggplot(MergeActivitySleepHeartRateWeight)+
  geom_point(mapping = aes(x=BMI,y=TotalMinutesAsleep,color=Id))+
  labs(title = "Relation b/w BMI and Total Minutes Asleep for each user")
```

Relation b/w BMI and Total Minutes Asleep for each u