Bella App Project

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R Markdown

Bellabeat is beautifully designed technology that informs and inspires women around the world. Collecting data on activity, sleep, stress, and reproductive health has allowed Bellabeat to empower women with knowledge about their own health and habits

Questions

###1. What are some trends in smart device usage? ###2. How could these trends apply to Bellabeat customers? ###3. How could these trends help influence Bellabeat marketing strategy?

##Data cleaning using Excel, Data Exploration using R and visualisation using Tableau

Install packages and loaded

```
install.packages("tidyverse")
```

```
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.2'
## (as 'lib' is unspecified)
```

```
install.packages("here")
```

```
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.2'
## (as 'lib' is unspecified)
```

```
install.packages("skimr")
```

```
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.2'
## (as 'lib' is unspecified)
```

```
install.packages("janitor")
```

```
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.2'
## (as 'lib' is unspecified)
```

```
install.packages("ggplot2")
```

```
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.2'
## (as 'lib' is unspecified)
```

```
install.packages("rmarkdown")
```

```
## Installing package into '/cloud/lib/x86_64-pc-linux-gnu-library/4.2'
## (as 'lib' is unspecified)
```

```
library("tidyverse")
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.2 --
```

```
## v ggplot2 3.3.6      v purrr   0.3.5
## v tibble  3.1.8      v dplyr   1.0.10
## v tidyr   1.2.1      v stringr 1.4.1
## v readr   2.1.3      v forcats 0.5.2
## -- Conflicts --------------------------------------- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library("here")
```

```
## here() starts at /cloud/project
```

```
library("skimr")
library("janitor")
```

```
##
## Attaching package: 'janitor'
##
## The following objects are masked from 'package:stats':
##
##     chisq.test, fisher.test
```

```
library("ggplot2")
```

##Importing data and rename

```
activity<- read.csv("daily_activity.csv")
calories <- read.csv("dailyCalories_merged.csv")
steps <- read.csv("dailySteps_merged.csv")
sleep <- read.csv("sleepDay_merged.csv")
weight <- read.csv("weight_info.csv")
intensity <- read.csv("dailyIntensities_merged.csv")
```

##Data checking

```
head(activity)
```

```
##           Id ActivityDate TotalSteps TotalDistance TrackerDistance
## 1 1503960366    4/12/2016      13162          8.50            8.50
## 2 1503960366    4/13/2016      10735          6.97            6.97
## 3 1503960366    4/14/2016      10460          6.74            6.74
## 4 1503960366    4/15/2016       9762          6.28            6.28
## 5 1503960366    4/16/2016      12669          8.16            8.16
## 6 1503960366    4/17/2016       9705          6.48            6.48
##   LoggedActivitiesDistance VeryActiveDistance ModeratelyActiveDistance
## 1                        0              1.88                     0.55
## 2                        0              1.57                     0.69
## 3                        0              2.44                     0.40
## 4                        0              2.14                     1.26
## 5                        0              2.71                     0.41
## 6                        0              3.19                     0.78
##   LightActiveDistance SedentaryActiveDistance VeryActiveMinutes
## 1                6.06                       0                25
## 2                4.71                       0                21
## 3                3.91                       0                30
## 4                2.83                       0                29
## 5                5.04                       0                36
## 6                2.51                       0                38
```

```
##   FairlyActiveMinutes LightlyActiveMinutes SedentaryMinutes Calories
## 1                  13                  328              728     1985
## 2                  19                  217              776     1797
## 3                  11                  181             1218     1776
## 4                  34                  209              726     1745
## 5                  10                  221              773     1863
## 6                  20                  164              539     1728
```

```
head(calories)
```

```
##           Id ActivityDay Calories
## 1 1503960366   4/12/2016     1985
## 2 1503960366   4/13/2016     1797
## 3 1503960366   4/14/2016     1776
## 4 1503960366   4/15/2016     1745
## 5 1503960366   4/16/2016     1863
## 6 1503960366   4/17/2016     1728
```

```
head(steps)
```

```
##           Id ActivityDay StepTotal
## 1 1503960366   4/12/2016     13162
## 2 1503960366   4/13/2016     10735
## 3 1503960366   4/14/2016     10460
## 4 1503960366   4/15/2016      9762
## 5 1503960366   4/16/2016     12669
## 6 1503960366   4/17/2016      9705
```

```
head(sleep)
```

```
##           Id              SleepDay TotalSleepRecords TotalMinutesAsleep
## 1 1503960366 4/12/2016 12:00:00 AM                 1                327
## 2 1503960366 4/13/2016 12:00:00 AM                 2                384
## 3 1503960366 4/15/2016 12:00:00 AM                 1                412
## 4 1503960366 4/16/2016 12:00:00 AM                 2                340
## 5 1503960366 4/17/2016 12:00:00 AM                 1                700
## 6 1503960366 4/19/2016 12:00:00 AM                 1                304
##   TotalTimeInBed
## 1            346
## 2            407
## 3            442
## 4            367
## 5            712
## 6            320
```

```
head(weight)
```

```
##           Id                   Date WeightKg WeightPounds Fat   BMI
## 1 1503960366  5/2/2016 11:59:59 PM     52.6     115.9631  22 22.65
## 2 1503960366  5/3/2016 11:59:59 PM     52.6     115.9631  NA 22.65
## 3 1927972279  4/13/2016 1:08:52 AM    133.5     294.3171  NA 47.54
## 4 2873212765 4/21/2016 11:59:59 PM     56.7     125.0021  NA 21.45
## 5 2873212765 5/12/2016 11:59:59 PM     57.3     126.3249  NA 21.69
## 6 4319703577 4/17/2016 11:59:59 PM     72.4     159.6147  25 27.45
##   IsManualReport        LogId
## 1           True 1.462234e+12
## 2           True 1.462320e+12
```

```
## 3          False 1.460510e+12
## 4           True 1.461283e+12
## 5           True 1.463098e+12
## 6           True 1.460938e+12
```

##Fixing data format ## Change date format=before splitting

```
 class(sleep$SleepDay)
```

```
## [1] "character"
```

It is a character not a date

```
sleep$SleepDay <- as.Date(sleep$SleepDay)

class(sleep$SleepDay)
```

```
## [1] "Date"
```

```
sleep$date <- as.Date(sleep$SleepDay)
sleep$time <- format(as.POSIXct(sleep$SleepDay,
                                format = "%H:%M:%S"))
```

##Data explore

```
n_distinct(activity$Id)
```

```
## [1] 33
```

```
n_distinct(calories$Id)
```

```
## [1] 33
```

```
n_distinct(steps$Id)
```

```
## [1] 33
```

```
n_distinct(sleep$Id)
```

```
## [1] 24
```

```
n_distinct(weight$Id)
```

```
## [1] 8
```

weight variable cannot be used as it is not significant to make a conclusion

summary od data statistics to identify the trend to analyze

```
activity %>%
  select(TotalSteps,
         VeryActiveMinutes,
         FairlyActiveMinutes,
         LightlyActiveMinutes,
         Calories) %>%
  summary()
```

```
##    TotalSteps    VeryActiveMinutes FairlyActiveMinutes LightlyActiveMinutes
##  Min.   :    0   Min.   :  0.00    Min.   :  0.00      Min.   :  0.0
##  1st Qu.: 3790   1st Qu.:  0.00    1st Qu.:  0.00      1st Qu.:127.0
```

```
##  Median : 7406   Median :  4.00    Median :  6.00      Median :199.0
##  Mean   : 7638   Mean   : 21.16    Mean   : 13.56      Mean   :192.8
##  3rd Qu.:10727   3rd Qu.: 32.00    3rd Qu.: 19.00      3rd Qu.:264.0
##  Max.   :36019   Max.   :210.00    Max.   :143.00      Max.   :518.0
##     Calories
##  Min.   :   0
##  1st Qu.:1828
##  Median :2134
##  Mean   :2304
##  3rd Qu.:2793
##  Max.   :4900
```

```
calories %>%
  select(Calories) %>%
  summary()
```

```
##     Calories
##  Min.   :   0
##  1st Qu.:1828
##  Median :2134
##  Mean   :2304
##  3rd Qu.:2793
##  Max.   :4900
```

```
steps %>%
  select(StepTotal) %>%
  summary()
```

```
##    StepTotal
##  Min.   :    0
##  1st Qu.: 3790
##  Median : 7406
##  Mean   : 7638
##  3rd Qu.:10727
##  Max.   :36019
```

```
sleep %>%
  select(TotalSleepRecords,
         TotalMinutesAsleep,
         TotalTimeInBed) %>%
  summary()
```

```
##  TotalSleepRecords TotalMinutesAsleep TotalTimeInBed
##  Min.   :1.000     Min.   : 58.0      Min.   : 61.0
##  1st Qu.:1.000     1st Qu.:361.0      1st Qu.:403.0
##  Median :1.000     Median :433.0      Median :463.0
##  Mean   :1.119     Mean   :419.5      Mean   :458.6
##  3rd Qu.:1.000     3rd Qu.:490.0      3rd Qu.:526.0
##  Max.   :3.000     Max.   :796.0      Max.   :961.0
```

To see numbers of total sleep records of users (sleep habit of user)

```
sum(sleep$TotalSleepRecords == "1")
```

```
## [1] 367
```

```
sum(sleep$TotalSleepRecords == "2")
```

```
## [1] 43
```

```
sum(sleep$TotalSleepRecords == "3")
```

```
## [1] 3
```

Merged data to visualise steps and calories using activity and sleep data using Id. (steps and calories to see whether user is active or not)

However, we need to rename column date in activity

```
colnames(activity)[colnames(activity) == "ActivityDate"] <- "date"
```

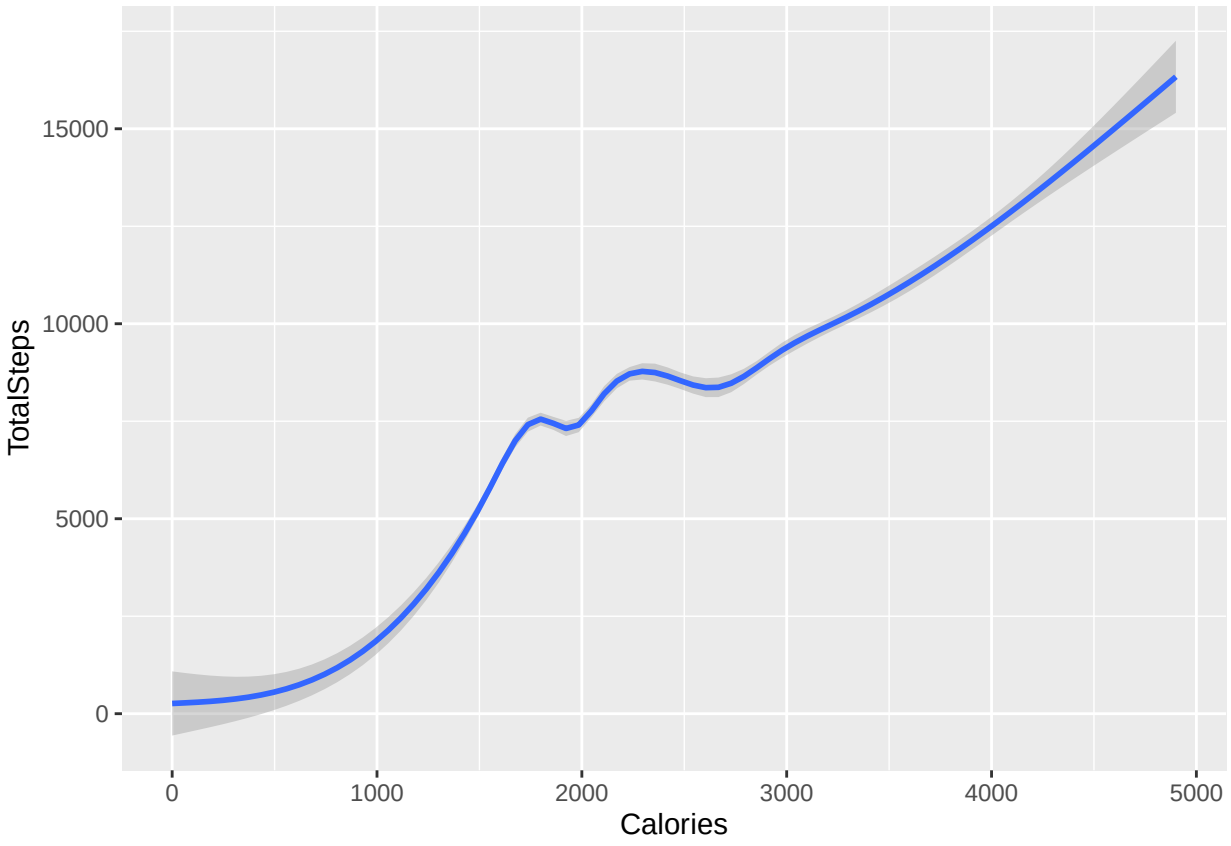
Merge the data

```
Steps_calories<- merge(activity, sleep, by = c("Id"))
```

Visualisation of steps and calories

```
ggplot(data= Steps_calories) + geom_smooth(mapping= aes(x=Calories, y=TotalSteps))
```

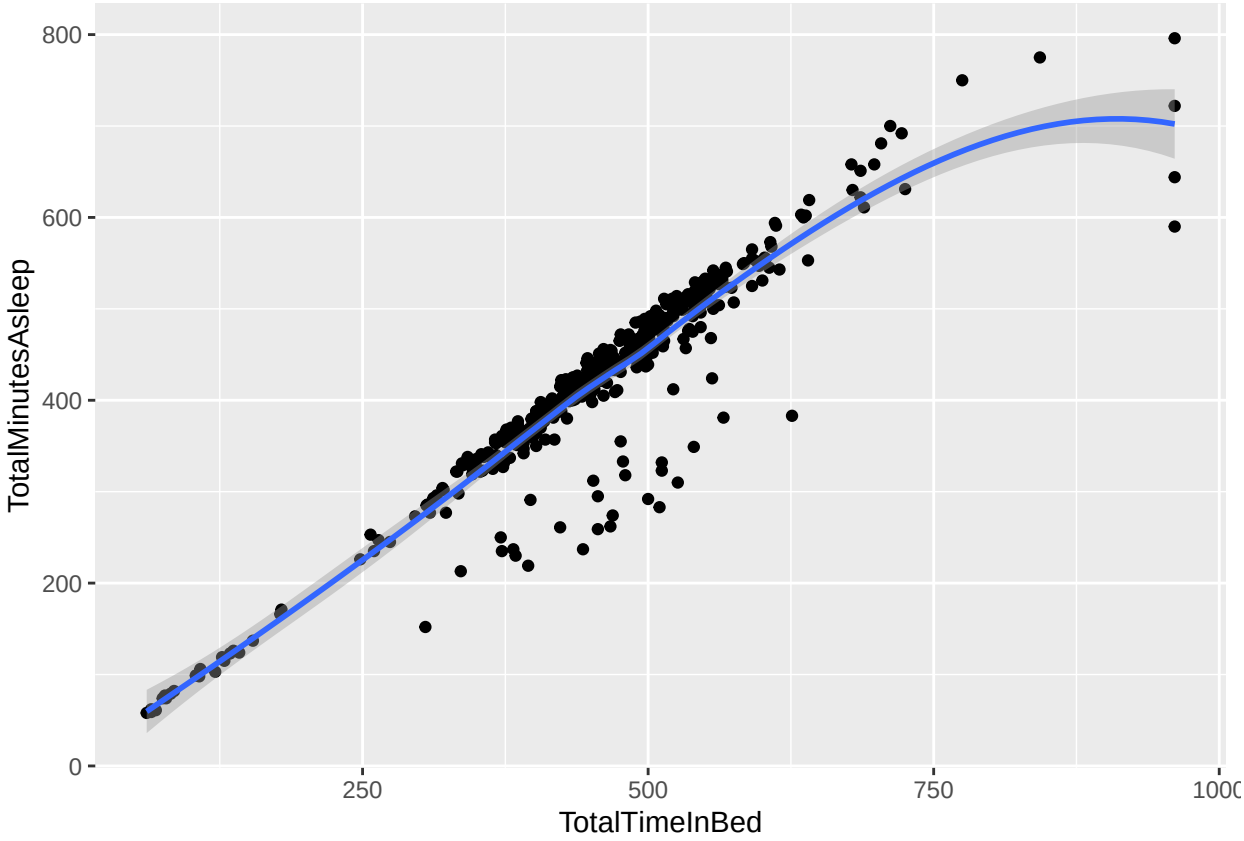
```
## `geom_smooth()` using method = 'gam' and formula 'y ~ s(x, bs = "cs")'
```



Visualisation Total time in bed & total minutes asleep

```
ggplot(data= sleep) + geom_point (mapping= aes(y=TotalMinutesAsleep,
                                               x= TotalTimeInBed))+
                      geom_smooth (mapping= aes(y=TotalMinutesAsleep,
                                                x= TotalTimeInBed))
```

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```



Creating new dataframe for visualisation of sleep count and user

```
TotalSleep = c (1,2,3)
UserSleepCount= c (367,43,3)

SleepCount <- data.frame(TotalSleep,
                         UserSleepCount)
```

###To get a clear visualisation of activity of users, data will be visualise using Tableau