Reproducible Research: Peer Assessment 1

Loading R library

```
library("dplyr")
```

```
##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

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

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

```
## Loading required package: lattice

## Loading required package: survival

## Loading required package: Formula

##
## Attaching package: 'Hmisc'

## The following objects are masked from 'package:dplyr':
##
##     src, summarize

## The following objects are masked from 'package:base':
##
##     format.pval, units
```

```
library("timeDate")
```

Loading and preprocessing the data

```
tPath <- "D:/00-PDrive/MyStudy/01-Course/00-Coursera/2-DSFusingR/5-Reproducible/Project1"
setwd(tPath)
master <- as.character(unzip("repdata_data_activity.zip", list = TRUE)$Name)
Dat <- read.csv(unz("repdata_data_activity.zip", "activity.csv"), header = TRUE, sep = ",")
dim(Dat)
```

```
## [1] 17568     3
```

```
head(Dat)
```

```
##   steps       date interval
## 1    NA 2012-10-01        0
## 2    NA 2012-10-01        5
## 3    NA 2012-10-01       10
## 4    NA 2012-10-01       15
## 5    NA 2012-10-01       20
## 6    NA 2012-10-01       25
```

```
Dat$date <- as.Date(Dat$date, "%Y-%m-%d")
str(Dat)
```

```
## 'data.frame':    17568 obs. of  3 variables:
##  $ steps   : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ date    : Date, format: "2012-10-01" "2012-10-01" ...
##  $ interval: int  0 5 10 15 20 25 30 35 40 45 ...
```

What is mean total number of steps taken per day?

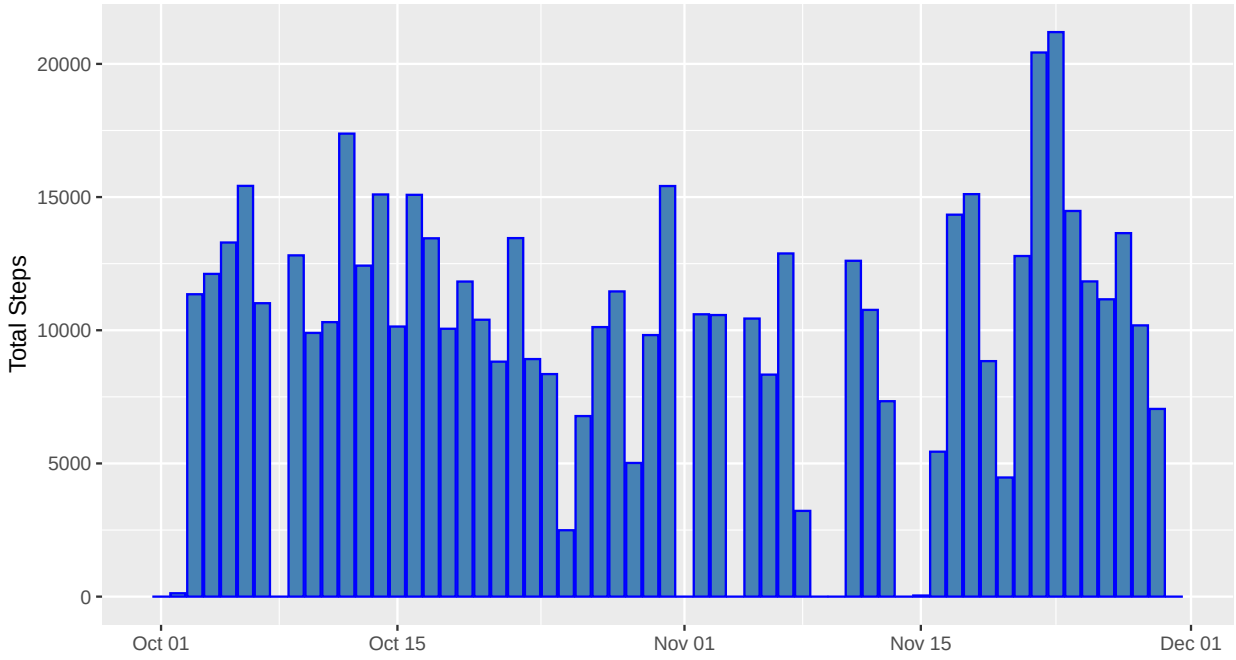
- Aggregation total steps according to day

```
totSteps <- Dat %>%
    group_by(date) %>%
    summarise_at(vars(steps), list(totSteps = sum), na.rm = TRUE)
totStepsbyDay <- as.data.frame(totSteps)
head(totStepsbyDay)
```

```
##         date totSteps
## 1 2012-10-01        0
## 2 2012-10-02      126
## 3 2012-10-03    11352
## 4 2012-10-04    12116
## 5 2012-10-05    13294
## 6 2012-10-06    15420
```

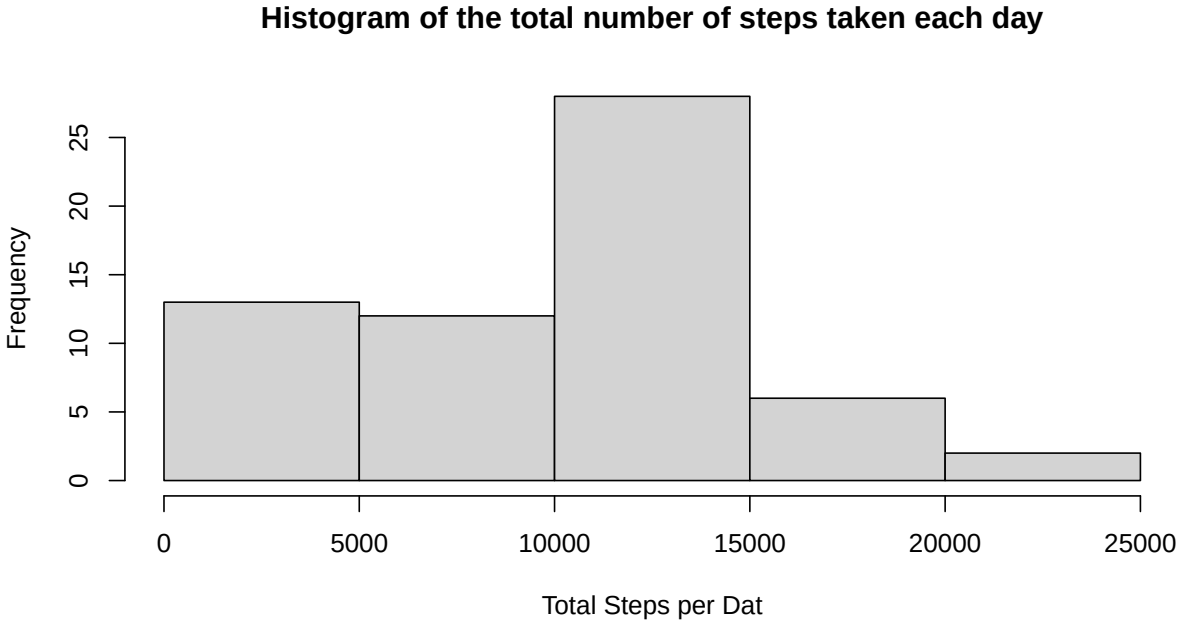
- Draw a graph to show the total number of steps for each day

```
g <- ggplot(data = totStepsbyDay, aes(x= date, y = totSteps))
g <- g + geom_bar(stat = "identity", color="blue", fill="steelblue")
g + ylab("Total Steps") + xlab("")
```



- Histogram of the total number of steps taken each day

```
hist(totStepsbyDay$totSteps, xlab = "Total Steps per Dat", main = "Histogram of the total number of step
```



- Mean and median of the total number of steps taken per day: 9354 and 10395

```
summary(totStepsbyDay$totSteps)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       0    6778   10395    9354   12811   21194
```

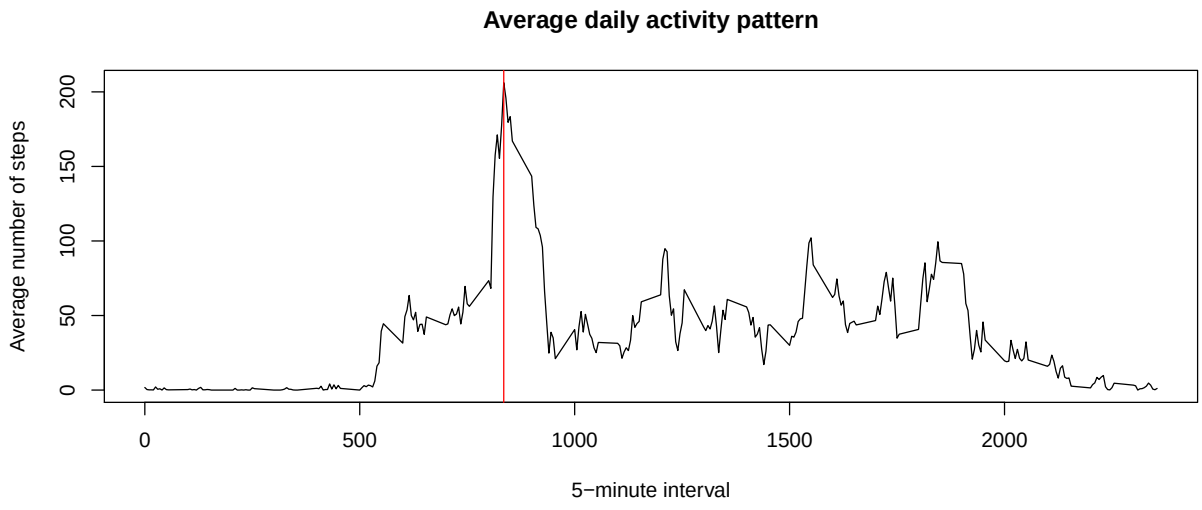
What is the average daily activity pattern?

- The time series plot of the average number of steps taken

```
mSteps <- Dat %>%
    group_by(interval) %>%
    summarise_at(vars(steps), list(meanSteps = mean), na.rm = TRUE)
meanSteps <- as.data.frame(mSteps)
head(meanSteps)
```

```
##   interval meanSteps
## 1        0 1.7169811
## 2        5 0.3396226
## 3       10 0.1320755
## 4       15 0.1509434
## 5       20 0.0754717
## 6       25 2.0943396
```

```
maxPos <- which.max(meanSteps$meanSteps)
maxIntv <- meanSteps[maxPos, 1]
with(meanSteps, plot(x = interval, y = meanSteps, type = "l",
    xlab = "5-minute interval", ylab = "Average number of steps",
    main = "Average daily activity pattern"))
abline(v = maxIntv, col = "red")
```



- The maximum 5-minute interval is at 835 and the value is 206.

Imputing missing values

- impute steps with mean value using r "Hmisc" package

```
Dat$imputedSteps <- with(Dat, impute(steps, mean))
head(Dat)
```

```
##   steps       date interval imputedSteps
## 1    NA 2012-10-01        0      37.3826
## 2    NA 2012-10-01        5      37.3826
## 3    NA 2012-10-01       10      37.3826
## 4    NA 2012-10-01       15      37.3826
## 5    NA 2012-10-01       20      37.3826
## 6    NA 2012-10-01       25      37.3826
```

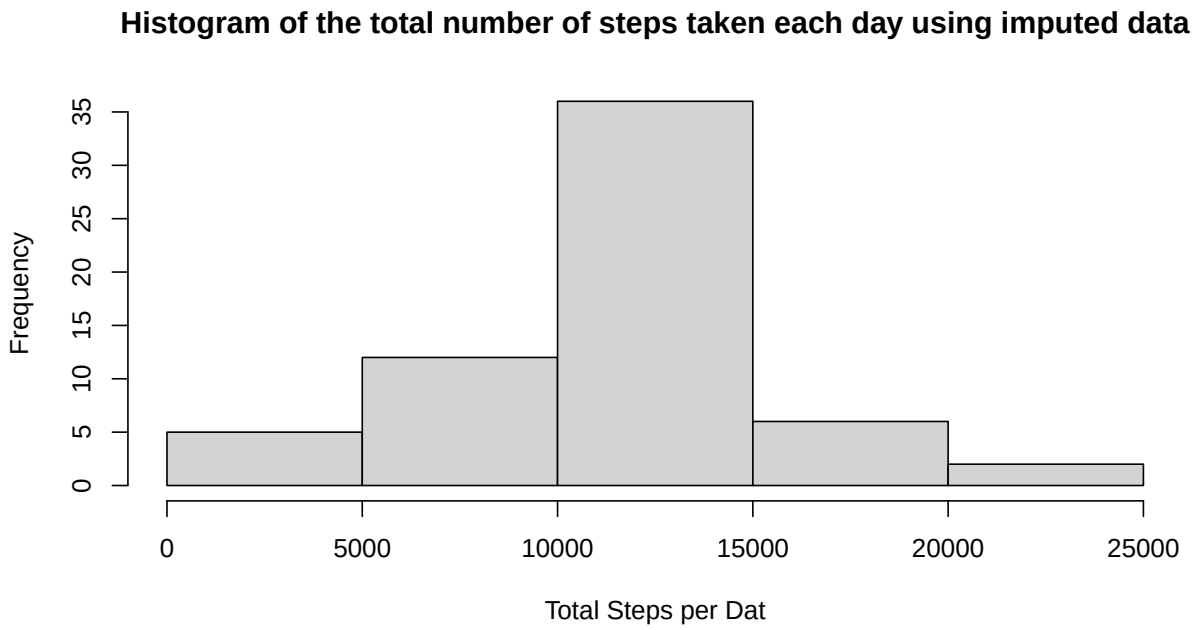
- Aggregation total steps according to day using imputed data

```
totSteps_I <- Dat %>%
    group_by(date) %>%
    summarise_at(vars(imputedSteps), list(totSteps = sum), na.rm = TRUE)
totStepsbyDay_I <- as.data.frame(totSteps_I)
head(totStepsbyDay_I)
```

```
##         date totSteps
## 1 2012-10-01 10766.19
## 2 2012-10-02   126.00
## 3 2012-10-03 11352.00
## 4 2012-10-04 12116.00
## 5 2012-10-05 13294.00
## 6 2012-10-06 15420.00
```

- Histogram of the total number of steps taken each day using imputed data

```
hist(totStepsbyDay_I$totSteps, xlab = "Total Steps per Dat",
     main = "Histogram of the total number of steps taken each day using imputed data")
```



Are there differences in activity patterns between weekdays and weekends?

- Add a logic weekend column

```
Dat$Weekend <- isWeekend(Dat$date, wday = 1:5)
head(Dat)
```

```
##   steps       date interval imputedSteps Weekend
## 1    NA 2012-10-01        0      37.3826   FALSE
## 2    NA 2012-10-01        5      37.3826   FALSE
## 3    NA 2012-10-01       10      37.3826   FALSE
## 4    NA 2012-10-01       15      37.3826   FALSE
## 5    NA 2012-10-01       20      37.3826   FALSE
## 6    NA 2012-10-01       25      37.3826   FALSE
```

- Aggregate mean steps for both week day and week end

```
mSteps_wkDay <- Dat %>%
    filter(Weekend == FALSE) %>%
    group_by(interval) %>%
    summarise_at(vars(steps), list(meanSteps = mean), na.rm = TRUE)
meanSteps_wkDay <- as.data.frame(mSteps_wkDay)
head(meanSteps_wkDay)
```

```
##   interval meanSteps
## 1        0 2.3333333
## 2        5 0.4615385
## 3       10 0.1794872
```

```
## 4       15 0.2051282
## 5       20 0.1025641
## 6       25 1.5128205
```

```
mSteps_wkEnd <- Dat %>%
    filter(Weekend == TRUE) %>%
    group_by(interval) %>%
    summarise_at(vars(steps), list(meanSteps = mean), na.rm = TRUE)
meanSteps_wkEnd <- as.data.frame(mSteps_wkEnd)
head(meanSteps_wkEnd)
```

```
##   interval meanSteps
## 1        0  0.000000
## 2        5  0.000000
## 3       10  0.000000
## 4       15  0.000000
## 5       20  0.000000
## 6       25  3.714286
```

- Panel plot comparing the average number of steps taken per 5-minute interval across weekdays and weekends

```
rng <- range(meanSteps_wkDay$meanSteps, meanSteps_wkEnd$meanSteps)
par(mfrow = c(1, 2))
with(meanSteps_wkDay, plot(x = interval, y = meanSteps, type = "l", ylim = rng,
                           xlab = "5-minute interval", ylab = "Average number of steps",
                           main = "Average daily activity pattern in week day"))
with(meanSteps_wkEnd, plot(x = interval, y = meanSteps, type = "l", ylim = rng,
                           xlab = "5-minute interval", ylab = "Average number of steps",
                           main = "Average daily activity pattern in week end"))
```