Reproducible Research: Peer Assessment 1

Introduction

It is now possible to collect a large amount of data about personal movement using activity monitoring devices such as a Fitbit, Nike Fuelband, or Jawbone Up. These type of devices are part of the "quantified self" movement – a group of enthusiasts who take measurements about themselves regularly to improve their health, to find patterns in their behavior, or because they are tech geeks. But these data remain under-utilized both because the raw data are hard to obtain and there is a lack of statistical methods and software for processing and interpreting the data. This assignment makes use of data from a personal activity monitoring device. This device collects data at 5 minute intervals through out the day. The data consists of two months of data from an anonymous individual collected during the months of October and November, 2012 and include the number of steps taken in 5 minute intervals each day.

In this assignment, we were requested to ask a series of questions.

Loading and preprocessing the data

We forked then cloned the GitHub repository created for this assignment, then loaded the data and had a quick exploration.

```
unzip("activity.zip")
activity<-read.csv("activity.csv")
head(activity)
```

```
##   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
```

We imported required packages

```
library(ggplot2)
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
```

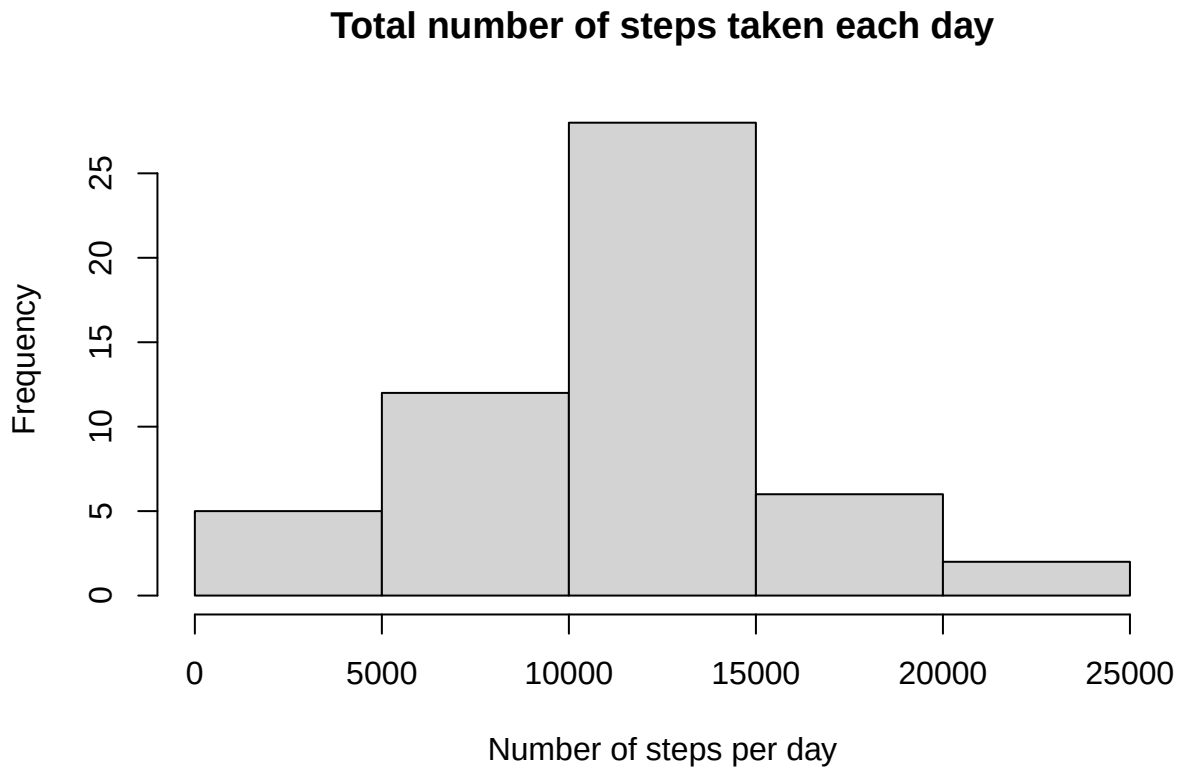
What is mean total number of steps taken per day?

Calculate the total number of steps taken per day:

```
dailysteps<-aggregate(steps~date, activity, sum)
```

Build the histogram of the total number of steps taken each day:

```
hist(dailysteps$steps, xlab="Number of steps per day",
     ylab="Frequency", main="Total number of steps taken each day")
```



Calculate and report the mean and median of the total number of steps taken per day

```
mean(dailysteps$steps)
```

```
## [1] 10766.19
```

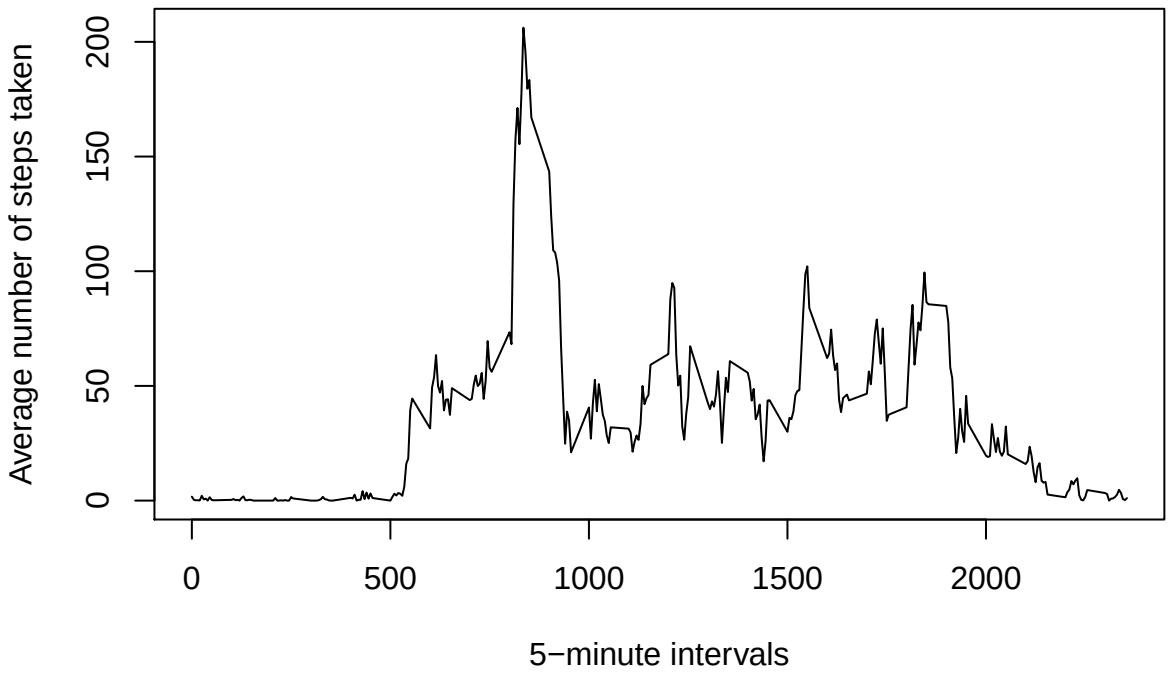
```
median(dailysteps$steps)
```

```
## [1] 10765
```

What is the average daily activity pattern?

Make a time series plot of the 5-minute interval (x-axis) and the average number of steps taken, averaged across all days (y-axis)

```
IntervalSteps<-aggregate(steps~interval, data=activity, mean, na.rm=TRUE)
plot(steps~interval, data=IntervalSteps, type="l", xlab="5-minute intervals", ylab=("Average number of s
```



Which 5-minute interval, on average across all the days in the dataset, contains the maximum number of steps?

```
IntervalSteps[which.max(IntervalSteps$steps), ]$interval
```

```
## [1] 835
```

Imputing missing values

Calculate and report the total number of missing values in the dataset (i.e. the total number of rows with NAs)

```
Missing <- sum(is.na(activity$steps))
print(Missing)
```

```
## [1] 2304
```

Devise a strategy for filling in all of the missing values in the dataset. The strategy does not need to be sophisticated. For example, you could use the mean/median for that day, or the mean for that 5-minute interval, etc.

=> let's fill in all of the missing values in the dataset by the mean number of steps per interval

```
m<-mean(IntervalSteps$steps)
```

Create a new dataset that is equal to the original dataset but with the missing data filled in

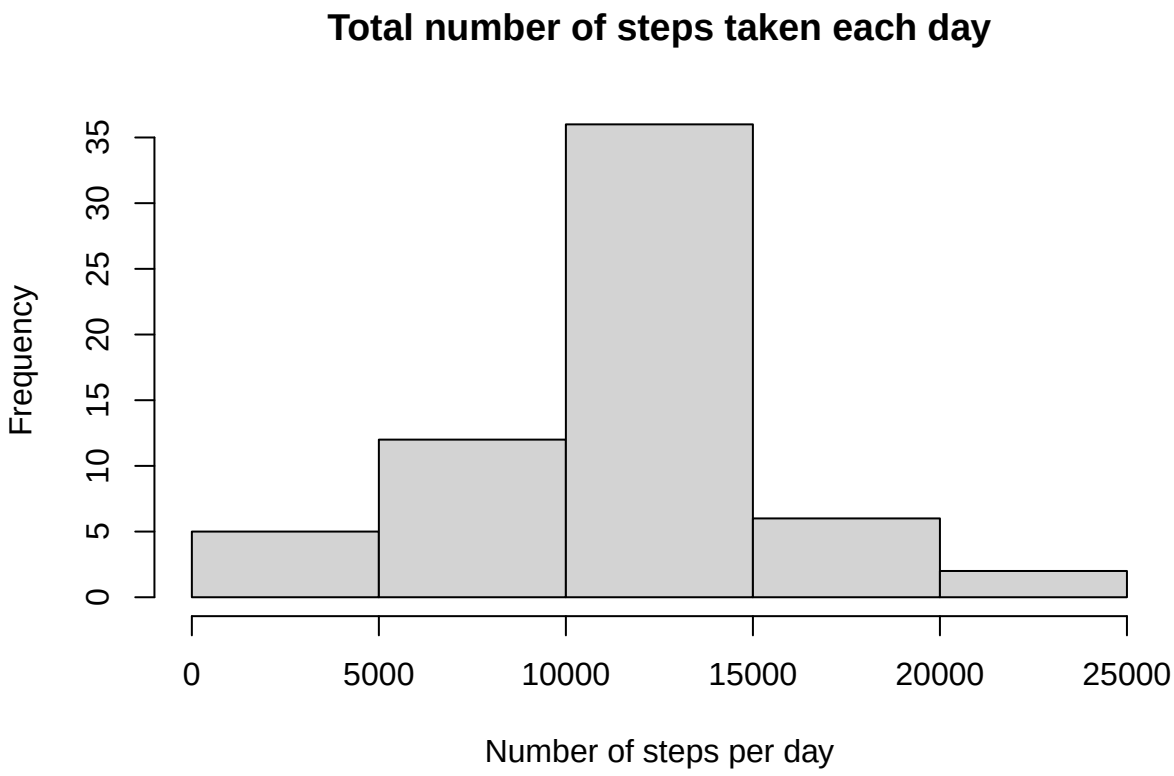
```
activitynona<- transform(activity, steps = ifelse(is.na(activity$steps), m, activity$steps))
head(activitynona)
```

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

Make a histogram of the total number of steps taken each day and calculate and report the mean and median total number of steps taken per day. Do these values differ from the estimates from the first part of the assignment? What is the impact of imputing missing data on the estimates of the total daily number of steps?

Histogram:

```
dailystepsnona<-aggregate(steps~date, activitynona, sum)
hist(dailystepsnona$steps, xlab="Number of steps per day",
     ylab="Frequency", main="Total number of steps taken each day")
```



Calculate and report the mean and median of the total number of steps taken per day

```
mean(dailystepsnona$steps)
```

```
## [1] 10766.19
```

```
median(dailystepsnona$steps)
```

```
## [1] 10766.19
```

Imputing missing data has no impact on mean and non material impact (0.01%) on median.

Are there differences in activity patterns between weekdays and weekends?

Create a new factor variable in the dataset with two levels – "weekday" and "weekend" indicating whether a given date is a weekday or weekend day.

```
activitynona$date <- as.Date(strptime(activitynona$date, format="%Y-%m-%d"))
activitynona1 <- mutate(activitynona, "day_type"= ifelse(weekdays(activitynona$date)=="samedi" | weekday
head(activitynona1)
```

```
##     steps       date interval day_type
## 1 37.3826 2012-10-01        0  Weekday
```

```
## 2 37.3826 2012-10-01        5  Weekday
## 3 37.3826 2012-10-01       10  Weekday
## 4 37.3826 2012-10-01       15  Weekday
## 5 37.3826 2012-10-01       20  Weekday
## 6 37.3826 2012-10-01       25  Weekday
```

Make a panel plot containing a time series plot of the 5-minute interval (x-axis) and the average number of steps taken, averaged across all weekday days or weekend days (y-axis). See the README file in the GitHub repository to see an example of what this plot should look like using simulated data.

```
IntervalStepsnona<-aggregate(steps~interval+day_type, data=activitynona1, mean)
plot <- ggplot(IntervalStepsnona, aes(x = interval , y = steps, color=day_type)) + facet_wrap(~day_type
  geom_line()+labs(title="Average steps per 5-minutes intervals", x="Intervals", y="Number of steps")
print(plot)
```