Analysis of Data from Wearable Devices

The Data

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.

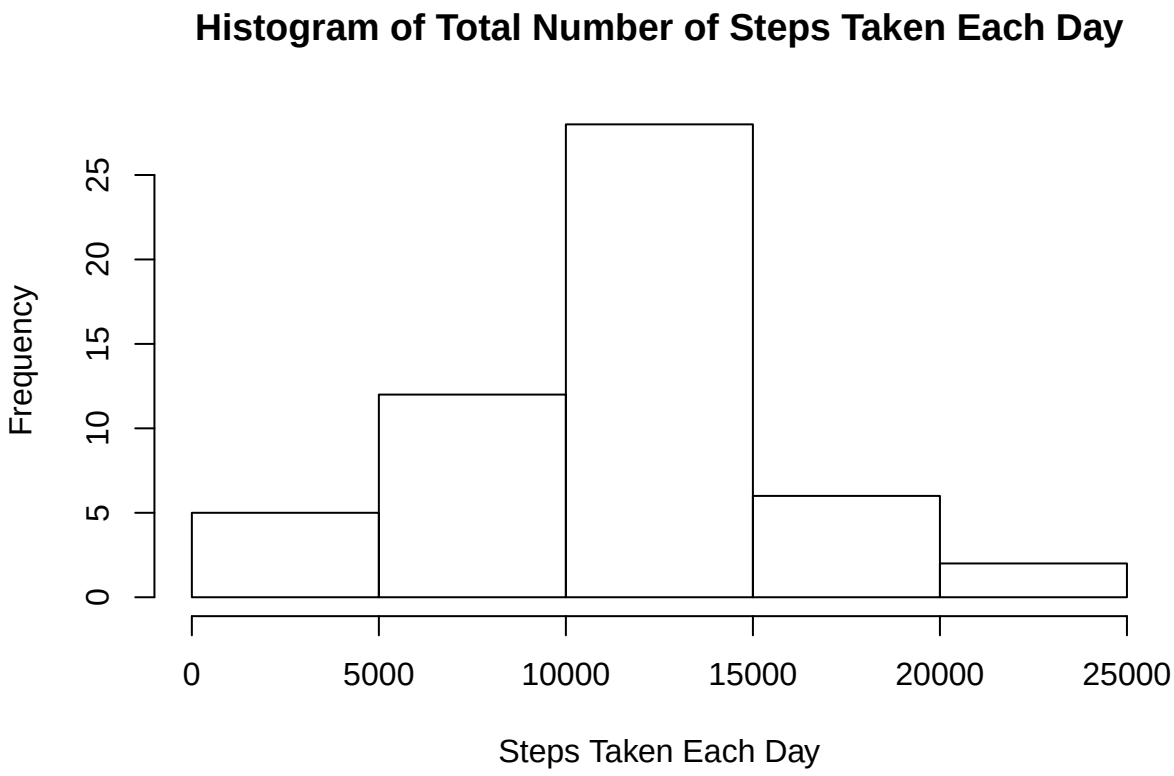
The variables included in this dataset are: . steps: Number of steps taking in a 5-minute interval (missing values are coded as NA) . date: The date on which the measurement was taken in YYYY-MM-DD format . interval: Identifier for the 5-minute interval in which measurement was taken

1. The code for reading and processing our data is:

```
data<-read.csv("project 1 data.csv")
```

2. Generate a histogram of the total number of steps taken each day:

```
hist(tapply(data$steps, data$date, sum), xlab="Steps Taken Each Day", main="Histogram of Total Number o
```



3. The mean number of steps taken is:

```
mean(tapply(data$steps, data$date, sum), na.rm=TRUE)
```

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

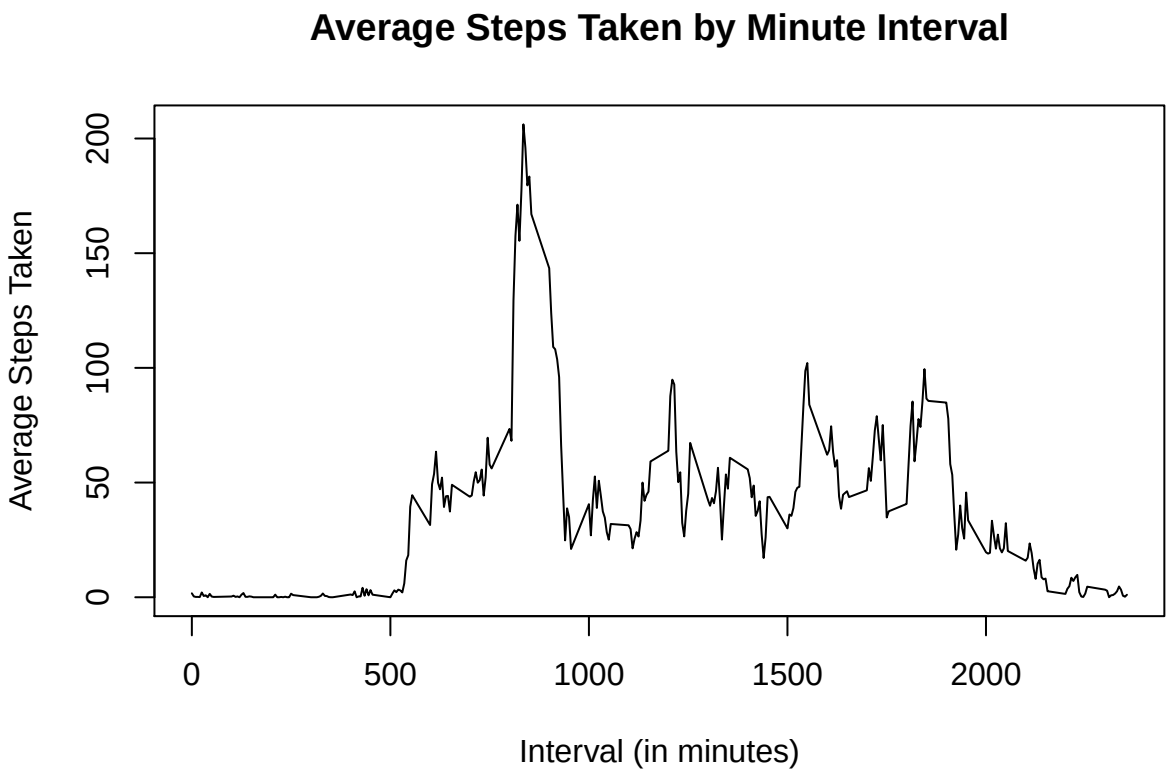
and the median number of steps taken is:

```
median(tapply(data$steps, data$date, sum), na.rm=TRUE)
```

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

4. Here is a time-series plot of the average number of steps:

```
plot(unique(data$interval), tapply(data$steps, data$interval, mean, na.rm=TRUE), type="l", xlab="Interva
```



5. The five-minute interval that, on average, contains the maximum number of steps is:

```
##find which interval has the maximum average steps
max<-which.max(tapply(data$steps, data$interval, mean, na.rm=TRUE))
##extract the name of the interval which corresponds to a length in feet
names(max)
```

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

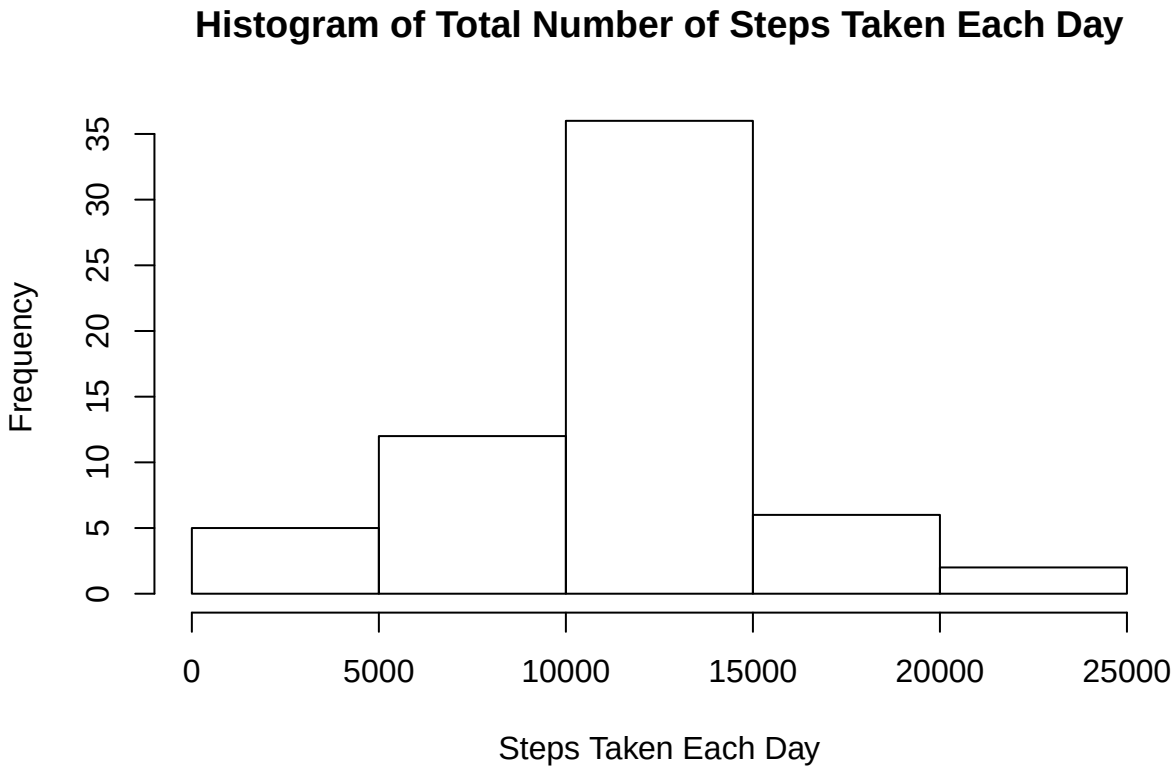
6. The code to impute values for the NAs in the data is:

```
##get average steps for each interval
avg_steps<-tapply(data$steps, data$interval, mean, na.rm=TRUE)
##make data frame of invtervals and average steps
df1<-data.frame(interval=names(avg_steps), avg_steps)

##load qdap package for lookup function
library(qdapTools)
## replaces NAs with average steps from corresponding interval in df1. Must convert interval column in c
data$steps<-ifelse(is.na(data$steps), lookup(as.factor(data$interval), df1), data$steps)
```

7. Using this newly refined data, here is a histogram of the total number of steps taken each day:

```
hist(tapply(data$steps, data$date, sum), xlab="Steps Taken Each Day", main="Histogram of Total Number o
```



8. And here is a panel plot comparing the average number of steps taken across intervals for both weekdays and weekends:

```
##load lubridate package and convert date column from factor to date
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
```

```
## The following object is masked from 'package:base':
##
##     date
```

```
##convert to date format
data$date<-ymd(data$date)
##create a vector of days of the week for each date in data
day<-weekdays(data$date)
##overwrite day vector based on whether day is week or weekend
```

```r
day<-ifelse((day=="Sunday" | day=="Saturday"), "weekend", "weekday")
##insert day vector into data
data<-data.frame(steps=data[,1], date=data[ ,2], day, interval=data[ ,3])

##create a subset data frame where day=weekend
sub_end<-subset(data, data$day=="weekend")
##create a new data frame of average steps per interval, interval, and day from weekend days
end<-data.frame(steps=tapply(sub_end$steps, sub_end$interval, mean), interval=unique(sub_end$interval),
##create a subset data frame where day=weekday
sub_day<-subset(data, data$day=="weekday")
##create a new data frame of average steps per interval, interval, and day from weekdays
day<-data.frame(steps=tapply(sub_day$steps, sub_day$interval, mean), interval=unique(sub_day$interval),
##put df of avg. steps per interval for weekend and df for avg. steps per interval for weekday together
new_data<-rbind(end, day)
##make lattice panel plot of interval on x-axis, avg. steps taken on y-axis, and separated by weekend/w
library(lattice)
xyplot(steps~interval|day, data=new_data, type="l", layout=c(1,2))
```