PA1_template

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R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com (http://rmarkdown.rstudio.com).

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
data <- read.csv("activity.csv", header = TRUE, sep = ",", na.strings = "NA")
```

```
summary(data)
```

```
##      steps                date          interval     
##  Min.   :  0.00   2012-10-01:  288   Min.   :   0.0  
##  1st Qu.:  0.00   2012-10-02:  288   1st Qu.: 588.8  
##  Median :  0.00   2012-10-03:  288   Median :1177.5  
##  Mean   : 37.38   2012-10-04:  288   Mean   :1177.5  
##  3rd Qu.: 12.00   2012-10-05:  288   3rd Qu.:1766.2  
##  Max.   :806.00   2012-10-06:  288   Max.   :2355.0  
##  NA's   :2304     (Other)   :15840
```

```
str(data)
```

```
## 'data.frame':    17568 obs. of  3 variables:
##  $ steps   : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ date    : Factor w/ 61 levels "2012-10-01","2012-10-02",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ interval: int  0 5 10 15 20 25 30 35 40 45 ...
```

```
head(data)
```

```
##   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
```

```
data$date <- as.Date(data$date, format = "%Y-%m-%d")
data$interval <- factor(data$interval)
```

1 - Subsitting the dataset to ignore missing values

```
NA_index <- is.na(as.character(data$steps))
data_no_NA <- data[!NA_index,]
head(data_no_NA)
```

```
##     steps       date interval
## 289     0 2012-10-02        0
## 290     0 2012-10-02        5
## 291     0 2012-10-02       10
## 292     0 2012-10-02       15
## 293     0 2012-10-02       20
## 294     0 2012-10-02       25
```

2 - Aggregating the number of steps taken each day:

Creating a data frame with the steps taken for each day

```
steps_each_day <- aggregate(steps ~ date, data = data_no_NA, sum)
```

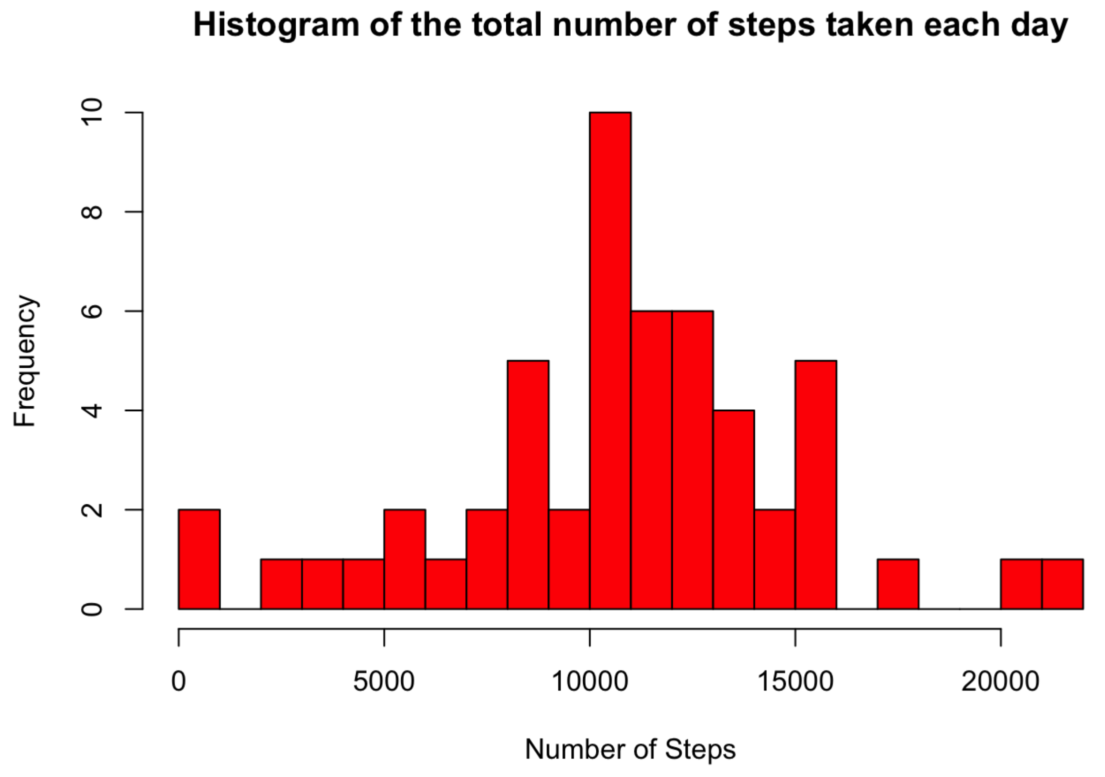
Adding column names to the created data frame

```
colnames(steps_each_day) <- c("date", "steps")
```

3 - Making a histogram of the total number of steps taken each day:

Including Plots

You can also embed plots, for example:



number of steps taken per day:

```
mean(steps_each_day$steps)
```

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

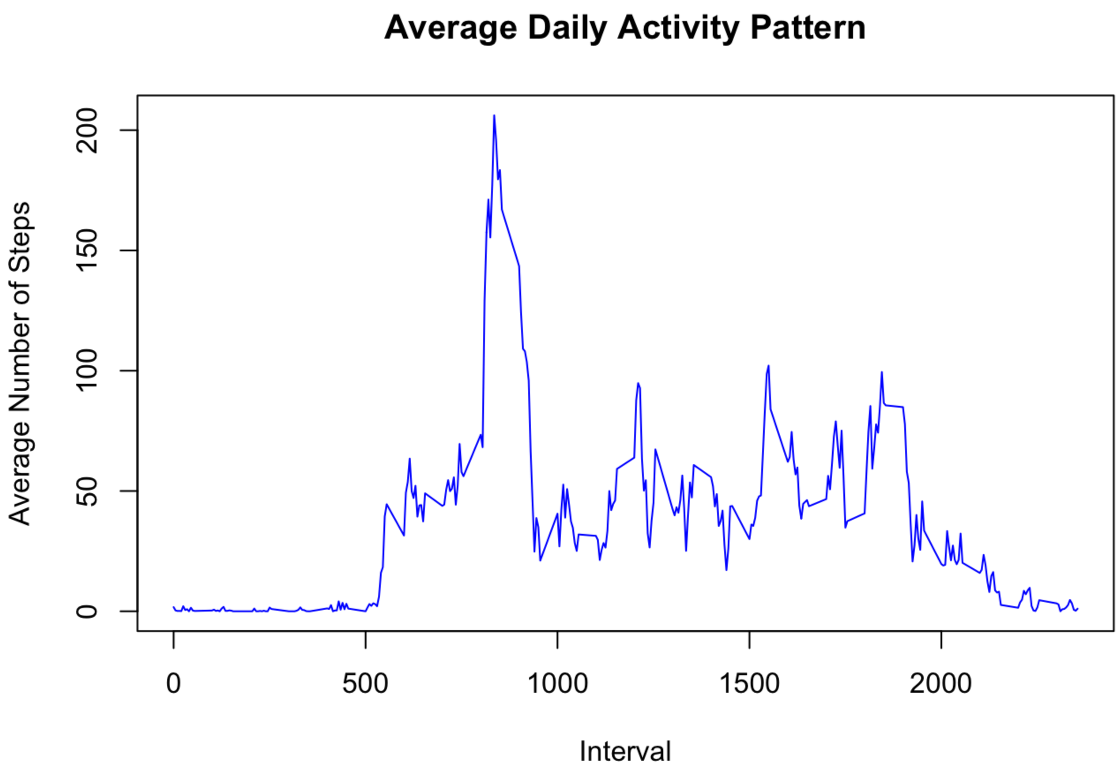
```
##Median
median(steps_each_day$steps)
```

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

Calculating the average number of steps taken, averaged across all days:

```
#Calculating the average
steps_per_interval <- aggregate(data_no_NA$steps, by=list(interval=data_no_NA$interval), FUN=mean)
```

```
#Adding columns names
colnames(steps_per_interval) <- c("interval", "average_steps")
```



The 5-minute interval that contains the maximum number of steps:

```
#The maximum number of average steps
max_steps <- max(steps_per_interval$average_steps)
max_steps
```

```
## [1] 206.1698
```

```
#The 5-minute interval that contains the maximum number of steps
intervale_max_steps<-steps_per_interval[which.max(steps_per_interval$average_steps),]$interval
intervale_max_steps
```

```
## [1] 835
## 288 Levels: 0 5 10 15 20 25 30 35 40 45 50 55 100 105 110 115 120 ... 2355
```

The total number of missing values in the dataset (for each variable):

For the “steps” variable:

```
sum(is.na(as.character(data$steps)))
```

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

```
##For the “date” variable:

sum(is.na(as.character(data$date)))
```

```
## [1] 0
```

```
##For the “interval” variable:

sum(is.na(as.character(data$interval)))
```

```
## [1] 0
```

The strategy for filling in all of the missing values in the dataset. Missing values are replaced by the mean of that 5-minute interval.

```
#finding the indices of missing values (NAs)
NA_index <- which(is.na(as.character(data$steps)))
complete_data <- data
#Imputing missing values using the mean for that 5-minute interval
complete_data[NA_index, ]$steps<-unlist(lapply(NA_index, FUN=function(NA_index){
                steps_per_interval[data[NA_index,]$interval==steps_per_interval$interval,]$average
_steps
                }))
```

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

```
#Checking the complete data with the summary and str methods
summary(complete_data)
```

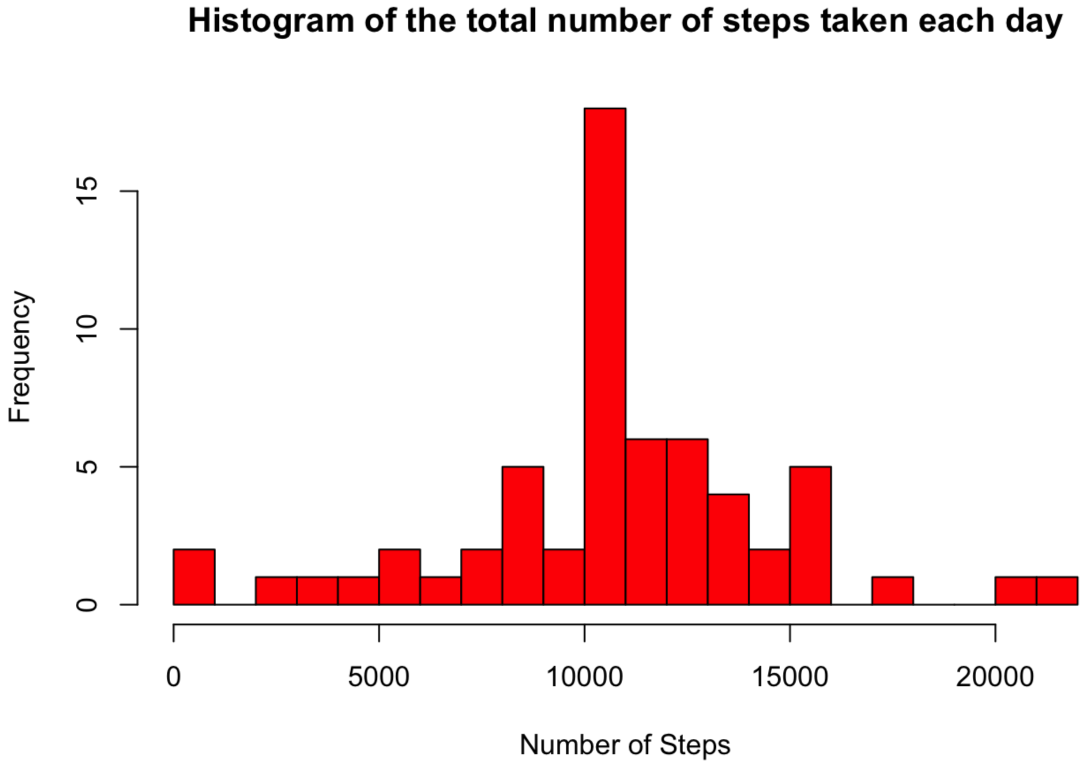
```
##      steps             date                 interval    
##  Min.   :  0.00   Min.   :2012-10-01   0      :   61  
##  1st Qu.:  0.00   1st Qu.:2012-10-16   5      :   61  
##  Median :  0.00   Median :2012-10-31   10     :   61  
##  Mean   : 37.38   Mean   :2012-10-31   15     :   61  
##  3rd Qu.: 27.00   3rd Qu.:2012-11-15   20     :   61  
##  Max.   :806.00   Max.   :2012-11-30   25     :   61  
##                                        (Other):17202
```

```
str(complete_data)
```

```
## 'data.frame':    17568 obs. of  3 variables:
##  $ steps   : num  1.717 0.3396 0.1321 0.1509 0.0755 ...
##  $ date    : Date, format: "2012-10-01" "2012-10-01" ...
##  $ interval: Factor w/ 288 levels "0","5","10","15",..: 1 2 3 4 5 6 7 8 9 10 ...
```

Making a histogram of the total number of steps taken each day for the complete dataset:

```
#Creating a data frame with the steps taken for each day
steps_each_day_complete <- aggregate(steps ~ date, data = complete_data, sum)
#Adding column names to the created data frame
colnames(steps_each_day_complete) <- c("date", "steps")
```



##Calculating the mean and median total number of steps taken per day for the complete dataset:

```
mean(steps_each_day_complete$steps)
```

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

```
#Median
median(steps_each_day_complete$steps)
```

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

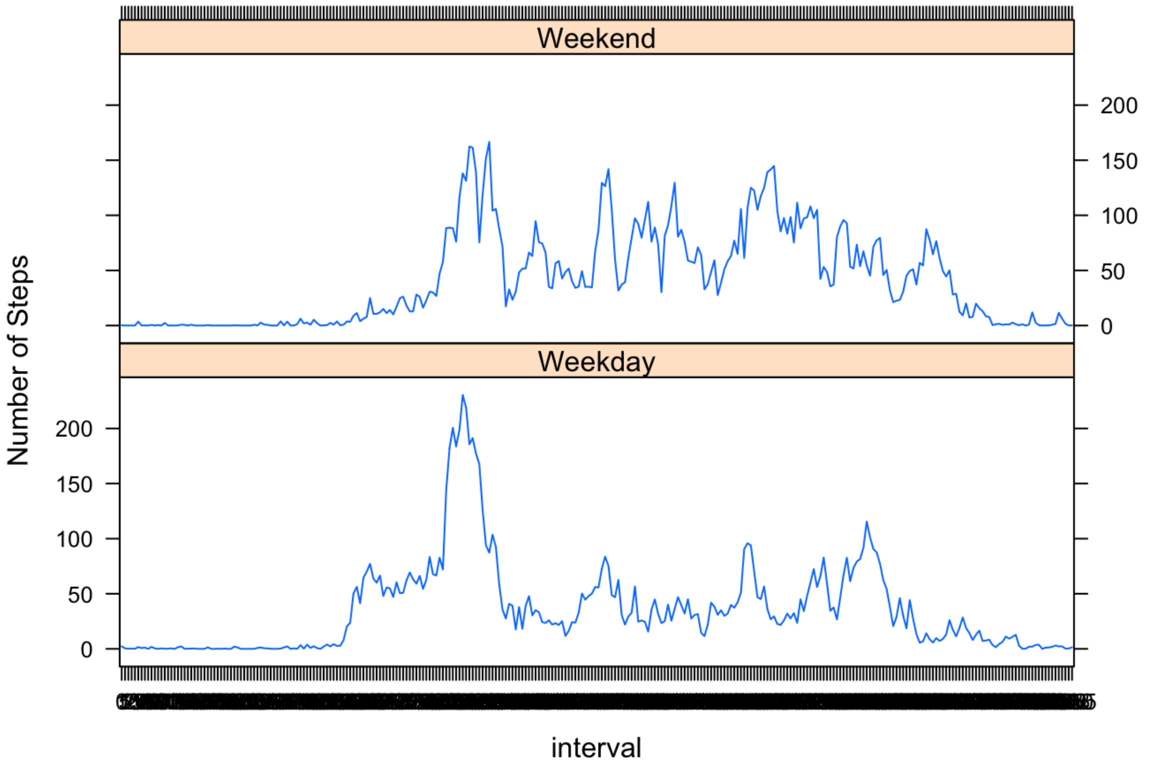
Are there differences in activity patterns between weekdays and weekends?

```
#Creating a factor variable "day "to store the day of the week:
complete_data$day <- as.factor(weekdays(complete_data$date))
```

```
#Creating a logical variable "is_weekday" (weekday=TRUE, weekend = FALSE) :
complete_data$is_weekday <- ifelse(!(complete_data$day %in% c("Saturday","Sunday")), TRUE, FALSE)
```

```
#Calculating the average number of steps for weekdays
weekdays_data <- complete_data[complete_data$is_weekday,]
steps_per_interval_weekdays <- aggregate(weekdays_data$steps, by=list(interval=weekdays_data$inter
val), FUN=mean)
#Calculating the average number of steps for weekends
weekends_data <- complete_data[!complete_data$is_weekday,]
steps_per_interval_weekends <- aggregate(weekends_data$steps, by=list(interval=weekends_data$inter
val), FUN=mean)
#Adding columns names
colnames(steps_per_interval_weekdays) <- c("interval", "average_steps")
colnames(steps_per_interval_weekends) <- c("interval", "average_steps")
#Adding a column to indecate the day
steps_per_interval_weekdays$day <- "Weekday"
steps_per_interval_weekends$day <- "Weekend"

#Merging the two togather
week_data <- rbind(steps_per_interval_weekends, steps_per_interval_weekdays)
#Converting the day variabke to a factor
week_data$day <- as.factor(week_data$day)
```



` **knit** knit2 <img src="PA1_template_files/figure-html/pressure-1.png" width="672" /> Note that the echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.