Reproducible Research: Peer Assessment 1

Load libraries

```
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(lattice)
```

Loading and preprocessing the data

```
act <- read.csv("activity.csv", stringsAsFactors = FALSE)
summary(act)
```

```
##      steps            date              interval
##  Min.   :  0.00   Length:17568       Min.   :   0.0
##  1st Qu.:  0.00   Class :character   1st Qu.: 588.8
##  Median :  0.00   Mode  :character   Median :1177.5
##  Mean   : 37.38                      Mean   :1177.5
##  3rd Qu.: 12.00                      3rd Qu.:1766.2
##  Max.   :806.00                      Max.   :2355.0
##  NA's   :2304
```

Since there is a date value, we will convert that into a date class.

```
act_date <- as.Date(act$date)
```

There are many NA's in the Steps column, we'll convert those to zero to avoid issues with plotting.

```
act$steps <- as.integer(act$steps)
```

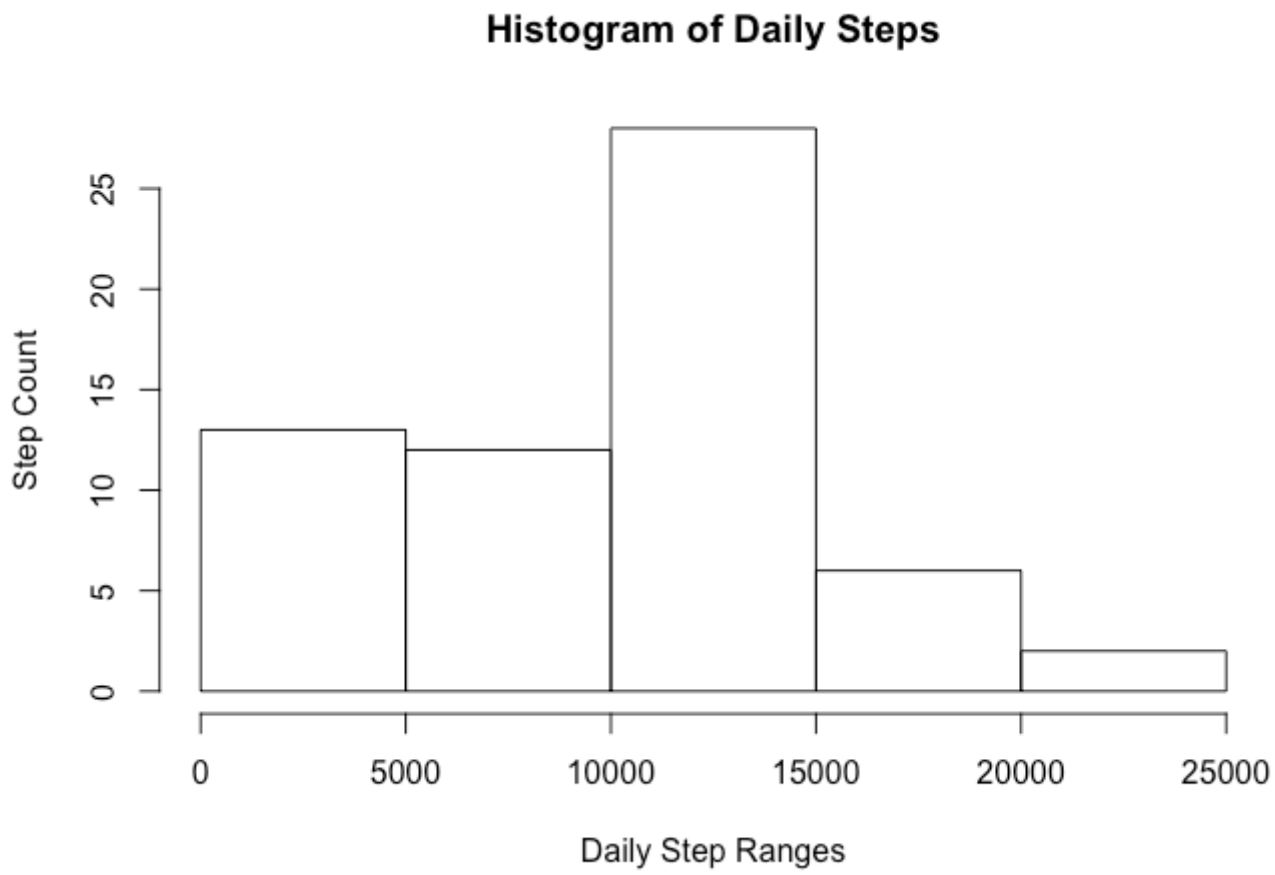
What is mean total number of steps taken per day?

First we group the steps by day.

```
act_day <- summarize(group_by(act,date),
                     steps = sum(steps, na.rm = TRUE))
print(act_day)
```

```
## # A tibble: 61 × 2
##          date steps
##         <chr> <int>
## 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
## 7  2012-10-07 11015
## 8  2012-10-08     0
## 9  2012-10-09 12811
## 10 2012-10-10  9900
## # ... with 51 more rows
```

```
hist(act_day$steps, main = "Histogram of Daily Steps", xlab = "Daily Step Ranges", ylab
= "Step Count")
```



Now we calculate the Mean and Median

```
daily_steps_mean <- round(mean(act_day$steps))
print(paste("Average Daily Steps is", daily_steps_mean))
```

```
## [1] "Average Daily Steps is 9354"
```

```
daily_steps_med <- round(median(act_day$steps))
print(paste("Median Daily Steps is", daily_steps_med))
```

```
## [1] "Median Daily Steps is 10395"
```

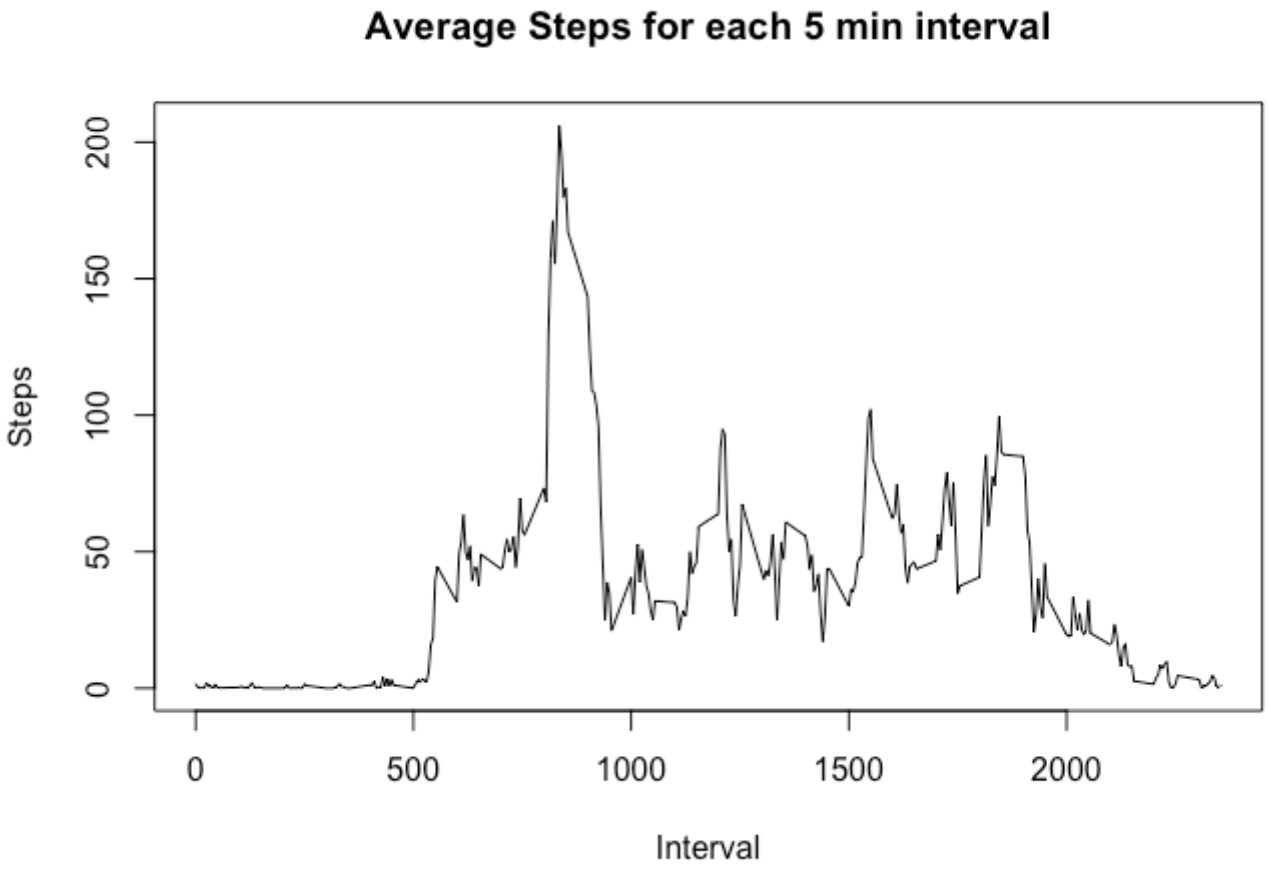
Average Daily Steps is 9354

Median Daily Steps is 10395

What is the average daily activity pattern?

First we make a time series chart of all 5 min5ute intervals and calculate the average steps taken every 5 min5utes.

```
min5 <- summarise(group_by(act,interval), steps = mean(steps, na.rm = TRUE))

plot(min5$interval, min5$steps, type = "l", main = "Average Steps for each 5 min interva
l", xlab = "Interval", ylab = "Steps")
```




```
max_pos <- match(max(min5$steps),min5$steps)
print( paste0("The highest steps interval is ", min5$interval[max_pos] ) )
```

```
## [1] "The highest steps interval is 835"
```

Highest Step interval is 835

Inputing missing values

First we check for how many incomplete rows there are:

```
act2 <- act
for(i in names(act2)){
    print(paste0("Column ", i,
                 " has ",
                 sum(is.na(act2[i])) ,
                 " NA's"))
}
```

```
## [1] "Column steps has 2304 NA's"
## [1] "Column date has 0 NA's"
## [1] "Column interval has 0 NA's"
```

There are 2304 incomplete rows all in the steps column. We will attempt to substitute and fill in those empty cells with the mean across all intervals.

```
    pos <- 0
    for( i in act2$steps){
        pos <- pos + 1
        if(is.na(i)){
            inter <- act2$interval[pos]
            inter_pos <- which(act2$interval == inter)
            int_mean <- mean(act2$steps[inter_pos], na.rm = TRUE)
            act2$steps[pos] <- round(int_mean)
        }
    }
```

Now we look at the new stats for the filled in dataframe:

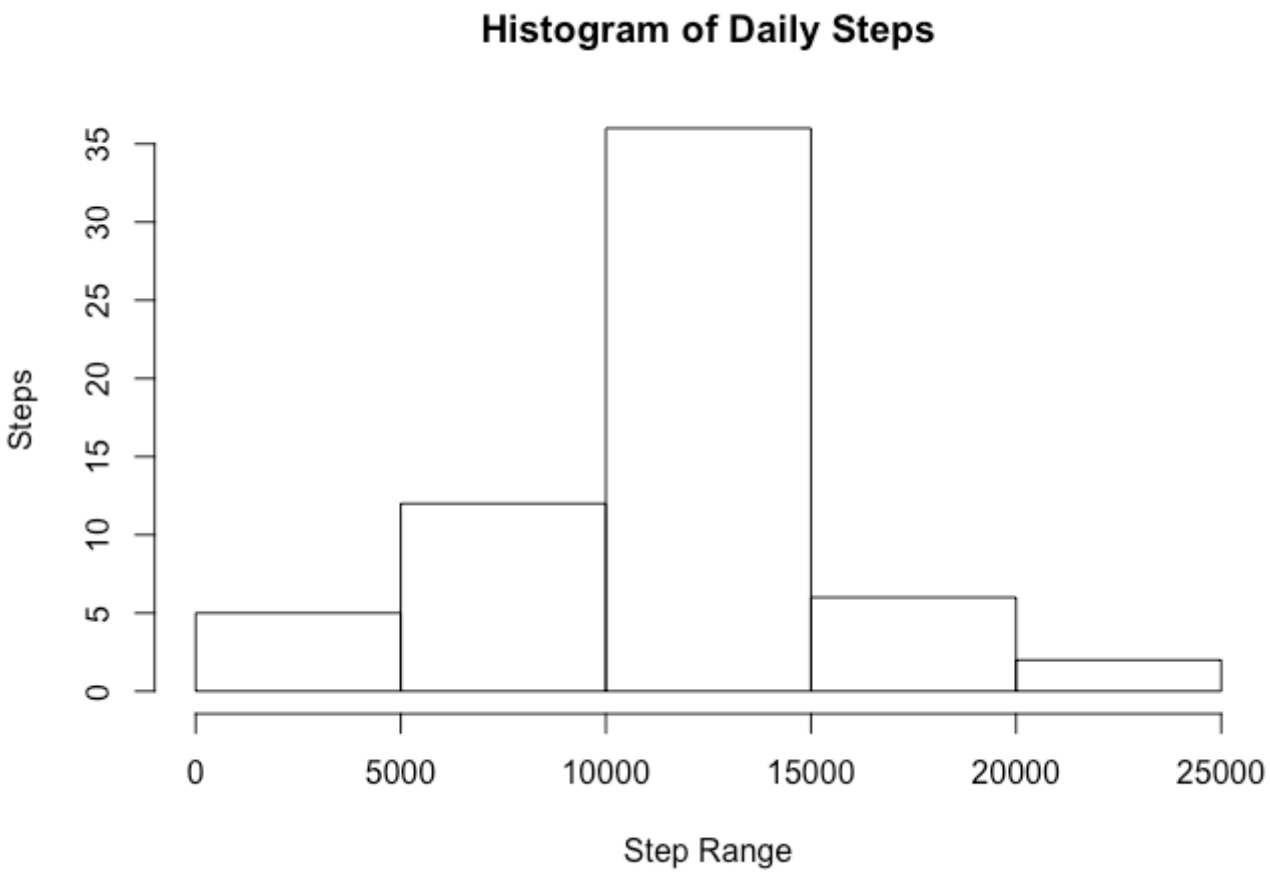
```
act2_day <- summarize(group_by(act2,date),
                      steps = sum(steps, na.rm = TRUE))

daily_steps_mean2 <- round(mean(act2_day$steps))
print(paste("Average Daily Steps is with filled in values", daily_steps_mean2))
```

```
## [1] "Average Daily Steps is with filled in values 10766"
```

```
daily_steps_med2 <- round(median(act2_day$steps))
print(paste("Median Daily Steps with filled in values is", daily_steps_med2))
```

```
## [1] "Median Daily Steps with filled in values is 10762"
```

```
hist(act2_day$steps, main = "Histogram of Daily Steps", xlab = "Step Range", ylab = "Ste
ps")
```



After filling the values, it is clear from the historgrams that the daily step values have shifted toward the median.

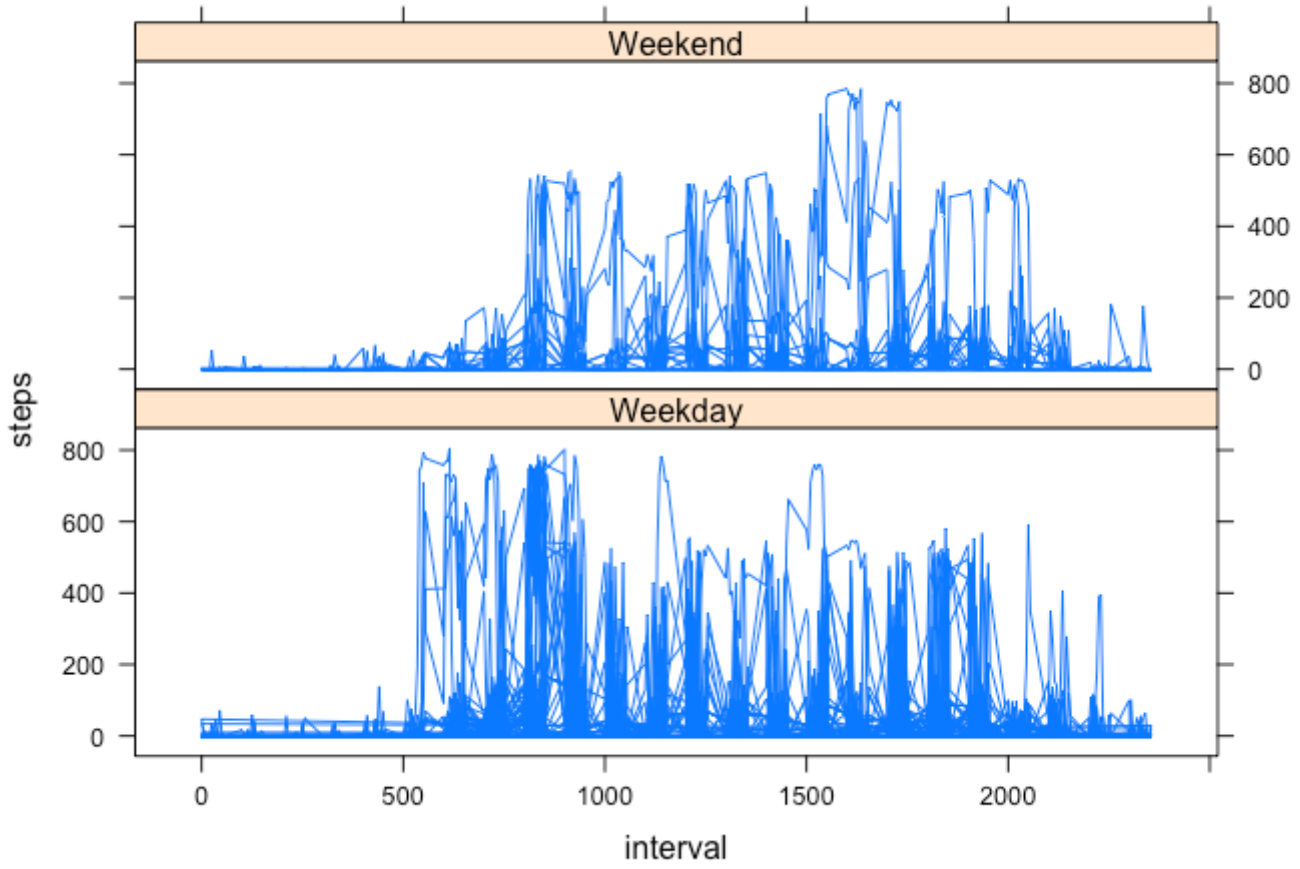
Are there differences in activity patterns between weekdays and weekends?

We first label what day of the week each date is and break the data down inbetween weekend and weekday

```
#First we create a column of day names
act2$day <- weekdays(as.Date(act2$date), abbreviate = TRUE)
#Then we create a column of weekday or weekend types.(Weekday by Default)
act2$day_type <- "Weekday"
#Now we run a GREP search of all cells that contain "SUN"" or "SAT"" and replace that co
lumn type with "Weekend"
act2[ grep("Sun|Sat",act2$day),"day_type"] <- "Weekend"
act2$day_type <- as.factor(act2$day_type)
```

Now we plot the 2 data sets

```
xyplot(steps~interval|day_type, type = "l", data = act2, layout = c(1,2))
```



The overlayed graphs show there is more steps taken during weekday mornings, and then some more in the evening while the weekends have a more even spread of walking throughout the day.