

Reproducible Research: Peer Assessment 1

Loading and preprocessing the data

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

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

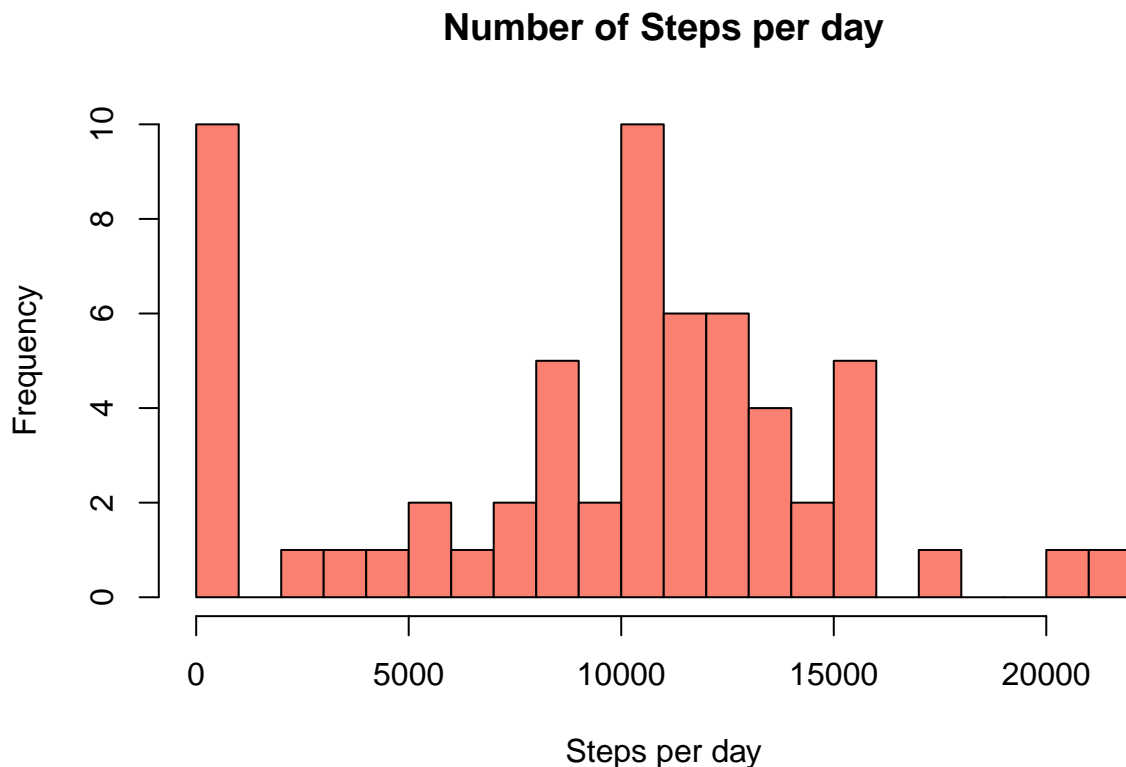
```
activity$date = as.Date(activity$date, "%Y-%m-%d")
```

Total Number of steps per day

Histogram Plot

```
activity.day.steps <- aggregate(activity$steps,
                                by = list(activity$date),
                                FUN = "sum", na.rm = TRUE)

h1 <- hist(activity.day.steps[,2], xlab="Steps per day",
           main="Number of Steps per day",
           col="salmon", breaks=20)
```



Mean and Median steps per day

```
mean.total.steps <- round(mean(activity.day.steps[,2]),2)
median.total.steps <- round(median(activity.day.steps[,2]),2)
tab <- data.frame(Mean = mean.total.steps,Median = median.total.steps)
kable(tab)
```

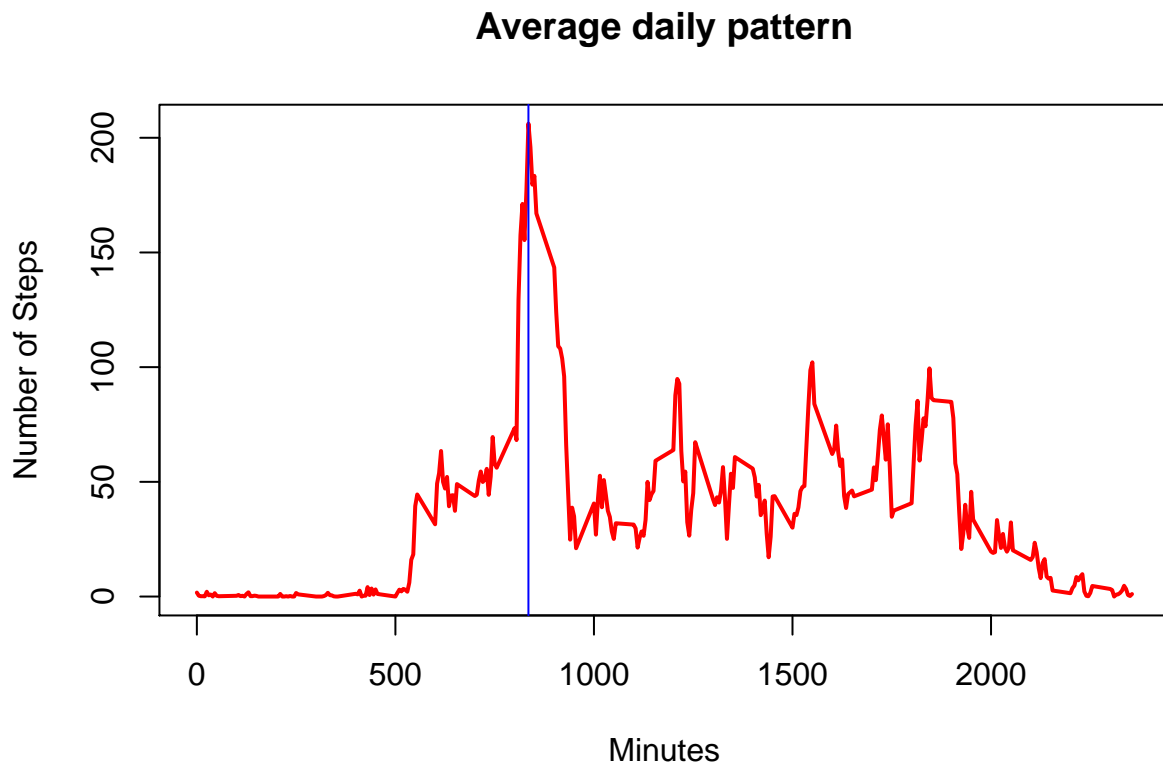
Mean	Median
9354.23	10395

Average daily Activity Pattern

Time Series Plot

```
activity.time.steps <- aggregate(activity$steps, by = list(activity$interval),FUN = "mean",na.rm = TRUE)
names(activity.time.steps) <- c("Interval","AvgSteps")
Max.5 <- activity.time.steps[activity.time.steps$AvgSteps == max(activity.time.steps$AvgSteps),1 ]

plot(x = activity.time.steps$Interval,y = activity.time.steps$AvgSteps,
     type = 'l',main = "Average daily pattern",
     xlab = "Minutes",ylab = "Number of Steps",col = "red",lwd=2 )
abline(v = Max.5,col = "blue",lwd =1)
```



minute interval with maximum number of steps is at : 835 mins

Imputing missing values

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

The total number of rows with NAs is 2304

Creating a data set after imputing data

Impute Strategy is to replace NA values for any 5 minute interval with the average value for that 5 minute interval across all days

```
impute <- function(v){
  if(is.na(v$steps)){
    v$steps = activity.time.steps[activity.time.steps$Interval==v$interval,2]
  }
  else{
    v$steps = v$steps
  }
  return(v$steps)
}

clean.steps = as.vector(NULL)

for (i in seq(1:nrow(activity))){
  clean.steps[i] <- impute(activity[i,])
}

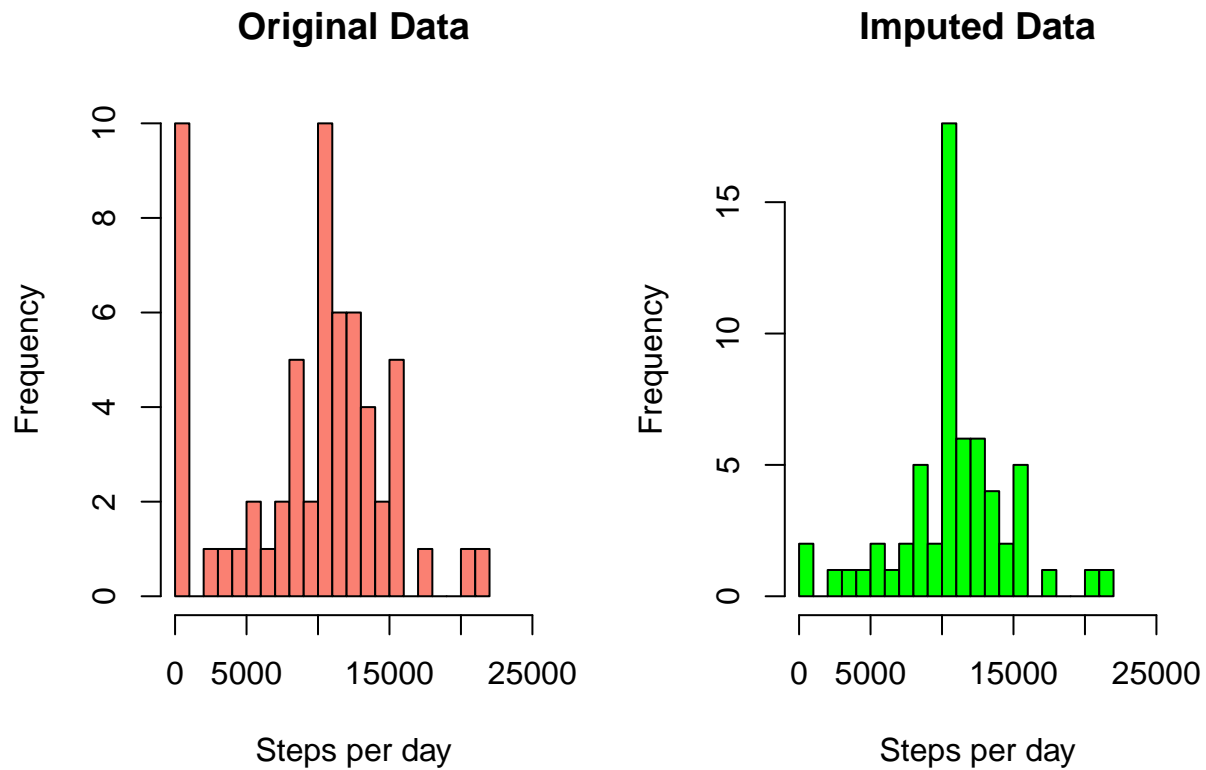
activity.clean <- cbind(activity, clean.steps)
```

Comparison of histograms after imputing data

```
activity.day.clean <- aggregate(activity.clean$clean.steps,
                                by = list(activity.clean$date),
                                FUN = "sum")

par(mfrow=c(1,2))
h1 <- hist(activity.day.steps[,2],
            xlab="Steps per day",main="Original Data",
            col="salmon",breaks=20,xlim=c(0,25000))

h2 <- hist(activity.day.clean[,2],
            xlab="Steps per day",main="Imputed Data",
            col="green",breaks=20,xlim=c(0,25000))
```



Mean and Median Steps per day: Original data vs imputed data

	Mean	Median
Original Data	9354.23	10395.00
Imputed Data	10766.19	10766.19

Weekday vs Weekend Activity Pattern

```
activity.time.clean <- as.tbl(activity.clean) %>%
  mutate(isWeekday = ifelse(weekdays(date) %in% c("Saturday","Sunday"), "Weekend", "Weekday")) %>%
  mutate(isWeekday=as.factor(isWeekday)) %>%
  group_by(isWeekday, interval) %>%
  summarize(AvgSteps = mean(clean.steps)) %>%
  select(interval, AvgSteps, isWeekday)

g <- ggplot(activity.time.clean) +
  geom_line(aes(x= interval, y=AvgSteps, col = isWeekday), size =2) +
  labs( x = "Time Interval(in mins)", y="Average Steps", title = "Activity Pattern") +
  facet_wrap(facets = ~ isWeekday, nrow=2) +
  theme_fivethirtyeight()

print(g)
```

Activity Pattern

