# Reproducible Research: Peer Assessment 1

```
knitr::opts_chunk$set(fig.path = "figures/")
```

## Loading and preprocessing the data

### 1.Code for reading in the dataset and/or processing the data

**Load the package we need**

```
library(knitr)
library(tidyverse)  #including dplyr ggplot2
```

```
## -- Attaching packages ---------------------------------------------------------------------------
```

```
## v ggplot2 3.3.0     v purrr   0.3.3
## v tibble  3.0.1     v dplyr   0.8.5
## v tidyr   1.0.3     v stringr 1.4.0
## v readr   1.3.1     v forcats 0.5.0
```

```
## -- Conflicts ------------------------------------------------------------------------------------
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

**Set echo value to TRUE so that we can show both the code chunk and the results**

```
knitr::opts_chunk$set(echo = TRUE)
```

**Let's unzip the "activity.zip" file and read the data**

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

**Transforming data isn't necessary in my analysis procedure**

## What is mean total number of steps taken per day?

### 2.Histogram of the total number of steps taken each day

**Calculate the total number of steps taken per day**

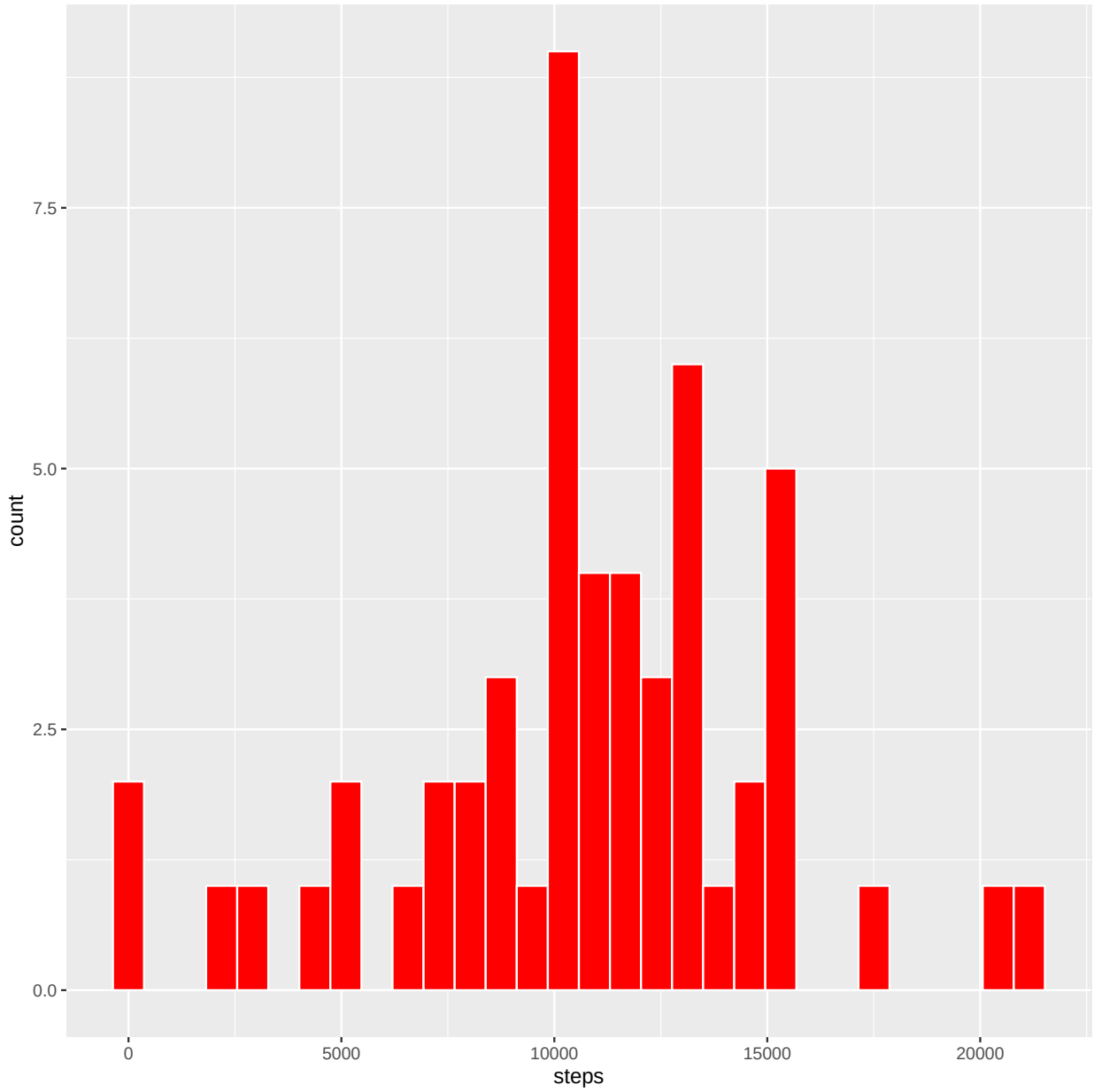
```
total_steps_perday <- data %>%filter(!is.na(steps))%>% group_by(date) %>% summarise_each(sum,steps)
head(total_steps_perday)
```

```
## # A tibble: 6 x 2
##   date       steps
##   <fct>      <int>
## 1 2012-10-02   126
## 2 2012-10-03 11352
## 3 2012-10-04 12116
## 4 2012-10-05 13294
```

```
## 5 2012-10-06 15420
## 6 2012-10-07 11015
```

**Create the histogram**

```
ggplot(total_steps_perday,mapping = aes(x= steps)) +geom_histogram(fill = "Red",color = "White",bins = 3
```




**3.Mean and median number of steps taken each day**

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

```
summarise(total_steps_perday,mean = mean(steps),median = median(steps))
```

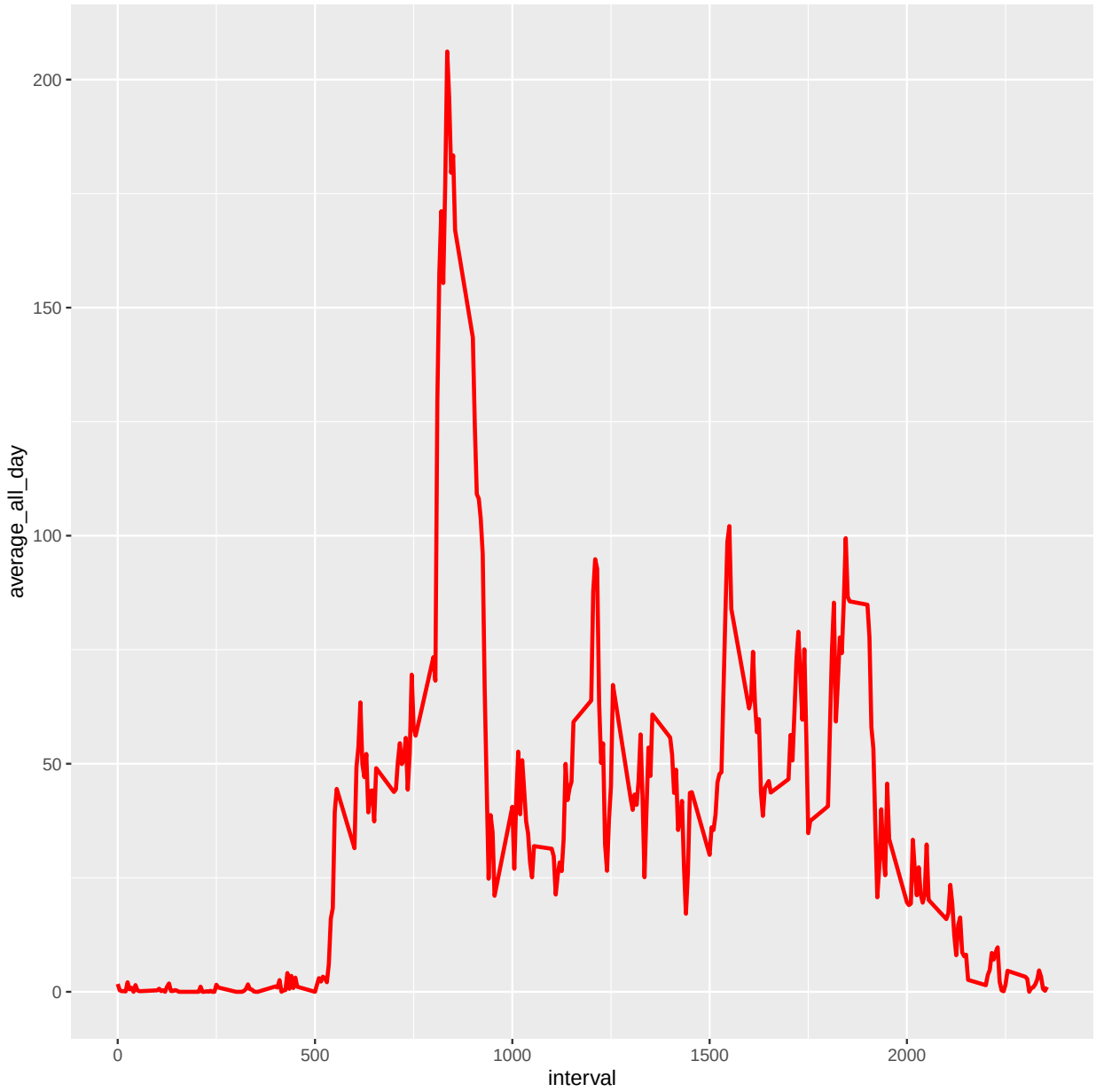
```
## # A tibble: 1 x 2
##     mean median
```

```
##    <dbl>  <int>
## 1 10766.  10765
```

## What is the average daily activity pattern?

### 4.Time series plot of the average number of steps taken

```
data %>% filter(!is.na(steps)) %>%group_by(interval) %>%
    summarise(average_all_day = mean(steps)) %>%
    ggplot(mapping = aes(x = interval,y = average_all_day))+
    geom_line(color = "red",size = 1)
```



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

```
avg_frame <- data %>% filter(!is.na(steps)) %>%group_by(interval) %>%
    summarise(average_all_day = mean(steps))

avg_frame[which(avg_frame$average_all_day == max(avg_frame$average_all_day)),]$interval
```

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

## Imputing missing values

**6.Code to describe and show a strategy for imputing missing data**

```
#Calculate and report the total number of missing values in the dataset
#(i.e. the total number of rows with NAS)
#2304 NAs
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
```

```
#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.

#Using the mean for that 5-minute interval

mean_steps_perinterval <- data %>% group_by(interval) %>% summarise(mean_value = mean(steps,na.rm = TRU


#Create a new dataset that is equal to the original dataset but with the missing data filled in.
new_data <- data

for (i in 1:nrow(new_data))
{
    if (is.na(new_data$steps[i]))
    {
        new_data$steps[i] <-
            mean_steps_perinterval[which(new_data$interval[i] == mean_steps_perinterval$interval),]$mean

        #print(mean_steps_perinterval[which(new_data$interval[i] == mean_steps_perinterval$interval),]$
    }
}


summary(new_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.: 27.00   2012-10-05:  288   3rd Qu.:1766.2  
##  Max.   :806.00   2012-10-06:  288   Max.   :2355.0  
##                   (Other)   :15840
```

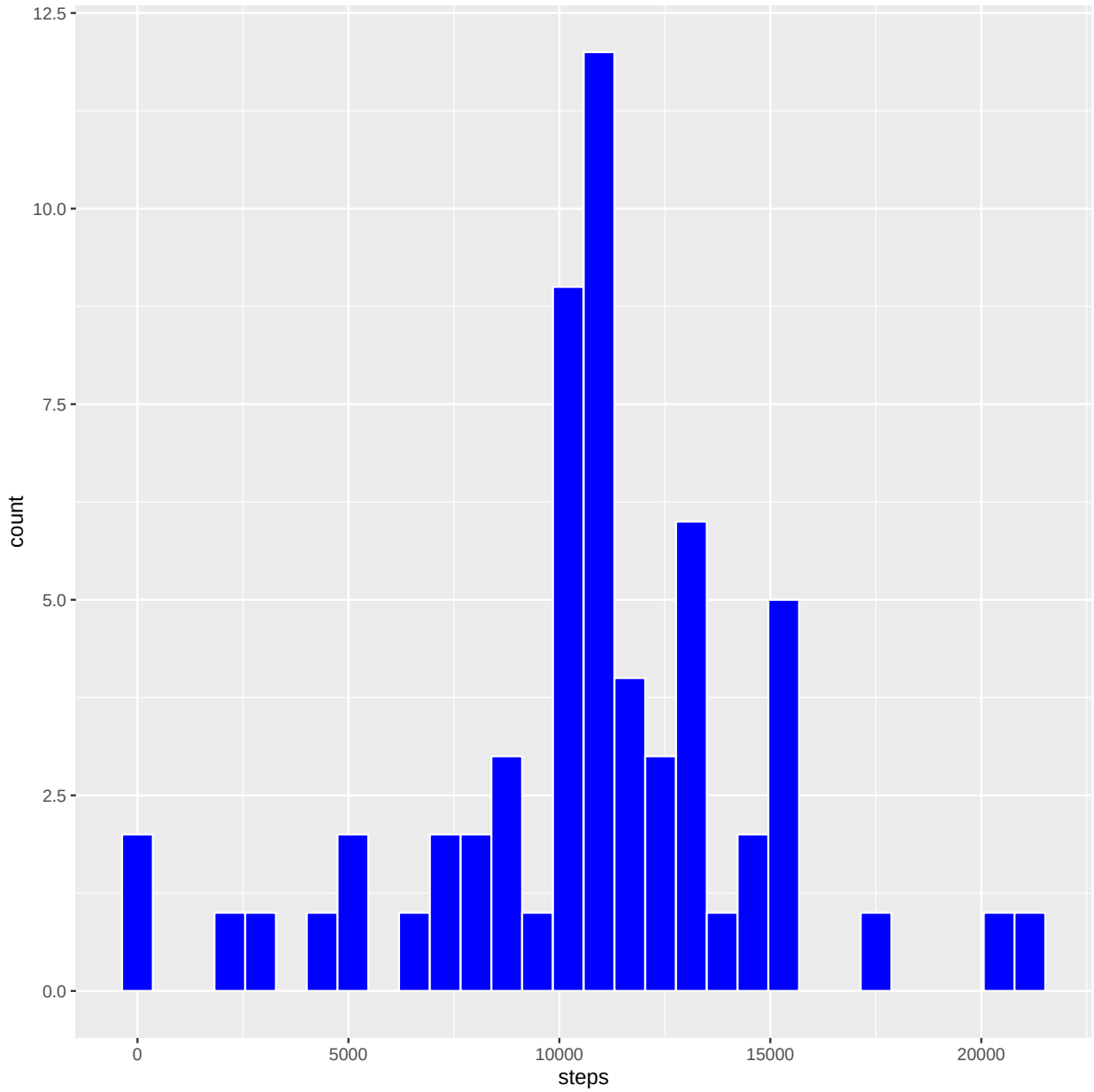
```
sum(is.na(new_data))
```

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

**7.Histogram of the total number of steps taken each day after missing values are imputed**

```
#Make a histogram of the total number of steps taken each day and Calculate and report the mean and med

total_steps_perday2 <- new_data %>% filter(!is.na(steps))%>% group_by(date) %>% summarise_each(sum,steps
ggplot(total_steps_perday2,mapping = aes(x= steps)) +geom_histogram(fill = "Blue",color = "White",bins =
```




```
summarise(total_steps_perday2,mean = mean(steps),median = median(steps))
```

```
## # A tibble: 1 x 2
##     mean median
##    <dbl>  <dbl>
## 1 10766. 10766.
```

```
#mean is same but median is greter
```

## 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.**

```
Sys.setlocale("LC_TIME", "English")
```

```
## [1] "English_United States.1252"
```

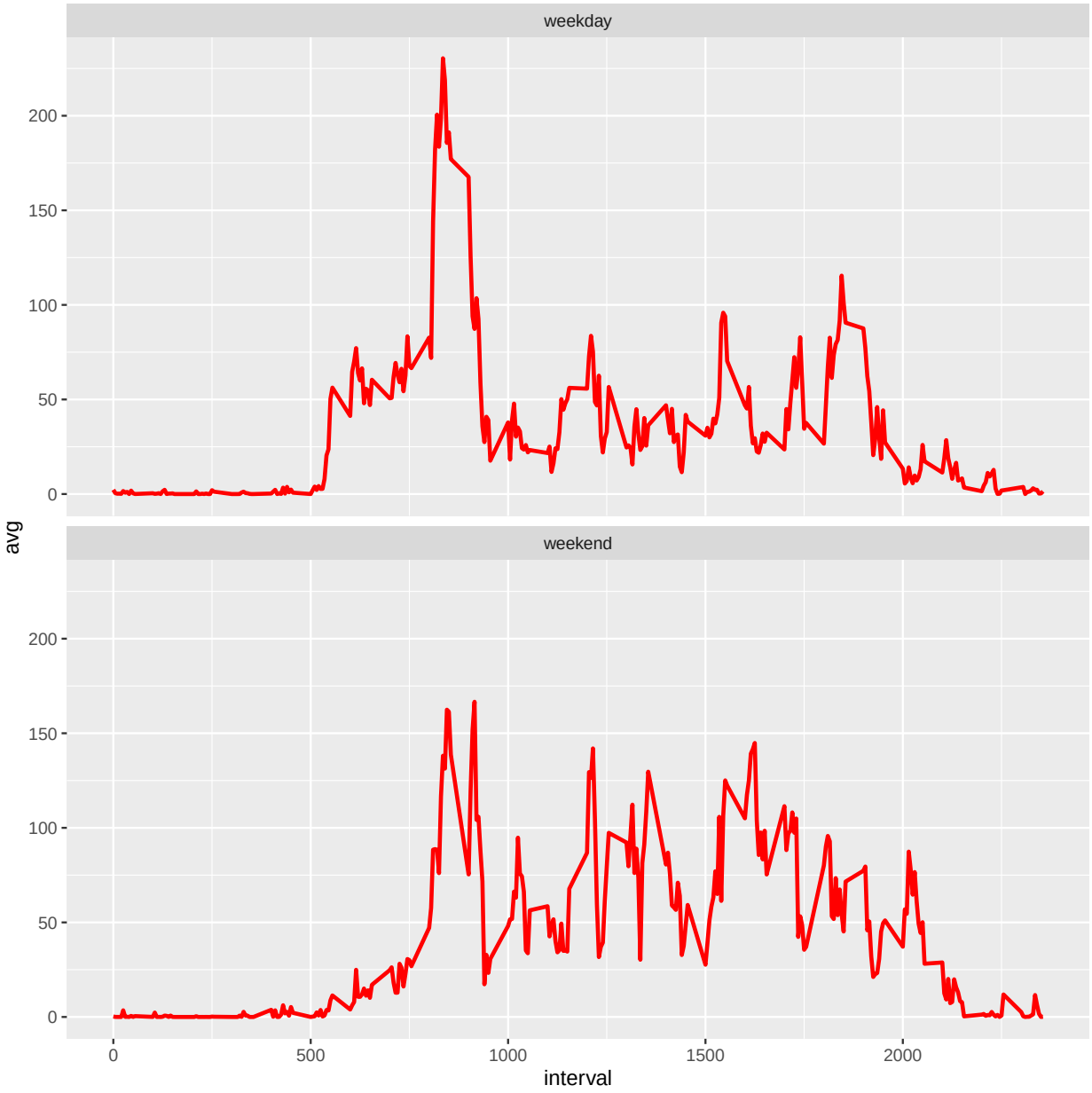
```
new_data <- new_data %>% mutate(week_day = weekdays(as.Date(date)),
                                week_day_or_not = ifelse(week_day %in% c("Monday","Tuesday","Wednesday"

summary(new_data)
```

```
##      steps               date          interval        week_day
##  Min.   :  0.00   2012-10-01:  288   Min.   :   0.0   Length:17568
##  1st Qu.:  0.00   2012-10-02:  288   1st Qu.: 588.8   Class :character
##  Median :  0.00   2012-10-03:  288   Median :1177.5   Mode  :character
##  Mean   : 37.38   2012-10-04:  288   Mean   :1177.5
##  3rd Qu.: 27.00   2012-10-05:  288   3rd Qu.:1766.2
##  Max.   :806.00   2012-10-06:  288   Max.   :2355.0
##                   (Other)   :15840
##  week_day_or_not
##  Length:17568
##  Class :character
##  Mode  :character
##
##
##
##
```

**8.Panel plot comparing the average number of steps taken per 5-minute interval across weekdays and weekends**

```
new_data %>% group_by(week_day_or_not,interval) %>% summarise(avg = mean(steps)) %>% ggplot(mapping = a
```




**9.All of the R code needed to reproduce the results (numbers, plots, etc.) in the report (above)**