PA1_template.Rmd

2023-06-25

1.0 Loading and pre-processing the data

```
#1.1 Ensure csv file is on the working directory

library(ggplot2)
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

activity <- read.csv("activity.csv")
```

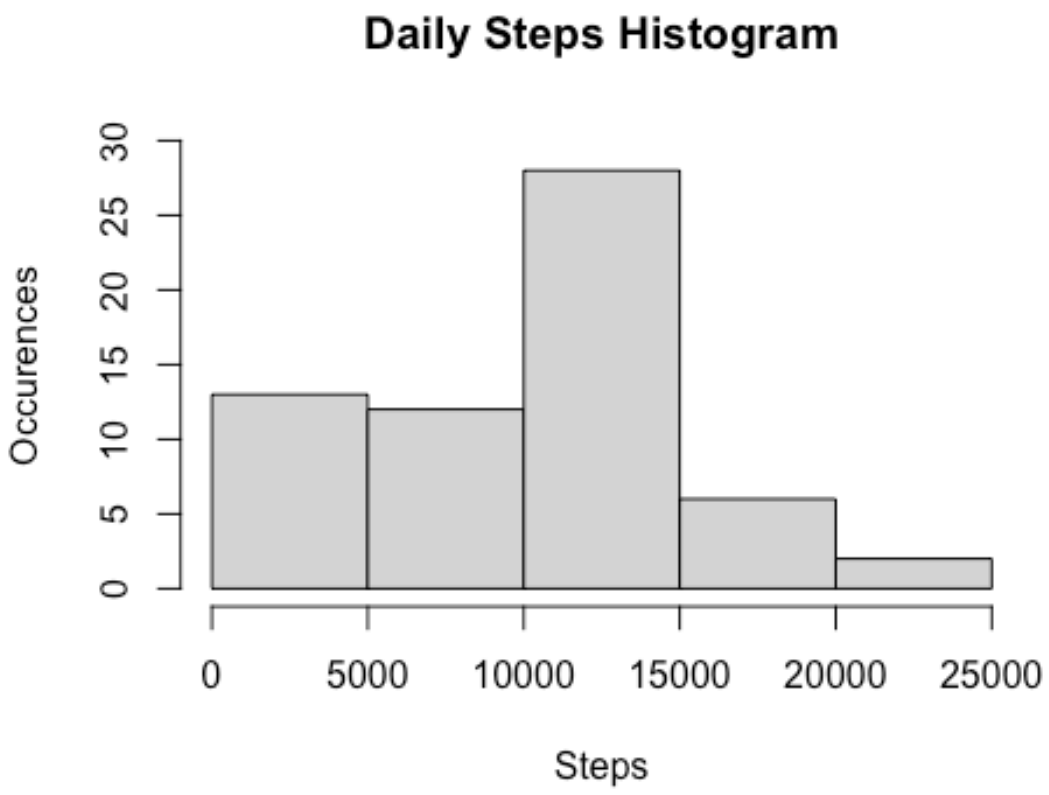
#2.0 What is mean total number of steps taken per day?

```
#2.1 Calculating the total steps per day

  StepsPerDay <- activity %>%
              group_by(date) %>%
              summarize(totalsteps =  sum(steps, na.rm = TRUE)) #removes NA
values

#2.2 Histogram of the total steps per day

  hist(StepsPerDay$totalsteps, main = "Daily Steps Histogram",
       xlab = "Steps", ylab = "Occurences", ylim=c(0,30))
```




```
#2.3 Calculate and report the mean and median of the total number of steps
taken per day

 mean <- round(mean(StepsPerDay$totalsteps))
  median <- round(median(StepsPerDay$totalsteps))
  print(paste("Mean: ", mean))

## [1] "Mean:  9354"

  print(paste("Median: ",median))

## [1] "Median:  10395"
```

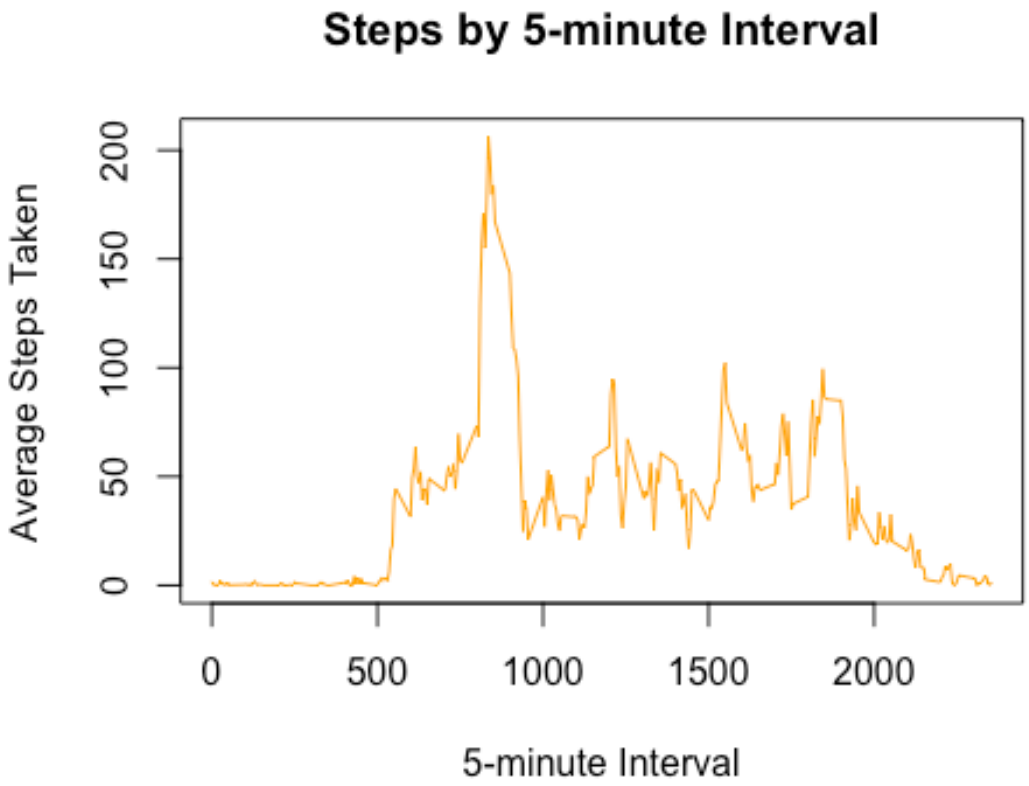
#3.0 What is the average daily activity pattern?

```
#3.1 Make a time series plot (i.e. type = "l") of the 5-minute interval (x-
axis)
# and the average number of steps taken, averaged across all days (y-axis)

 StepsPerInterval <- activity %>%
    group_by(interval) %>%
    summarize(MeanSteps = mean(steps, na.rm = TRUE))

  plot(StepsPerInterval$MeanSteps ~  StepsPerInterval$interval, main = "Steps
```

```
by 5-minute Interval",
       col='orange',type="l", xlab = "5-minute Interval", ylab="Average Steps
Taken")
```




```
#3.2 Which 5-minute interval, on average across all the days in the dataset,
# contains the maximum number of steps?

 print(paste("5-minute interval with the maximum number of steps on average
across all days:",

StepsPerInterval$interval[which.max(StepsPerInterval$MeanSteps)]))

## [1] "5-minute interval with the maximum number of steps on average across
all days: 835"

  print(paste("Average steps for the 5-minute interval with the maximum
number of steps on average across all days:",
              round(max(StepsPerInterval$MeanSteps))))

## [1] "Average steps for the 5-minute interval with the maximum number of
steps on average across all days: 206"
```

#4.0 Imputing missing values

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

print(paste("Total number of rows with NAs:", sum(is.na(activity$steps))))

## [1] "Total number of rows with NAs: 2304"

#4.2 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.


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

#Before Imputing NA
head(activity)

##   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

#After Imputing NA
  ActivityImputingNA <- activity
  for (i in 1:nrow(activity)){ #loop from 1 to 17568 row
    if(is.na(activity$steps[i])){ #if step is NA, the mean for that 5-minute
interval will be used
      ActivityImputingNA$steps[i] <-
StepsPerInterval$MeanSteps[ActivityImputingNA$interval[i] ==
StepsPerInterval$interval]
    }
  }
  #The mean is now populated to the intervals with NA
  head(ActivityImputingNA)

##       steps       date interval
## 1 1.7169811 2012-10-01        0
## 2 0.3396226 2012-10-01        5
## 3 0.1320755 2012-10-01       10
## 4 0.1509434 2012-10-01       15
## 5 0.0754717 2012-10-01       20
## 6 2.0943396 2012-10-01       25

  #4.4 Make a histogram of the total number of steps taken each day
  #and Calculate and report the mean and median total number of steps taken
per day.
  # Do these values differ from the estimates from the first part of the
```

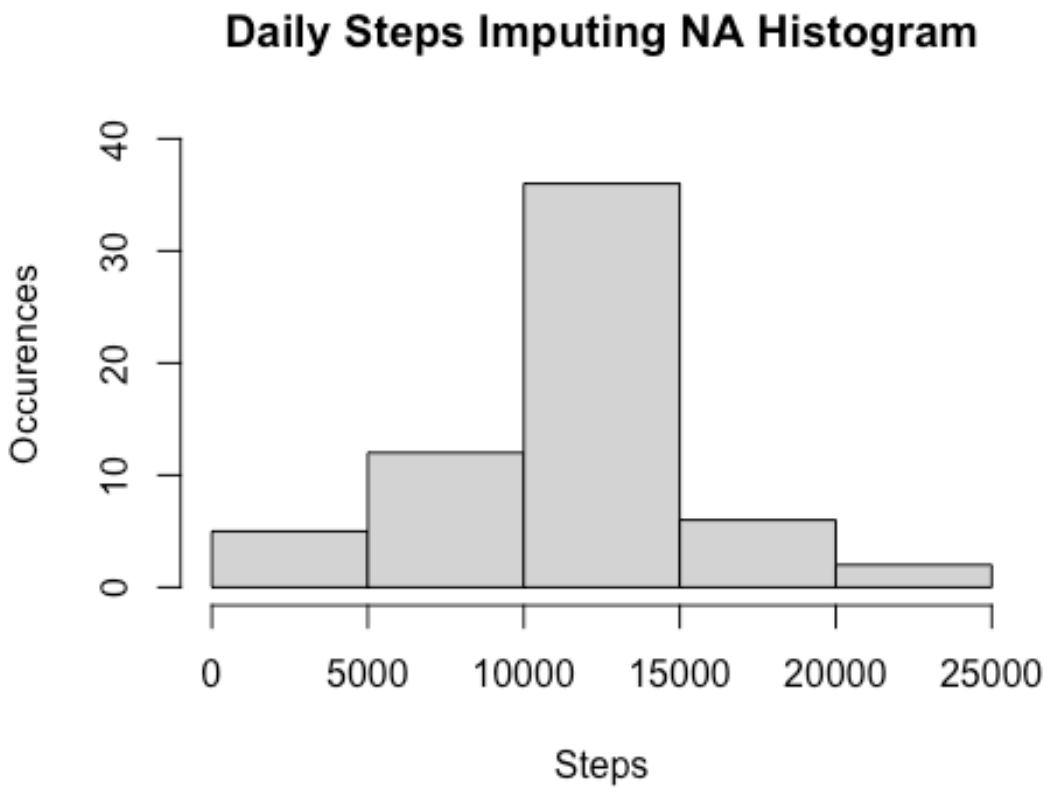
```
assignment?
  # What is the impact of imputing missing data on the estimates of the total
daily number of steps?

  StepsPerDayImputingNA <- ActivityImputingNA %>%
    group_by(date) %>%
    summarize(totalsteps =  round(sum(steps)))

head(StepsPerDayImputingNA)
```

```
## # A tibble: 6 × 2
##   date       totalsteps
##   <chr>           <dbl>
## 1 2012-10-01      10766
## 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
```

```
hist(StepsPerDayImputingNA$totalsteps, main="Daily Steps Imputing NA
Histogram",
       xlab = "Steps", ylab = "Occurences", ylim=c(0,40))
```



```
 meanImputingNA <- round(mean(StepsPerDayImputingNA$totalsteps))
  medianImputingNA <- round(median(StepsPerDayImputingNA$totalsteps))
  print(paste("Mean Imputing NA:", meanImputingNA))

## [1] "Mean Imputing NA: 10766"

  print(paste("Median Imputing NA:", medianImputingNA))

## [1] "Median Imputing NA: 10766"

#Compare Before and After Imputing NA
#The values differ from the estimates from the first part of the assignment.
#The mean and median increase after imputing missing values.

  CompareNA <- data.frame(mean = c(mean, meanImputingNA), median = c(median,
medianImputingNA))
  rownames(CompareNA) <- c("Before Imputing NA", "After Imputing NA")
  print(CompareNA)

##                       mean median
## Before Imputing NA  9354  10395
## After Imputing NA  10766  10766
```

#5.0 Are there differences in activity patterns between weekdays and weekends?

```
#5.1 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.

  ActivityDay <- ActivityImputingNA
  ActivityDay$date <- as.Date(ActivityDay$date)
  ActivityDay$day <- ifelse(weekdays(ActivityDay$date) %in%
c("Saturday","Sunday"),"Weekend","Weekday")
  ActivityDay$day <- as.factor(ActivityDay$day)

#5.2 Make a panel plot containing a time series plot (i.e.  type = "l") of
the 5-minute interval(x-axis)
#and the average number of steps taken, averaged across all weekday days or
weekend days (y-axis).
#See the README file in the GitHub repository to see an example of what this
plot
#should look like using simulated data.

  ActivityWeekday <- filter(ActivityDay, ActivityDay$day == "Weekday")
  ActivityWeekend <- filter(ActivityDay, ActivityDay$day == "Weekend")

  #Weekday average number of steps
  ActivityWeekday <- ActivityWeekday %>%
    group_by(interval) %>%
    summarize(steps = mean(steps))
  ActivityWeekday$day <- "Weekday"
```

```r
#Weekend average number of steps
ActivityWeekend <- ActivityWeekend %>%
  group_by(interval) %>%
  summarize(steps = mean(steps))
ActivityWeekend$day <- "Weekend"

#Combine Weekday and Weekend
ActivityWeekdayWeekend <- rbind(ActivityWeekday, ActivityWeekend)
ActivityWeekdayWeekend$day <- as.factor(ActivityWeekdayWeekend$day)

#plot
ggplot(ActivityWeekdayWeekend,
       aes(interval,steps)) +
  geom_line() +
  facet_grid (day~.) +
  labs(y = "Average Number of Steps") + labs(x = "Interval") +
  ggtitle("Weekday vs Weekend Average Number of Steps")
```