Reproducible Research: Peer Assessment 1

Loading and preprocessing the data

```
require(ggplot2)
```

```
## Loading required package: ggplot2
```

```
## Warning: package 'ggplot2' was built under R version 3.2.1
```

```
require(VIM)
```

```
## Loading required package: VIM
```

```
## Warning: package 'VIM' was built under R version 3.2.1
```

```
## Loading required package: colorspace
## Loading required package: grid
## Loading required package: data.table
```

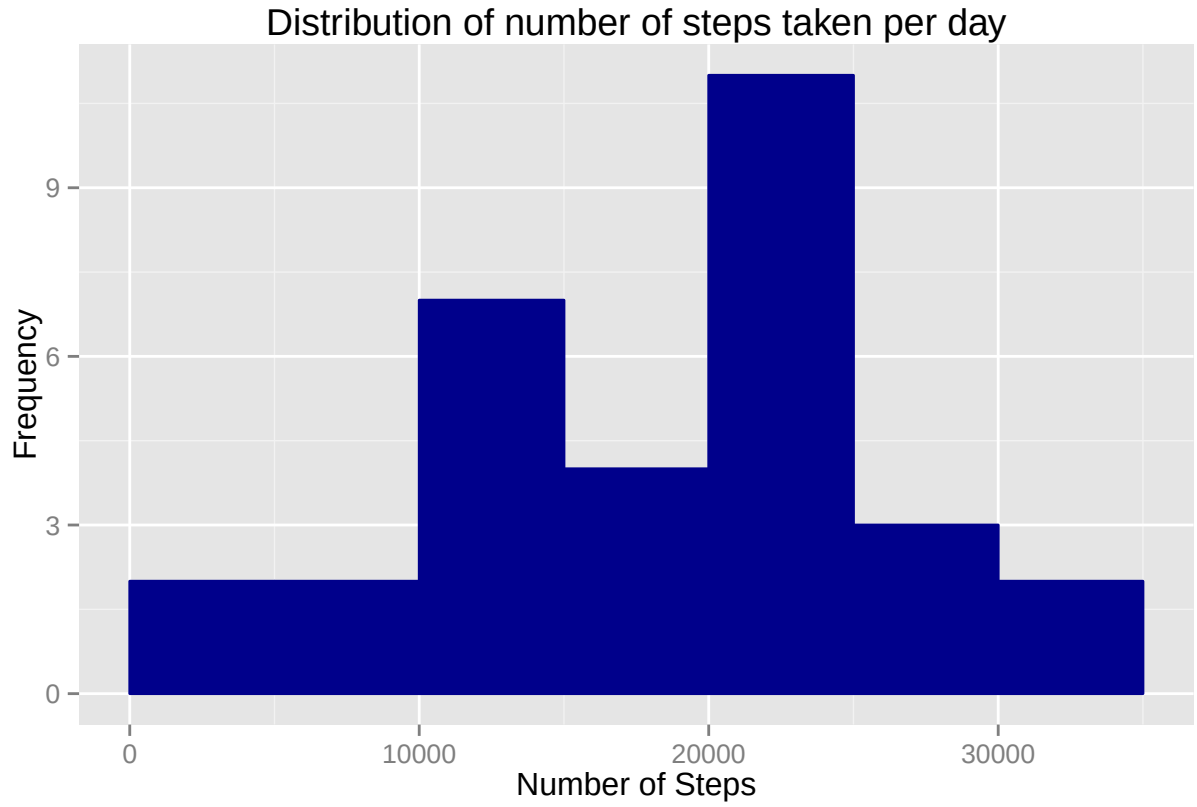
```
## Warning: package 'data.table' was built under R version 3.2.1
```

```
## VIM is ready to use.
##  Since version 4.0.0 the GUI is in its own package VIMGUI.
##
##           Please use the package to use the new (and old) GUI.
##
## Suggestions and bug-reports can be submitted at: https://github.com/alexkowa/VIM/issues
##
## Attaching package: 'VIM'
##
## The following object is masked from 'package:datasets':
##
##     sleep
```

```
DT <- read.csv(unz('activity.zip', 'activity.csv'))
DT$date <- as.Date(DT$date, '%Y-%M-%d')
```

What is mean total number of steps taken per day?

```
DT.date <- data.frame(steps = tapply(DT$steps, DT$date, sum, na.rm = TRUE))
qplot(DT.date$steps, data = DT.date, breaks = seq(0, 35000, by = 5000),
      xlab = 'Number of Steps', ylab = 'Frequency',
      main = 'Distribution of number of steps taken per day',
      fill=I("darkblue"), col=I("darkblue"))
```




```
mean(DT.date$steps)
```

```
## [1] 18406.71
```

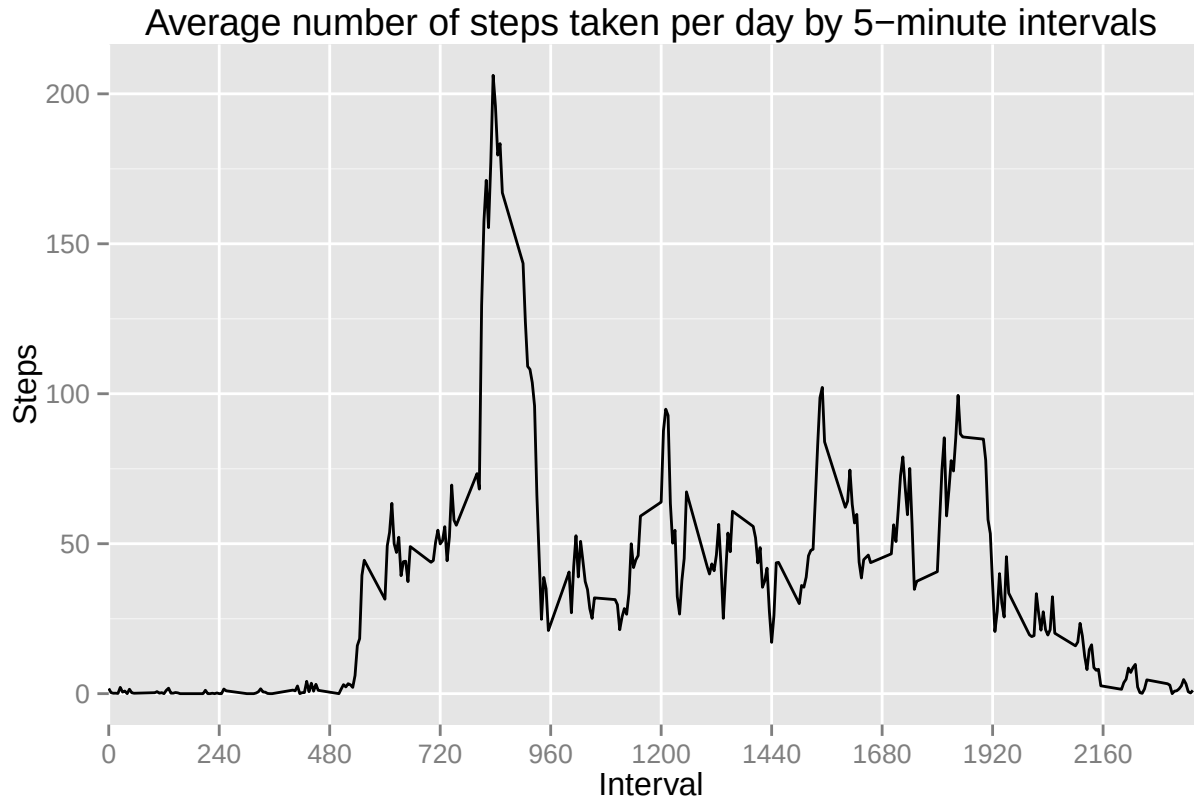
```
median(DT.date$steps)
```

```
## [1] 20525
```

What is the average daily activity pattern?

```
DT.interval <- data.frame(steps = tapply(DT$steps, DT$interval, mean, na.rm = TRUE))
DT.interval$interval <- as.numeric(row.names(DT.interval))

ggplot(data = DT.interval,
       aes(x = DT.interval$interval, y = DT.interval$steps, group = 1)) +
       geom_line() + xlab('Interval') + ylab('Steps') +
       ggtitle('Average number of steps taken per day by 5-minute intervals') +
       scale_x_discrete(breaks = seq(0, 2400, by = 240))
```




```
with(DT.interval, DT.interval[steps == max(steps) , "interval"])
```

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

Imputing missing values

```
nrow(DT[!(complete.cases(DT)),])
```

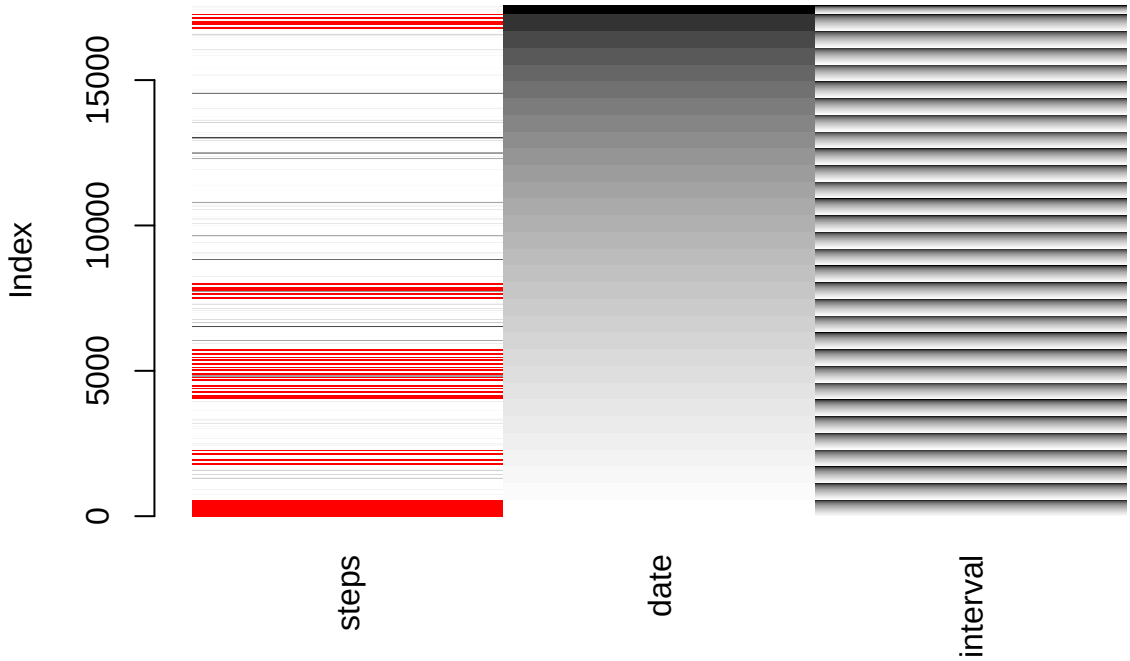
```
## [1] 2304
```

```
matrixplot(DT[order(DT$date, DT$interval),])
```

```
## Warning in hex(RGB(r, g, b), gamma = gamma, fixup = fixup, ...): 'gamma' is
## deprecated and has no effect
```

```
## Warning in hex(RGB(r, g, b), gamma = gamma, fixup = fixup, ...): 'gamma' is
## deprecated and has no effect
```

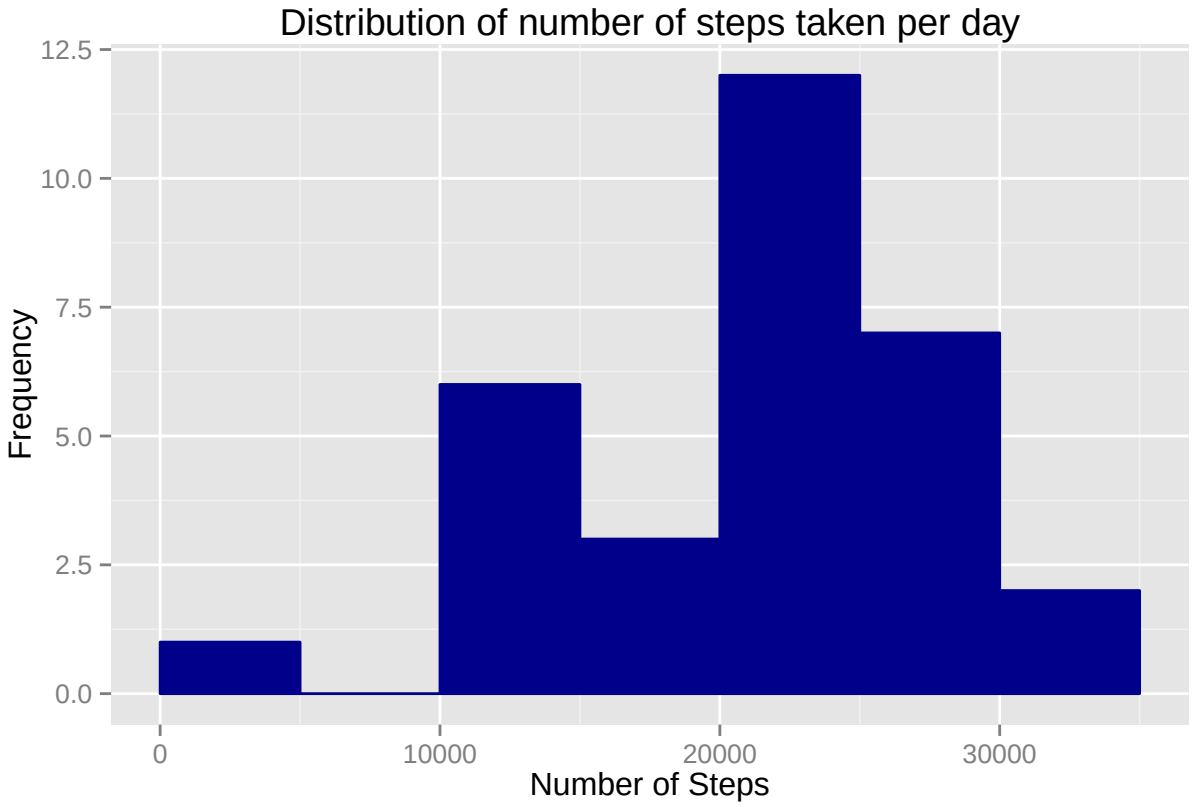
```
## Warning in hex(RGB(r, g, b), gamma = gamma, fixup = fixup, ...): 'gamma' is
## deprecated and has no effect
```



I don't see obvious pattern across intervals, but there are many missing values in certain dates (see plot). Therefore the strategy is to calculate mean of the every 5-minute interval and fill the result in the missing value.

```
DT.fill <- merge(DT[is.na(DT$steps), ], DT.interval, by = 'interval')
DT[is.na(DT$steps), 'steps'] <- DT.fill$steps.y

DT.dt <- data.frame(steps = tapply(DT$steps, DT$date, sum, na.rm = TRUE))
qplot(DT.dt$steps, data = DT.dt, breaks = seq(0, 35000, by = 5000),
      xlab = 'Number of Steps', ylab = 'Frequency',
      main = 'Distribution of number of steps taken per day',
      fill=I("darkblue"), col=I("darkblue"))
```




```
mean(DT.dt$steps)
```

```
## [1] 21185.08
```

```
median(DT.dt$steps)
```

```
## [1] 22833
```

Values differ from the estimates from the first part of the assignment, because we included missing observations with some data. Therefore, number of steps per day increased.

Are there differences in activity patterns between weekdays and weekends?

```
DT$day.dm <- weekdays(DT$date) == c('Saturday','Sunday')
DT.weekly <- data.frame(tapply(DT$steps,
                        list(DT$interval, DT$day.dm),
                        mean))
DT.weekly$interval <- as.numeric(row.names(DT.weekly))
DT.weekly <- reshape(DT.weekly,
                     varying = c('FALSE.','TRUE.'),
                     dir = 'long',
                     v.names ='steps',
```

```
                      timevar = 'day',
                      times = c('Weekday','Weekend'))
ggplot(data = DT.weekly,
       aes(x = DT.weekly$interval, y = DT.weekly$steps, group = 1)) +
       geom_line() + xlab('Interval') + ylab('Steps') +
       ggtitle('Average number of steps taken per day by 5-minute intervals') +
       scale_x_discrete(breaks = seq(0, 2400, by = 240)) +
       facet_grid(day ~.)
```