title: "Activity Monitoring" author: "Bernard Akyena" date: "July 29, 2017" --- output: word\_document: default html\_document: default ---

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

activity <- read.csv("activity.csv")  
sapply(activity, class)

## steps date interval   
## "integer" "factor" "integer"

1. Code for transfroming data and calculate mean total os steps and install zoo package.

library(zoo)

##   
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':  
##   
## as.Date, as.Date.numeric

activity$date <- as.Date(activity$date, format = "%Y-%m-%d")  
suppressWarnings(library(zoo))  
  
is.regular(activity$date)

## [1] TRUE

unique(activity$date)

## [1] "2012-10-01" "2012-10-02" "2012-10-03" "2012-10-04" "2012-10-05"  
## [6] "2012-10-06" "2012-10-07" "2012-10-08" "2012-10-09" "2012-10-10"  
## [11] "2012-10-11" "2012-10-12" "2012-10-13" "2012-10-14" "2012-10-15"  
## [16] "2012-10-16" "2012-10-17" "2012-10-18" "2012-10-19" "2012-10-20"  
## [21] "2012-10-21" "2012-10-22" "2012-10-23" "2012-10-24" "2012-10-25"  
## [26] "2012-10-26" "2012-10-27" "2012-10-28" "2012-10-29" "2012-10-30"  
## [31] "2012-10-31" "2012-11-01" "2012-11-02" "2012-11-03" "2012-11-04"  
## [36] "2012-11-05" "2012-11-06" "2012-11-07" "2012-11-08" "2012-11-09"  
## [41] "2012-11-10" "2012-11-11" "2012-11-12" "2012-11-13" "2012-11-14"  
## [46] "2012-11-15" "2012-11-16" "2012-11-17" "2012-11-18" "2012-11-19"  
## [51] "2012-11-20" "2012-11-21" "2012-11-22" "2012-11-23" "2012-11-24"  
## [56] "2012-11-25" "2012-11-26" "2012-11-27" "2012-11-28" "2012-11-29"  
## [61] "2012-11-30"

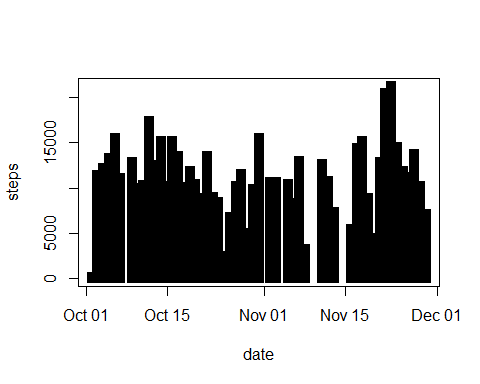
colMeans(is.na(activity))

## steps date interval   
## 0.1311475 0.0000000 0.0000000

steps\_day <- aggregate(steps ~ date, rm.na = TRUE, data = activity, FUN = sum)

1. Code for plot, Mean and Median number of steps taken each day

plot(steps\_day, type = "h", lwd = 10, lend = "square")



aggregate(steps ~ date, data = activity, FUN = mean)

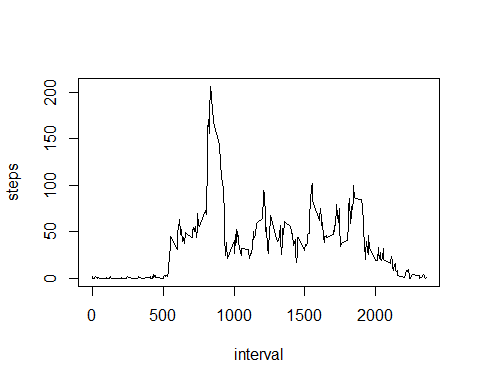
## date steps  
## 1 2012-10-02 0.4375000  
## 2 2012-10-03 39.4166667  
## 3 2012-10-04 42.0694444  
## 4 2012-10-05 46.1597222  
## 5 2012-10-06 53.5416667  
## 6 2012-10-07 38.2465278  
## 7 2012-10-09 44.4826389  
## 8 2012-10-10 34.3750000  
## 9 2012-10-11 35.7777778  
## 10 2012-10-12 60.3541667  
## 11 2012-10-13 43.1458333  
## 12 2012-10-14 52.4236111  
## 13 2012-10-15 35.2048611  
## 14 2012-10-16 52.3750000  
## 15 2012-10-17 46.7083333  
## 16 2012-10-18 34.9166667  
## 17 2012-10-19 41.0729167  
## 18 2012-10-20 36.0937500  
## 19 2012-10-21 30.6284722  
## 20 2012-10-22 46.7361111  
## 21 2012-10-23 30.9652778  
## 22 2012-10-24 29.0104167  
## 23 2012-10-25 8.6527778  
## 24 2012-10-26 23.5347222  
## 25 2012-10-27 35.1354167  
## 26 2012-10-28 39.7847222  
## 27 2012-10-29 17.4236111  
## 28 2012-10-30 34.0937500  
## 29 2012-10-31 53.5208333  
## 30 2012-11-02 36.8055556  
## 31 2012-11-03 36.7048611  
## 32 2012-11-05 36.2465278  
## 33 2012-11-06 28.9375000  
## 34 2012-11-07 44.7326389  
## 35 2012-11-08 11.1770833  
## 36 2012-11-11 43.7777778  
## 37 2012-11-12 37.3784722  
## 38 2012-11-13 25.4722222  
## 39 2012-11-15 0.1423611  
## 40 2012-11-16 18.8923611  
## 41 2012-11-17 49.7881944  
## 42 2012-11-18 52.4652778  
## 43 2012-11-19 30.6979167  
## 44 2012-11-20 15.5277778  
## 45 2012-11-21 44.3993056  
## 46 2012-11-22 70.9270833  
## 47 2012-11-23 73.5902778  
## 48 2012-11-24 50.2708333  
## 49 2012-11-25 41.0902778  
## 50 2012-11-26 38.7569444  
## 51 2012-11-27 47.3819444  
## 52 2012-11-28 35.3576389  
## 53 2012-11-29 24.4687500

aggregate(steps ~ date, data = activity, FUN = median)

## date steps  
## 1 2012-10-02 0  
## 2 2012-10-03 0  
## 3 2012-10-04 0  
## 4 2012-10-05 0  
## 5 2012-10-06 0  
## 6 2012-10-07 0  
## 7 2012-10-09 0  
## 8 2012-10-10 0  
## 9 2012-10-11 0  
## 10 2012-10-12 0  
## 11 2012-10-13 0  
## 12 2012-10-14 0  
## 13 2012-10-15 0  
## 14 2012-10-16 0  
## 15 2012-10-17 0  
## 16 2012-10-18 0  
## 17 2012-10-19 0  
## 18 2012-10-20 0  
## 19 2012-10-21 0  
## 20 2012-10-22 0  
## 21 2012-10-23 0  
## 22 2012-10-24 0  
## 23 2012-10-25 0  
## 24 2012-10-26 0  
## 25 2012-10-27 0  
## 26 2012-10-28 0  
## 27 2012-10-29 0  
## 28 2012-10-30 0  
## 29 2012-10-31 0  
## 30 2012-11-02 0  
## 31 2012-11-03 0  
## 32 2012-11-05 0  
## 33 2012-11-06 0  
## 34 2012-11-07 0  
## 35 2012-11-08 0  
## 36 2012-11-11 0  
## 37 2012-11-12 0  
## 38 2012-11-13 0  
## 39 2012-11-15 0  
## 40 2012-11-16 0  
## 41 2012-11-17 0  
## 42 2012-11-18 0  
## 43 2012-11-19 0  
## 44 2012-11-20 0  
## 45 2012-11-21 0  
## 46 2012-11-22 0  
## 47 2012-11-23 0  
## 48 2012-11-24 0  
## 49 2012-11-25 0  
## 50 2012-11-26 0  
## 51 2012-11-27 0  
## 52 2012-11-28 0  
## 53 2012-11-29 0

1. Code for time series analysis, missing values and plot

plot(aggregate(steps ~ interval, data = activity, FUN = mean), type = "l")



max(activity$steps, na.rm = TRUE)

## [1] 806

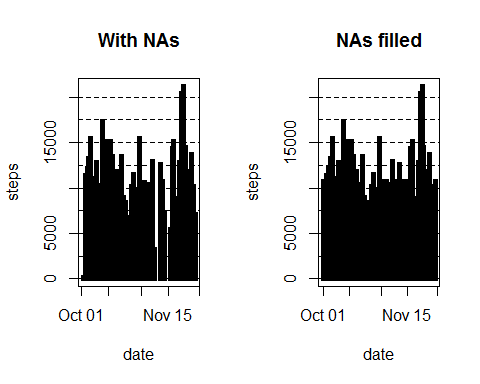
sum(is.na(activity))

## [1] 2304

activity2 <- activity  
sapply(activity2, class)

## steps date interval   
## "integer" "Date" "integer"

activity2$steps[is.na(activity2$steps)] <- mean(na.omit(activity$steps))  
activity2$date <- as.Date(activity2$date, format = "%Y-%m-%d")  
  
steps\_day2 <- aggregate(steps ~ date, rm.na = TRUE, data = activity2, FUN = sum)  
  
par(mfrow = c(1, 2))  
plot(steps\_day, type = "h", lwd = 5,lend = "square", main = "With NAs")  
abline(h = seq(0, 20000, 2500), lty = "dashed")  
plot(steps\_day2, type = "h", lwd = 5, lend = "square", main = "NAs filled")  
abline(h = seq(0, 20000, 2500), lty = "dashed")



aggregate(steps ~ date, data = activity, FUN = mean)

## date steps  
## 1 2012-10-02 0.4375000  
## 2 2012-10-03 39.4166667  
## 3 2012-10-04 42.0694444  
## 4 2012-10-05 46.1597222  
## 5 2012-10-06 53.5416667  
## 6 2012-10-07 38.2465278  
## 7 2012-10-09 44.4826389  
## 8 2012-10-10 34.3750000  
## 9 2012-10-11 35.7777778  
## 10 2012-10-12 60.3541667  
## 11 2012-10-13 43.1458333  
## 12 2012-10-14 52.4236111  
## 13 2012-10-15 35.2048611  
## 14 2012-10-16 52.3750000  
## 15 2012-10-17 46.7083333  
## 16 2012-10-18 34.9166667  
## 17 2012-10-19 41.0729167  
## 18 2012-10-20 36.0937500  
## 19 2012-10-21 30.6284722  
## 20 2012-10-22 46.7361111  
## 21 2012-10-23 30.9652778  
## 22 2012-10-24 29.0104167  
## 23 2012-10-25 8.6527778  
## 24 2012-10-26 23.5347222  
## 25 2012-10-27 35.1354167  
## 26 2012-10-28 39.7847222  
## 27 2012-10-29 17.4236111  
## 28 2012-10-30 34.0937500  
## 29 2012-10-31 53.5208333  
## 30 2012-11-02 36.8055556  
## 31 2012-11-03 36.7048611  
## 32 2012-11-05 36.2465278  
## 33 2012-11-06 28.9375000  
## 34 2012-11-07 44.7326389  
## 35 2012-11-08 11.1770833  
## 36 2012-11-11 43.7777778  
## 37 2012-11-12 37.3784722  
## 38 2012-11-13 25.4722222  
## 39 2012-11-15 0.1423611  
## 40 2012-11-16 18.8923611  
## 41 2012-11-17 49.7881944  
## 42 2012-11-18 52.4652778  
## 43 2012-11-19 30.6979167  
## 44 2012-11-20 15.5277778  
## 45 2012-11-21 44.3993056  
## 46 2012-11-22 70.9270833  
## 47 2012-11-23 73.5902778  
## 48 2012-11-24 50.2708333  
## 49 2012-11-25 41.0902778  
## 50 2012-11-26 38.7569444  
## 51 2012-11-27 47.3819444  
## 52 2012-11-28 35.3576389  
## 53 2012-11-29 24.4687500

aggregate(steps ~ date, data = activity, FUN = median)

## date steps  
## 1 2012-10-02 0  
## 2 2012-10-03 0  
## 3 2012-10-04 0  
## 4 2012-10-05 0  
## 5 2012-10-06 0  
## 6 2012-10-07 0  
## 7 2012-10-09 0  
## 8 2012-10-10 0  
## 9 2012-10-11 0  
## 10 2012-10-12 0  
## 11 2012-10-13 0  
## 12 2012-10-14 0  
## 13 2012-10-15 0  
## 14 2012-10-16 0  
## 15 2012-10-17 0  
## 16 2012-10-18 0  
## 17 2012-10-19 0  
## 18 2012-10-20 0  
## 19 2012-10-21 0  
## 20 2012-10-22 0  
## 21 2012-10-23 0  
## 22 2012-10-24 0  
## 23 2012-10-25 0  
## 24 2012-10-26 0  
## 25 2012-10-27 0  
## 26 2012-10-28 0  
## 27 2012-10-29 0  
## 28 2012-10-30 0  
## 29 2012-10-31 0  
## 30 2012-11-02 0  
## 31 2012-11-03 0  
## 32 2012-11-05 0  
## 33 2012-11-06 0  
## 34 2012-11-07 0  
## 35 2012-11-08 0  
## 36 2012-11-11 0  
## 37 2012-11-12 0  
## 38 2012-11-13 0  
## 39 2012-11-15 0  
## 40 2012-11-16 0  
## 41 2012-11-17 0  
## 42 2012-11-18 0  
## 43 2012-11-19 0  
## 44 2012-11-20 0  
## 45 2012-11-21 0  
## 46 2012-11-22 0  
## 47 2012-11-23 0  
## 48 2012-11-24 0  
## 49 2012-11-25 0  
## 50 2012-11-26 0  
## 51 2012-11-27 0  
## 52 2012-11-28 0  
## 53 2012-11-29 0

aggregate(steps ~ date, data = activity2, FUN = mean)

## date steps  
## 1 2012-10-01 37.3825996  
## 2 2012-10-02 0.4375000  
## 3 2012-10-03 39.4166667  
## 4 2012-10-04 42.0694444  
## 5 2012-10-05 46.1597222  
## 6 2012-10-06 53.5416667  
## 7 2012-10-07 38.2465278  
## 8 2012-10-08 37.3825996  
## 9 2012-10-09 44.4826389  
## 10 2012-10-10 34.3750000  
## 11 2012-10-11 35.7777778  
## 12 2012-10-12 60.3541667  
## 13 2012-10-13 43.1458333  
## 14 2012-10-14 52.4236111  
## 15 2012-10-15 35.2048611  
## 16 2012-10-16 52.3750000  
## 17 2012-10-17 46.7083333  
## 18 2012-10-18 34.9166667  
## 19 2012-10-19 41.0729167  
## 20 2012-10-20 36.0937500  
## 21 2012-10-21 30.6284722  
## 22 2012-10-22 46.7361111  
## 23 2012-10-23 30.9652778  
## 24 2012-10-24 29.0104167  
## 25 2012-10-25 8.6527778  
## 26 2012-10-26 23.5347222  
## 27 2012-10-27 35.1354167  
## 28 2012-10-28 39.7847222  
## 29 2012-10-29 17.4236111  
## 30 2012-10-30 34.0937500  
## 31 2012-10-31 53.5208333  
## 32 2012-11-01 37.3825996  
## 33 2012-11-02 36.8055556  
## 34 2012-11-03 36.7048611  
## 35 2012-11-04 37.3825996  
## 36 2012-11-05 36.2465278  
## 37 2012-11-06 28.9375000  
## 38 2012-11-07 44.7326389  
## 39 2012-11-08 11.1770833  
## 40 2012-11-09 37.3825996  
## 41 2012-11-10 37.3825996  
## 42 2012-11-11 43.7777778  
## 43 2012-11-12 37.3784722  
## 44 2012-11-13 25.4722222  
## 45 2012-11-14 37.3825996  
## 46 2012-11-15 0.1423611  
## 47 2012-11-16 18.8923611  
## 48 2012-11-17 49.7881944  
## 49 2012-11-18 52.4652778  
## 50 2012-11-19 30.6979167  
## 51 2012-11-20 15.5277778  
## 52 2012-11-21 44.3993056  
## 53 2012-11-22 70.9270833  
## 54 2012-11-23 73.5902778  
## 55 2012-11-24 50.2708333  
## 56 2012-11-25 41.0902778  
## 57 2012-11-26 38.7569444  
## 58 2012-11-27 47.3819444  
## 59 2012-11-28 35.3576389  
## 60 2012-11-29 24.4687500  
## 61 2012-11-30 37.3825996

aggregate(steps ~ date, data = activity2, FUN = median)

## date steps  
## 1 2012-10-01 37.3826  
## 2 2012-10-02 0.0000  
## 3 2012-10-03 0.0000  
## 4 2012-10-04 0.0000  
## 5 2012-10-05 0.0000  
## 6 2012-10-06 0.0000  
## 7 2012-10-07 0.0000  
## 8 2012-10-08 37.3826  
## 9 2012-10-09 0.0000  
## 10 2012-10-10 0.0000  
## 11 2012-10-11 0.0000  
## 12 2012-10-12 0.0000  
## 13 2012-10-13 0.0000  
## 14 2012-10-14 0.0000  
## 15 2012-10-15 0.0000  
## 16 2012-10-16 0.0000  
## 17 2012-10-17 0.0000  
## 18 2012-10-18 0.0000  
## 19 2012-10-19 0.0000  
## 20 2012-10-20 0.0000  
## 21 2012-10-21 0.0000  
## 22 2012-10-22 0.0000  
## 23 2012-10-23 0.0000  
## 24 2012-10-24 0.0000  
## 25 2012-10-25 0.0000  
## 26 2012-10-26 0.0000  
## 27 2012-10-27 0.0000  
## 28 2012-10-28 0.0000  
## 29 2012-10-29 0.0000  
## 30 2012-10-30 0.0000  
## 31 2012-10-31 0.0000  
## 32 2012-11-01 37.3826  
## 33 2012-11-02 0.0000  
## 34 2012-11-03 0.0000  
## 35 2012-11-04 37.3826  
## 36 2012-11-05 0.0000  
## 37 2012-11-06 0.0000  
## 38 2012-11-07 0.0000  
## 39 2012-11-08 0.0000  
## 40 2012-11-09 37.3826  
## 41 2012-11-10 37.3826  
## 42 2012-11-11 0.0000  
## 43 2012-11-12 0.0000  
## 44 2012-11-13 0.0000  
## 45 2012-11-14 37.3826  
## 46 2012-11-15 0.0000  
## 47 2012-11-16 0.0000  
## 48 2012-11-17 0.0000  
## 49 2012-11-18 0.0000  
## 50 2012-11-19 0.0000  
## 51 2012-11-20 0.0000  
## 52 2012-11-21 0.0000  
## 53 2012-11-22 0.0000  
## 54 2012-11-23 0.0000  
## 55 2012-11-24 0.0000  
## 56 2012-11-25 0.0000  
## 57 2012-11-26 0.0000  
## 58 2012-11-27 0.0000  
## 59 2012-11-28 0.0000  
## 60 2012-11-29 0.0000  
## 61 2012-11-30 37.3826

1. Code for activity patterns between weekdays and weekends

activity2$weekday <- factor(format(activity2$date, "%A"))  
  
levels(activity2$weekday) <- list(weekday = c("Monday", "Tuesday",  
 "Wednesday", "Thursday",  
 "Friday"), weekend =  
 c("Saturday", "Sunday"))  
  
par(mfrow = c(2, 1))  
  
with(activity2[activity2$weekday == "weekend",], plot(aggregate(steps ~ interval, FUN = mean), type = "l", main = "Weekends"))  
  
with(activity2[activity2$weekday == "weekday",], plot(aggregate(steps ~ interval, FUN = mean), type = "l", main = "Weekdays"))

