R Notebook

```r
library(tidyr)
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
```

```r
library(ggplot2)
library(forecast)
```

```r
force_table <- read.csv("~/Downloads/normalized_summed.csv")
force = force_table$force
```

algorithm 1. moving average to smooth the line
2. low pass filter to find points that are in the "peak period"
3. use moving average again to find the begin and end index

Finding Threshold

The first hundred points are basically "noise", so I check the max of that.

```r
summary(force[1:100])
```

```
##       Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
## 7.904e-06 3.808e-05 5.914e-05 7.669e-05 8.554e-05 9.752e-04
```

```r
threshold = 0.0009
```

```r
# using moving average to smooth the data
mv_degree = 4
# processed supposed to find the points that are in the "peak period"
force_mv = na.omit(ma(c(rep(0, mv_degree), force, rep(0, mv_degree)), order= mv_degree*2+1))
processed =  as.numeric(force_mv > threshold)
```
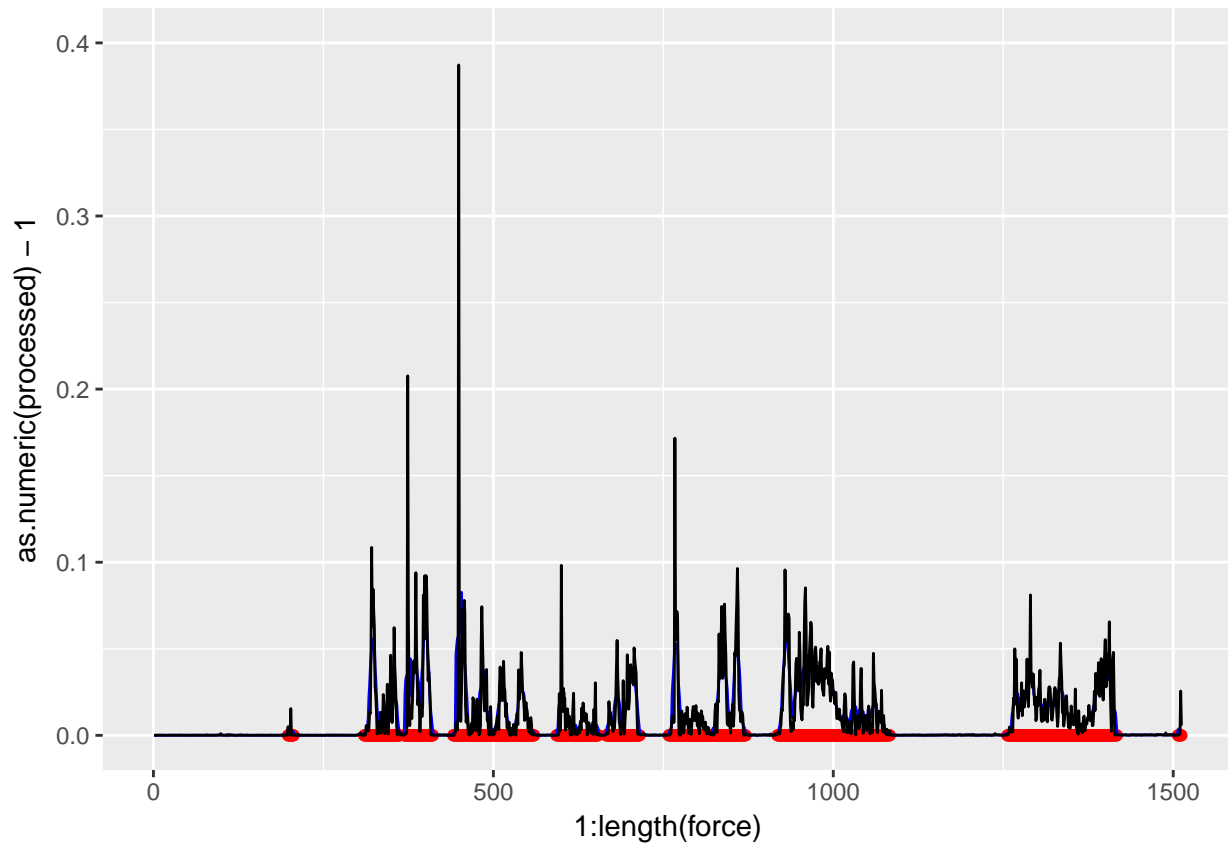
Showing how well the moving average(blue color) and low pass filter(red color) does

```r
ggplot() +
  geom_point(aes(x=1:length(force), y=as.numeric(processed)-1),colour="red") +
  geom_line(aes(x=1:length(force), y= force_mv),colour="blue") +
  geom_line(aes(x=1:length(force), y=force)) +
  ylim(0, 0.4)
```

```
## Warning: Removed 727 rows containing missing values (geom_point).
```

```
# if you want them to seperate by k(only odd number since I am running moving avg)
# then it will unable to detect spikes that are under k-length long
k = 17
processed_mv_degree = (k-1)/2
processed_mv = na.omit(ma(c(rep(0, processed_mv_degree), processed, rep(0, processed_mv_degree)), order=
processed_mv2 = as.numeric(round(processed_mv, 5) == round((processed_mv_degree+1)/(processed_mv_degree
```

Checking

```
ggplot() +
  geom_point(aes(x=1:length(force), y=processed -1, color="red")) +
  geom_point(aes(x=1:length(force), y=processed_mv2-1, colour="blue")) +
  geom_line(aes(x=1:length(force), y=force)) +
  ylim(0, 0.4)
```

Warning: Removed 727 rows containing missing values (geom_point).

Warning: Removed 1489 rows containing missing values (geom_point).