

Examples With Peak Finder Script

Michael Olvera

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Using Peak Finder

This is a quick guide on how to use the Peak Finder script. Feel free to follow along with the code in this file to make sure everything is working well. For this file, R code is in boxes, and outputs are boxes with `##` before the code.

Before starting, include the following line of code at the top of your script:

```
source("R/peakFinder.R")
```

Preprocessing

Samples must be preprocessed to be a dataframe with **Time** included in column 1, and all other columns samples. A preprocessed dataset is included in the zip folder:

```
example <- read.csv('data/CaHandUT1.csv')
head(example) # Prints first 6 rows
```

```
##      Time      R1      R2      R3      R4      R5      R6      R7
## 1  0.0000 187.6669 387.1738 176.6555 168.4455 167.4844 179.7831 184.2782
## 2 10.0075 187.4253 387.0821 176.1735 170.1468 169.4760 180.8299 184.5747
## 3 20.0149 186.4995 387.4237 176.3546 170.1221 169.2472 181.1079 184.0144
## 4 30.0224 186.3735 386.6219 175.9589 170.0625 169.4075 180.7528 184.4155
## 5 40.0298 185.2577 386.7345 176.1445 170.1175 169.1206 180.9563 183.9717
## 6 50.0373 185.3023 385.3170 175.7450 169.8538 169.0676 180.4453 184.2486
##      R8      R9      R10     R11     R12     R13     R14
## 1 351.8155 184.4244 340.8282 176.8191 213.6833 184.8174 182.6327
## 2 352.0044 184.4453 341.1342 178.9146 212.3781 185.0817 181.5208
## 3 353.9073 184.8587 340.2362 178.8213 211.2374 184.4887 181.5315
## 4 353.3250 184.4861 337.6030 178.8120 210.5008 184.8378 180.6417
## 5 355.3002 184.7740 336.4125 178.6491 209.4161 184.0433 180.7844
## 6 354.0300 184.2582 333.7079 178.8892 208.3467 184.4472 180.0346
```

As a side note, make sure all of your columns are numeric/integers. A common mistake with R is that .csv files are loaded with columns being factors.

```
str(example)
```

```
## 'data.frame':    1967 obs. of  15 variables:
## $ Time: num  0 10 20 30 40 ...
## $ R1 : num  188 187 186 186 185 ...
## $ R2 : num  387 387 387 387 387 ...
## $ R3 : num  177 176 176 176 176 ...
## $ R4 : num  168 170 170 170 170 ...
## $ R5 : num  167 169 169 169 169 ...
## $ R6 : num  180 181 181 181 181 ...
## $ R7 : num  184 185 184 184 184 ...
## $ R8 : num  352 352 354 353 355 ...
## $ R9 : num  184 184 185 184 185 ...
```

```
## $ R10 : num 341 341 340 338 336 ...
## $ R11 : num 177 179 179 179 179 ...
## $ R12 : num 214 212 211 211 209 ...
## $ R13 : num 185 185 184 185 184 ...
## $ R14 : num 183 182 182 181 181 ...
```

As you can see above, all columns are of **type** numeric (**num**). Looking at the second row of the output, *\$ Time* indicates the title of the column, then the datatype, followed by the first few data entries.

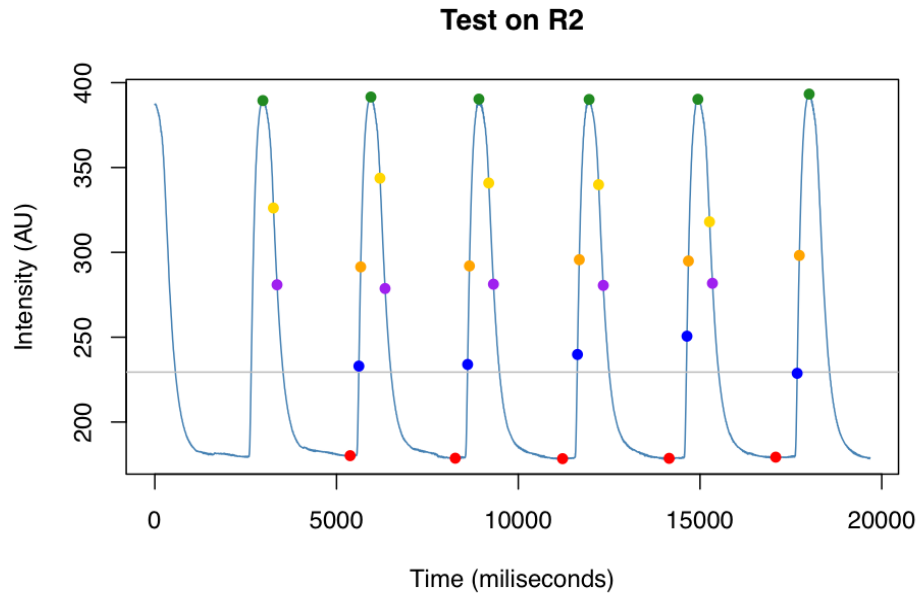
Analysis

The main functions are *runTestGraph()* and *analyzeExperiment()*. You can call *runTestGraph()* on your dataset to see how the function calls each peak.

The result will be a graph of the GcAMP flow including dots corresponding to where the algorithm calls certain features. This includes:

- Peak calls (green).
- Trough calls (red).
- T50 mids (purple and red).

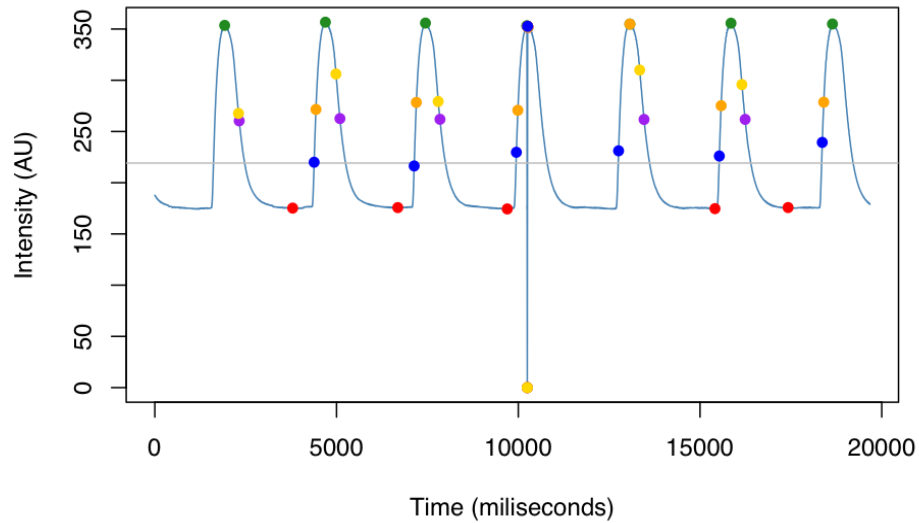
```
runTestGraph(example[,c(1,3)]) #test only the second sample
```



Looks good. Let's look at our first sample.

```
runTestGraph(example[,1:2]) #test only the first sample
```

Test on R1



Looks like there is something wrong with the data. We can run the experiment and see if the program can correct it.

```
analyzeExperiment(example)
```

```
## Caution: Erronious intensity detected at index 1025.
## Attempting fix.
## Patching Successfull!

##      Peak (AU) Min (AU) F/Fn (Amplitude) Upstroke T50 (ms)
## 1      354.945 175.074          2.027          256.858
## 2      390.802 179.050          2.183          268.200
## 3      344.151 173.446          1.984          256.858
## 4      305.698 168.554          1.814          263.530
## 5      299.784 166.658          1.799          258.526
## 6      380.394 178.854          2.127          266.866
## 7      404.861 182.915          2.213          245.183
## 8      358.781 178.488          2.010          270.201
## 9      378.690 183.499          2.064          273.537
## 10     356.669 176.051          2.026          260.194
## 11     390.698 178.441          2.190          253.046
## 12     452.593 190.325          2.378          262.195
## 13     428.052 182.451          2.346          246.851
## 14     349.117 172.896          2.019          266.866

##      Downstroke T50 (ms) Vmax Up Vmax Decay    BPM
## 1          398.630    1.032    -0.274 25.116
## 2          394.294    1.173    -0.345 23.950
## 3          420.313    0.939    -0.286 24.372
## 4          405.302    0.797    -0.217 24.372
## 5          388.623    0.725    -0.176 24.372
## 6          391.959    1.138    -0.363 24.231
```

```
## 7          385.287  1.270    -0.333 24.078
## 8          408.304  1.038    -0.283 24.861
## 9          391.959  1.049    -0.303 23.009
## 10         396.295  1.057    -0.306 24.176
## 11         383.143  1.300    -0.371 26.573
## 12         400.298  1.383    -0.462 22.884
## 13         351.929  1.437    -0.392 24.148
## 14         411.974  1.043    -0.278 26.230
```

Looks like the first sample had a missing value at index 1025. The program thankfully fixed it automaticall.

The output can be saved, and extracted to be used in Excel/Prism.

```
output <- analyzeExperiment(example)
write.csv(output, "~/Desktop/results.csv")
```

If you have any questions or bugs, let me know (michael.olvera@gladstone.ucsf.edu).

```
sessionInfo()
```

```
## R version 3.3.1 (2016-06-21)
## Platform: x86_64-apple-darwin13.4.0 (64-bit)
## Running under: OS X 10.11.3 (El Capitan)
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## attached base packages:
## [1] stats      graphics  grDevices  utils      datasets  methods   base
##
## loaded via a namespace (and not attached):
## [1] backports_1.0.5 magrittr_1.5    rprojroot_1.2  tools_3.3.1
## [5] htmltools_0.3.6 yaml_2.1.14     Rcpp_0.12.10   stringi_1.1.5
## [9] rmarkdown_1.5   knitr_1.15.1    stringr_1.2.0  digest_0.6.12
## [13] evaluate_0.10
```