kfmodel_test.R

high

Thu May 24 18:24:27 2018

```
# Compare results of R and Matlab versions of the KF Model function
```

```
# Setup
```

```
# Clear workspace of all objects and unload all extra (non-base) packages
rm(list = ls(all = TRUE))
if (!is.null(sessionInfo()$otherPkgs)) {
    res <- suppressWarnings(
        lapply(paste('package:', names(sessionInfo()$otherPkgs), sep=""),
               detach, character.only=TRUE, unload=TRUE, force=TRUE))
}

# Install pacman if needed
my_repo <- 'http://cran.r-project.org'
if (!require("pacman")) {install.packages("pacman", repos = my_repo)}
```

```
## Loading required package: pacman
```

```
# Get results from R
```

```
set.seed(1)
HR <- round(rnorm(20, 80, 20))
HR
```

```
##  [1]  67  84  63 112  87  64  90  95  92  74 110  88  68  36 102  79  80
## [18]  99  96  92
```

```
write.table(HR, 'HR.csv', row.names = F, col.names = F, sep = ',', quote = F)

CTstart <- 37

source('kfmodel.R')
CT_r <- kf_model(HR, CTstart)
```

```
# Get results from Matlab
```

```
pacman::p_load_gh('renozao/RcppOctave')

o_source('kfmodel.m')
CT_m <- .CallOctave('KFModel', HR, CTstart)
```

```
# Compare results
```

```
# Compare results from running R function with running Matlab function
cat(paste('Number of matching values = '),
    length(na.omit(match(CT_r, CT_m))), '/', length(HR) , '\n')
```

```
## Number of matching values =  20 / 20
```

```
identical(CT_r, CT_m)
```

```
## [1] TRUE
```

```r
all.equal(CT_r, CT_m)
```

```
## [1] TRUE
```

```r
# Display results
CT_r
```

```
##  [1] 36.99928 36.99997 36.99709 37.00534 37.00784 37.00249 37.00721
##  [8] 37.01475 37.02135 37.01826 37.03689 37.04194 37.03339 37.00143
## [15] 37.01935 37.01903 37.01953 37.03622 37.05007 37.06010
```

```r
CT_m
```

```
##  [1] 36.99928 36.99997 36.99709 37.00534 37.00784 37.00249 37.00721
##  [8] 37.01475 37.02135 37.01826 37.03689 37.04194 37.03339 37.00143
## [15] 37.01935 37.01903 37.01953 37.03622 37.05007 37.06010
```

```r
# Previous command should show same results as running in Octave/Matlab:
cmd <- 'echo "source(\\"kfmodel.m\\");
             HR = csvread(\\"HR.csv\\");
             disp(sprintf(\\"%0.5f\\n\\",KFModel(HR, 37)))" | octave'
out <- system(cmd, intern = T, ignore.stdout = F, ignore.stderr = F, wait = T)
out
```

```
##  [1] "36.99928" "36.99997" "36.99709" "37.00534" "37.00784" "37.00249"
##  [7] "37.00721" "37.01475" "37.02135" "37.01826" "37.03689" "37.04194"
## [13] "37.03339" "37.00143" "37.01935" "37.01903" "37.01953" "37.03622"
## [19] "37.05007" "37.06010" ""         ""
```

```r
# Parse (character string) results and store in a numeric vector
CT_o <- as.vector(na.omit(as.numeric(out)))

# Compare results as before

setdiff(round(CT_r, 5), round(CT_o, 5))
```

```
## numeric(0)
```

```r
# If results match then previous command produces "numeric(0)"

identical(round(CT_r, 5), round(CT_o, 5))
```

```
## [1] TRUE
```

```r
# If results match then previous command produces "TRUE"
```

```r
# Test with TNC study data
```

```r
pacman::p_load(data.table, dplyr)
pacman::p_load_gh('renozao/RcppOctave')

# Read the files containing the KF Model function
o_source('kfmodel.m')
source('kfmodel.R')

# Set the starting core body temperature
CTstart <- 37

# Read the sensor data
```

```r
sensor_data <- fread('output_data/sensor_data.csv')
```

```
##
Read 0.0% of 2100435 rows
Read 33.3% of 2100435 rows
Read 65.7% of 2100435 rows
Read 95.7% of 2100435 rows
Read 2100435 rows and 10 (of 10) columns from 0.155 GB file in 00:00:06
```

```r
HR.df <- sensor_data %>%
    select(noquestioner, heartrate, `time`) %>% na.omit() %>% unique()

# Do a quick test of the model on first 1000 rows of dataset
nobs <- 1000
CT_r <- kf_model(as.numeric(HR.df$heartrate[1:nobs]), CTstart)
CT_m <- .CallOctave('KFModel', as.numeric(HR.df$heartrate[1:nobs]), CTstart)
cat(paste('Number of matching values = '),
    length(na.omit(match(CT_r, CT_m))), '/', nobs , '\n')
```

```
## Number of matching values =  1000 / 1000
```

```r
# Compare the results
identical(CT_r, CT_m)
```

```
## [1] TRUE
```

```r
all.equal(CT_r, CT_m)
```

```
## [1] TRUE
```

```r
# Run the model once for each participant
CT_r_sensor <- sapply(unique(HR.df$noquestioner), function(x) {
    kf_model(as.numeric(HR.df[HR.df$noquestioner == x]$heartrate), CTstart)
    })
CT_m_sensor <- sapply(unique(HR.df$noquestioner), function(x) {
    .CallOctave('KFModel',
                as.numeric(HR.df[HR.df$noquestioner == x]$heartrate), CTstart)
    })

# Compare the results
identical(CT_r, CT_m)
```

```
## [1] TRUE
```

```r
all.equal(CT_r, CT_m)
```

```
## [1] TRUE
```

```r
# Store the results in the dataframe
for (x in unique(HR.df$noquestioner)) {
    HR.df[HR.df$noquestioner == x, 'ct.est.r'] <- CT_r_sensor[[x]]
    HR.df[HR.df$noquestioner == x, 'ct.est.m'] <- CT_m_sensor[[x]]
}

# Compare the results
identical(HR.df$ct.est.r, HR.df$ct.est.m)
```

```
## [1] TRUE
```

```r
cat('Size of dataset =', nrow(HR.df), 'rows\n')
```

```
## Size of dataset = 1523697 rows
```

```r
cat(paste('Number of matching values = '),
    length(na.omit(match(HR.df$ct.est.r, HR.df$ct.est.m))),
    '/', nrow(HR.df) ,'\n')
```

```
## Number of matching values =  1523697 / 1523697
```

```r
identical(HR.df$ct.est.r, HR.df$ct.est.m)
```

```
## [1] TRUE
```

```r
all.equal(HR.df$ct.est.r, HR.df$ct.est.m)
```

```
## [1] TRUE
```