Compare speed of alfam2() with Rcpp to old version in windows

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Packages

```
library(data.table)
```

Install packages

Locations for R (old) and Rcpp (new) versions

```
rver <- 'C:/Users/au277187/AppData/Local/R/win-library/4.3/ALFAM2-versions/R-ver/'
cver <- 'C:/Users/au277187/AppData/Local/R/win-library/4.3/'
```

Install different versions to different locations

```
#devtools::install_github('sashahafner/ALFAM2@v2.0', lib = rver)
#devtools::install_github('sashahafner/ALFAM2@v3.17', ref = 'Rcpp-dev', lib = cver, force = TRUE)
```

Input data

Generate input data.

Many plots

```
library(ALFAM2, lib.loc = cver)

res <- matrix(nrow = 5, ncol = 2)

set.seed(123)
d <- data.frame(ct = 1:168, app.mthd = 'bc',
                man.dm = 7, man.ph = 7, man.source = 'cattle',
                air.temp = rnorm(168, mean = 10, sd = 5),
                wind.2m = rnorm(168, mean = 5, sd = 1),
                tan.app = 100)
```

Without incorporation.

```
nplots <- 1000
nplots <- 100
datp <- d[rep(1:nrow(d), nplots), ]
datp$id <- rep(1:nplots, each = nrow(d))
```

Add incorporation.

```
datpi <- datp
datpi$t.incorp <- 3
datpi$incorp <- 'shallow'
```

With prep

```
datpp <- ALFAM2:::prepDat(datp, value = 'data')
datpp$`__f4` <- 1
datpp$`__add.row` <- FALSE
```

```
datpip <- ALFAM2:::prepDat(datpi, value = 'data')
datpip$`__f4` <- 1
datpip$`__add.row` <- FALSE
```

Many times

```
set.seed(123)
d <- data.frame(ct = 1:1E6 * 168 / 1E6, app.mthd = 'bc',
                man.dm = 7, man.ph = 7, man.source = 'cattle',
                air.temp = rnorm(1E6, mean = 10, sd = 5),
                wind.2m = rnorm(1E6, mean = 5, sd = 1),
                tan.app = 100)
```

Without incorporation.

```
datt <- d
```

Add incorporation.

```
datti <- datt
datti$t.incorp <- 3
datti$incorp <- 'shallow'
```

With prep

```
dattp <- ALFAM2:::prepDat(datt, value = 'data')
dattp$`__f4` <- 1
dattp$`__add.row` <- FALSE
```

```
dattip <- ALFAM2:::prepDat(datti, value = 'data')
dattip$`__f4` <- 1
dattip$`__add.row` <- FALSE
```

Results matrix

```
stdev <- times <- matrix(NA, nrow = 4, ncol = 3,
                         dimnames = list(c('plots', 'plots-incorp', 'times', 'times-incorp'),
                                         c('R', 'Rcpp', 'flat-out')))
```

Old R version

```
if ('ALFAM2' %in% (.packages())) detach('package:ALFAM2')
```

```
library(ALFAM2, lib.loc = rver)
packageVersion("ALFAM2")
```

```
## [1] '2.0'
```

Many plots, no incorporation.

```
nits <- 5
tt <- numeric(nits)
for (i in 1:nits) {
  tt[i] <- system.time(alfam2(datp, pars = ALFAM2::alfam2pars02, app.name = 'tan.app',
                              group = 'id', prep = TRUE, warn = FALSE))[3]
}
```

```
times['plots', 'R'] <- mean(tt)
stdev['plots', 'R'] <- sd(tt)
```

Many plots, with incorporation.

```
nits <- 3
tt <- numeric(nits)
for (i in 1:nits) {
  args(alfam2)
  tt[i] <- system.time(alfam2(datpi, pars = ALFAM2::alfam2pars02, time.incorp = 't.incorp',
                              app.name = 'tan.app', group = 'id', prep = TRUE, warn = FALSE))[3]
}
```

```
times['plots-incorp', 'R'] <- mean(tt)
stdev['plots-incorp', 'R'] <- sd(tt)
```

Many times, no incorporation.

```
nits <- 5
tt <- numeric(nits)
for (i in 1:nits) {
  tt[i] <- system.time(alfam2(datt, pars = ALFAM2::alfam2pars02, app.name = 'tan.app',
                              prep = TRUE, warn = FALSE))[3]
}
```

```
times['times', 'R'] <- mean(tt)
stdev['times', 'R'] <- sd(tt)
```

Many plots, with incorporation.

```
nits <- 3
tt <- numeric(nits)
for (i in 1:nits) {
  args(alfam2)
  tt[i] <- system.time(alfam2(datpi, pars = ALFAM2::alfam2pars02, time.incorp = 't.incorp',
                              app.name = 'tan.app', group = 'id', prep = TRUE, warn = FALSE))[3]
}
```

```
times['plots-incorp', 'R'] <- mean(tt)
stdev['plots-incorp', 'R'] <- sd(tt)
```

With Rcpp version

Now try latest Rcpp version.

```
detach('package:ALFAM2')
```

```
library(ALFAM2, lib.loc = cver)
packageVersion("ALFAM2")
```

```
## [1] '3.17'
```

No incorporation.

```
nits <- 5
tt <- numeric(nits)
for (i in 1:nits) {
  tt[i] <- system.time(alfam2(datp, pars = ALFAM2::alfam2pars02, app.name = 'tan.app',
                              group = 'id', prep = TRUE, warn = FALSE))[3]
}
```

```
tt
```

```
## [1] 0.17 0.16 0.17 0.14 0.14
```

```
mean(tt)
```

```
## [1] 0.156
```

```
sd(tt)
```

```
## [1] 0.01516575
```

```
100 * sd(tt) / mean(tt)
```

```
## [1] 9.721635
```

```
res[1, 2] <- mean(tt)
```

No data prep

```
nits <- 5
tt <- numeric(nits)
for (i in 1:nits) {
  tt[i] <- system.time(alfam2(datpp, pars = ALFAM2::alfam2pars02, app.name = 'tan.app',
                              group = 'id', prep = FALSE, warn = FALSE))[3]
}
```

```
## Warning in alfam2(datpp, pars = ALFAM2::alfam2pars02, app.name = "tan.app", : dat data frame has som
## You can proceed, but there may be problems.
## Better to remove/rename the offending columns: __add.row__f4

## Warning in alfam2(datpp, pars = ALFAM2::alfam2pars02, app.name = "tan.app", : dat data frame has som
## You can proceed, but there may be problems.
## Better to remove/rename the offending columns: __add.row__f4

## Warning in alfam2(datpp, pars = ALFAM2::alfam2pars02, app.name = "tan.app", : dat data frame has som
## You can proceed, but there may be problems.
## Better to remove/rename the offending columns: __add.row__f4

## Warning in alfam2(datpp, pars = ALFAM2::alfam2pars02, app.name = "tan.app", : dat data frame has som
## You can proceed, but there may be problems.
## Better to remove/rename the offending columns: __add.row__f4

## Warning in alfam2(datpp, pars = ALFAM2::alfam2pars02, app.name = "tan.app", : dat data frame has som
## You can proceed, but there may be problems.
## Better to remove/rename the offending columns: __add.row__f4
```

```
tt
```

```
## [1] 0.14 0.12 0.12 0.12 0.14
```

```
mean(tt)
```

```
## [1] 0.128
```

```
sd(tt)
```

```
## [1] 0.01095445
```

```
100 * sd(tt) / mean(tt)
```

```
## [1] 8.558165
```

```
res[2, 2] <- mean(tt)
```

With flatout option (external prep)

```
nits <- 5
tt <- numeric(nits)
head(datpp)
```

```
##   ct app.mthd man.dm man.ph man.source  air.temp  wind.2m tan.app id
## 1  1       bc      7      7     cattle  7.197622 5.516862     100  1
## 2  2       bc      7      7     cattle  8.849113 5.368965     100  1
## 3  3       bc      7      7     cattle 17.793542 4.784619     100  1
## 4  4       bc      7      7     cattle 10.352542 5.065293     100  1
## 5  5       bc      7      7     cattle 10.646439 4.965933     100  1
## 6  6       bc      7      7     cattle 18.575325 7.128452     100  1
##   app.mthd.ts app.mthd.bc app.mthd.os app.mthd.cs man.source.pig __f4 __add.row
## 1           0           1           0           0              0    1     FALSE
## 2           0           1           0           0              0    1     FALSE
## 3           0           1           0           0              0    1     FALSE
## 4           0           1           0           0              0    1     FALSE
## 5           0           1           0           0              0    1     FALSE
## 6           0           1           0           0              0    1     FALSE
```

```
undebug(alfam2)
```

```
## Warning in undebug(alfam2): argument is not being debugged
```

```
for (i in 1:nits) {
  tt[i] <- system.time(alfam2(datpp, pars = ALFAM2::alfam2pars02, app.name = 'tan.app',
                              warn = FALSE, flatout = TRUE))[3]
}
```

```
tt
```

```
## [1] 0.03 0.03 0.03 0.03 0.04
```

```
mean(tt)
```

```
## [1] 0.032
```

```
sd(tt)
```

```
## [1] 0.004472136
```

```
100 * sd(tt) / mean(tt)
```

```
## [1] 13.97542
```

```
res[4, 2] <- mean(tt)
```

With incorporation.

```
nits <- 3
tt <- numeric(nits)
for (i in 1:nits) {
  args(alfam2)
  tt[i] <- system.time(alfam2(datpi, pars = ALFAM2::alfam2pars02, time.incorp = 't.incorp',
                              app.name = 'tan.app', group = 'id', prep = TRUE, warn = FALSE))[3]
}
```

```
tt
```

```
## [1] 0.29 0.27 0.25
```

```
mean(tt)
```

```
## [1] 0.27
```

```
sd(tt)
```

```
## [1] 0.02
```

```
100 * sd(tt) / mean(tt)
```

```
## [1] 7.407407
```

```
res[3, 2] <- mean(tt)
```

Incorporation with flatout (prep before)

```
nits <- 3
tt <- numeric(nits)
for (i in 1:nits) {
  args(alfam2)
  tt[i] <- system.time(alfam2(datpip, pars = ALFAM2::alfam2pars02, time.incorp = 't.incorp',
                              app.name = 'tan.app', group = 'id', warn = FALSE, flatout = TRUE))[3]
}
```

```r
tt
```

```
## [1] 0.14 0.13 0.14
```

```r
mean(tt)
```

```
## [1] 0.1366667
```

```r
sd(tt)
```

```
## [1] 0.005773503
```

```r
100 * sd(tt) / mean(tt)
```

```
## [1] 4.224514
```

```r
res[5, 2] <- mean(tt)
```

```r
print(res)
```

```
##      [,1]      [,2]
## [1,]   NA 0.1560000
## [2,]   NA 0.1280000
## [3,]   NA 0.2700000
## [4,]   NA 0.0320000
## [5,]   NA 0.1366667
```