Compare speed of alfam2() with Rcpp to old version

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Packages

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

Install packages

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

```
rver <- '/home/sasha/R/ALFAM2-versions/R-ver/'
cver <- '/home/sasha/R/ALFAM2-versions/Rcpp-ver/'
```

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.

```
ALFAM2::alfam2pars02
```

```
##            int.f0    app.mthd.os.f0    app.rate.ni.f0         man.dm.f0
##       -0.60568338       -1.74351499       -0.01114900        0.39967070
## man.source.pig.f0    app.mthd.cs.f0            int.r1    app.mthd.bc.r1
##       -0.59202858       -7.63373787       -0.93921516        0.79352480
##          man.dm.r1       air.temp.r1        wind.2m.r1    app.mthd.ts.r1
##       -0.13988189        0.07354268        0.15026720       -0.45907135
## ts.cereal.hght.r1         man.ph.r1            int.r2      rain.rate.r2
##       -0.24471238        0.66500000       -1.79918546        0.39402156
##            int.r3    app.mthd.bc.r3    app.mthd.cs.r3         man.ph.r3
##       -3.22841225        0.56153956       -0.66647417        0.23800000
## incorp.shallow.f4 incorp.shallow.r3    incorp.deep.f4    incorp.deep.r3
##       -0.96496655       -0.58052689       -3.69494954       -1.26569562
```

```
d <- data.frame(ct = 1:168, app.mthd = 'bc',
                man.dm = 7, man.ph = 7, man.source = 'cattle',
                air.temp = 10, wind.2m = 3,
                tan.app = 100)
```

Without incorporation.

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

Add incorporation.

```
dati <- dat
dati$t.incorp <- 3
dati$incorp <- 'shallow'
```

With prep

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

```
datip <- ALFAM2:::prepDat(dati, value = 'data')
datip$`__group` <- datip$id
datip$`__f4` <- 1
datip$`__add.row` <- FALSE
```

Results matrix

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

Old R version

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

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

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

No incorporation.

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

```
tt
```

```
## [1] 0.373 0.368 0.373 0.371 0.378
```

```
mean(tt)
```

```
## [1] 0.3726
```

```
sd(tt)
```

```
## [1] 0.003646917
```

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

```
## [1] 0.9787752
```

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

No data prep

```r
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 = FALSE, warn = FALSE))[3]
}
```

```r
tt
```

```
## [1] 0.359 0.374 0.360 0.366 0.359
```

```r
mean(tt)
```

```
## [1] 0.3636
```

```r
sd(tt)
```

```
## [1] 0.006503845
```

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

```
## [1] 1.788736
```

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

With incorporation.

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

```r
tt
```

```
## [1] 1.082 1.081 1.055
```

```r
mean(tt)
```

```
## [1] 1.072667
```

```r
sd(tt)
```

```
## [1] 0.01530795
```

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

```
## [1] 1.427093
```

```r
res[3, 1] <- mean(tt)
```

No data prep

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(dat, pars = ALFAM2::alfam2pars02, app.name = 'tan.app',
                              group = 'id', prep = TRUE, warn = FALSE))[3]
}
```

```
tt
```

```
## [1] 0.144 0.139 0.141 0.140 0.140
```

```
mean(tt)
```

```
## [1] 0.1408
```

```
sd(tt)
```

```
## [1] 0.001923538
```

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

```
## [1] 1.366149
```

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

No data prep

```
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 = FALSE, warn = FALSE))[3]
}
```

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

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

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

## Warning in alfam2(datp, pars = ALFAM2::alfam2pars02, app.name = "tan.app", : dat data frame has some
## You can proceed, but there may be problems.
```

```
## Better to remove/rename the offending columns: __group__add.row__f4

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

```
tt
```

```
## [1] 0.121 0.123 0.122 0.124 0.123
```

```
mean(tt)
```

```
## [1] 0.1226
```

```
sd(tt)
```

```
## [1] 0.001140175
```

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

```
## [1] 0.9299963
```

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

With flatout option (external prep)

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

```
##   ct app.mthd man.dm man.ph man.source air.temp wind.2m tan.app id app.mthd.ts
## 1  1       bc      7      7     cattle       10       3     100  1           0
## 2  2       bc      7      7     cattle       10       3     100  1           0
## 3  3       bc      7      7     cattle       10       3     100  1           0
## 4  4       bc      7      7     cattle       10       3     100  1           0
## 5  5       bc      7      7     cattle       10       3     100  1           0
## 6  6       bc      7      7     cattle       10       3     100  1           0
##   app.mthd.bc app.mthd.os app.mthd.cs man.source.pig __group __f4 __add.row
## 1           1           0           0              0       1    1     FALSE
## 2           1           0           0              0       1    1     FALSE
## 3           1           0           0              0       1    1     FALSE
## 4           1           0           0              0       1    1     FALSE
## 5           1           0           0              0       1    1     FALSE
## 6           1           0           0              0       1    1     FALSE
```

```
undebug(alfam2)
```

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

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

```
tt
```

```
## [1] 0.030 0.029 0.030 0.030 0.030
```

```
mean(tt)
```

```
## [1] 0.0298
```

```
sd(tt)
```

```
## [1] 0.0004472136
```

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

```
## [1] 1.500717
```

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

With incorporation.

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

```
tt
```

```
## [1] 0.223 0.221 0.221
```

```
mean(tt)
```

```
## [1] 0.2216667
```

```
sd(tt)
```

```
## [1] 0.001154701
```

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

```
## [1] 0.5209175
```

```
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(datip, pars = ALFAM2::alfam2pars02, time.incorp = 't.incorp',
                              app.name = 'tan.app', group = 'id', warn = FALSE, flatout = TRUE))[3]
}
```

```
tt
```

```
## [1] 0.126 0.123 0.125
```

```
mean(tt)
```

```
## [1] 0.1246667
```

```
sd(tt)
```

```
## [1] 0.001527525
```

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

```
## [1] 1.225288
```

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

```r
print(res)
```

```
##          [,1]      [,2]
## [1,] 0.372600 0.1408000
## [2,] 0.363600 0.1226000
## [3,] 1.072667 0.2216667
## [4,]       NA 0.0298000
## [5,]       NA 0.1246667
```