mcds-dot-exe with Amakihi

Rexstad

What versions of packages?

```
library(Distance)
```

```
Loading required package: mrds
```

```
This is mrds 2.2.8.9005
Built: R 4.2.2; ; 2023-03-09 12:02:15 UTC; windows
MCDS.exe detected, by default single observer analyses will utilise both the mrds R optimiser
```

```
Attaching package: 'Distance'
```

```
The following object is masked from 'package:mrds':

    create.bins
```

```
library(tictoc)
data("amakihi")
conv <- convert_units("meter", NULL, "hectare")
devtools::session_info()
```

```
- Session info ---------------------------------------------------------------
 setting  value
 version  R version 4.2.2 (2022-10-31 ucrt)
 os       Windows 10 x64 (build 19045)
 system   x86_64, mingw32
 ui       RTerm
```

```
 language (EN)
 collate  English_United Kingdom.utf8
 ctype    English_United Kingdom.utf8
 tz       Europe/London
 date     2023-03-10
 pandoc   2.19.2 @ C:/Program Files/RStudio/resources/app/bin/quarto/bin/tools/ (via rmarkdow

- Packages -------------------------------------------------------------------
 package     * version    date (UTC) lib source
 cachem        1.0.7      2023-02-24 [1] CRAN (R 4.2.2)
 callr         3.7.3      2022-11-02 [1] CRAN (R 4.2.2)
 cli           3.6.0      2023-01-09 [1] CRAN (R 4.2.2)
 crayon        1.5.2      2022-09-29 [1] CRAN (R 4.1.3)
 devtools      2.4.5      2022-10-11 [1] CRAN (R 4.2.1)
 digest        0.6.31     2022-12-11 [1] CRAN (R 4.2.2)
 Distance    * 1.0.6.9003 2023-03-09 [1] Github (DistanceDevelopment/Distance@303377a)
 dplyr         1.1.0      2023-01-29 [1] CRAN (R 4.2.2)
 ellipsis      0.3.2      2021-04-29 [1] CRAN (R 4.2.1)
 evaluate      0.20       2023-01-17 [1] CRAN (R 4.2.2)
 fansi         1.0.3      2022-03-24 [1] CRAN (R 4.1.3)
 fastmap       1.1.0      2021-01-25 [1] CRAN (R 4.1.1)
 fs            1.6.1      2023-02-06 [1] CRAN (R 4.2.2)
 generics      0.1.3      2022-07-05 [1] CRAN (R 4.2.1)
 glue          1.6.2      2022-02-24 [1] CRAN (R 4.1.1)
 htmltools     0.5.4      2022-12-07 [1] CRAN (R 4.2.2)
 htmlwidgets   1.6.1      2023-01-07 [1] CRAN (R 4.2.2)
 httpuv        1.6.9      2023-02-14 [1] CRAN (R 4.2.2)
 jsonlite      1.8.4      2022-12-06 [1] CRAN (R 4.2.2)
 knitr         1.42       2023-01-25 [1] CRAN (R 4.2.2)
 later         1.3.0      2021-08-18 [1] CRAN (R 4.1.1)
 lattice       0.20-45    2021-09-22 [1] CRAN (R 4.2.1)
 lifecycle     1.0.3      2022-10-07 [1] CRAN (R 4.2.1)
 magrittr      2.0.3      2022-03-30 [1] CRAN (R 4.1.3)
 Matrix        1.5-3      2022-11-11 [1] CRAN (R 4.2.2)
 memoise       2.0.1      2021-11-26 [1] CRAN (R 4.1.1)
 mgcv          1.8-42     2023-03-02 [1] CRAN (R 4.2.2)
 mime          0.12       2021-09-28 [1] CRAN (R 4.1.1)
 miniUI        0.1.1.1    2018-05-18 [1] CRAN (R 4.1.1)
 mrds        * 2.2.8.9005 2023-03-09 [1] Github (DistanceDevelopment/mrds@47b8e12)
 nlme          3.1-160    2022-10-10 [1] CRAN (R 4.2.1)
 numDeriv      2016.8-1.1 2019-06-06 [1] CRAN (R 4.2.0)
 optimx        2022-4.30  2022-05-10 [1] CRAN (R 4.2.1)
 pillar        1.8.1      2022-08-19 [1] CRAN (R 4.2.1)
```

```
 pkgbuild      1.4.0      2022-11-27 [1] CRAN (R 4.2.2)
 pkgconfig     2.0.3      2019-09-22 [1] CRAN (R 4.2.1)
 pkgload       1.3.2      2022-11-16 [1] CRAN (R 4.2.2)
 prettyunits   1.1.1      2020-01-24 [1] CRAN (R 4.1.1)
 processx      3.8.0      2022-10-26 [1] CRAN (R 4.2.1)
 profvis       0.3.7      2020-11-02 [1] CRAN (R 4.1.3)
 promises      1.2.0.1    2021-02-11 [1] CRAN (R 4.1.1)
 ps            1.7.2      2022-10-26 [1] CRAN (R 4.2.1)
 purrr         1.0.1      2023-01-10 [1] CRAN (R 4.2.2)
 R6            2.5.1      2021-08-19 [1] CRAN (R 4.2.1)
 Rcpp          1.0.10     2023-01-22 [1] CRAN (R 4.2.2)
 remotes       2.4.2      2021-11-30 [1] CRAN (R 4.1.1)
 rlang         1.0.6      2022-09-24 [1] CRAN (R 4.1.3)
 rmarkdown     2.20       2023-01-19 [1] CRAN (R 4.2.2)
 Rsolnp        1.16       2015-12-28 [1] CRAN (R 4.2.1)
 rstudioapi    0.14       2022-08-22 [1] CRAN (R 4.2.1)
 sessioninfo   1.2.2      2021-12-06 [1] CRAN (R 4.1.2)
 shiny         1.7.4      2022-12-15 [1] CRAN (R 4.2.2)
 stringi       1.7.12     2023-01-11 [1] CRAN (R 4.2.2)
 stringr       1.5.0      2022-12-02 [1] CRAN (R 4.2.2)
 tibble        3.2.0      2023-03-08 [1] CRAN (R 4.2.2)
 tictoc      * 1.1        2022-09-03 [1] CRAN (R 4.2.2)
 tidyselect    1.2.0      2022-10-10 [1] CRAN (R 4.2.1)
 truncnorm     1.0-8      2018-02-27 [1] CRAN (R 4.2.1)
 urlchecker    1.0.1      2021-11-30 [1] CRAN (R 4.1.3)
 usethis       2.1.6      2022-05-25 [1] CRAN (R 4.1.3)
 utf8          1.2.3      2023-01-31 [1] CRAN (R 4.2.2)
 vctrs         0.5.2      2023-01-23 [1] CRAN (R 4.2.2)
 xfun          0.37       2023-01-31 [1] CRAN (R 4.2.2)
 xtable        1.8-4      2019-04-21 [1] CRAN (R 4.1.1)
 yaml          2.3.7      2023-01-23 [1] CRAN (R 4.2.2)

 [1] C:/Users/erexs/Documents/R/win-library/4.1
 [2] C:/Program Files/R/R-4.2.2/library
```

Amakihi with default behaviour

With both `skip_mcds` and `skip_R` arguments set to default value of `FALSE`

```r
tic()
amak.hn <- ds(amakihi, transect="point", key="hn", convert_units = conv, truncation=82.5)
```

```
Starting AIC adjustment term selection.

Fitting half-normal key function

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e87cbe4050.txt' had status
1

AIC= 10833.841

Fitting half-normal key function with cosine(2) adjustments

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e8583144b8.txt' had status
1

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 1764 > 1' in
coercion to 'logical(1)'

AIC= 10820.154

Fitting half-normal key function with cosine(2,3) adjustments

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e8142739d1.txt' had status
1

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 1849 > 1' in
coercion to 'logical(1)'
```

```
AIC= 10809.39

Fitting half-normal key function with cosine(2,3,4) adjustments

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e869d8d5a.txt' had status
1

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 1936 > 1' in
coercion to 'logical(1)'

AIC= 10799.122

Fitting half-normal key function with cosine(2,3,4,5) adjustments

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e81c22784.txt' had status
1

Warning in check.mono(result, n.pts = control$mono.points): Detection function
is not strictly monotonic!

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 2025 > 1' in
coercion to 'logical(1)'

Warning in check.mono(result, n.pts = control$mono.points): Detection function
is not strictly monotonic!

AIC= 10799.105

Fitting half-normal key function with cosine(2,3,4,5,6) adjustments
```

```
Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e84bfb7ecb.txt' had status
3

Error in read.table(statsfile, row.names = NULL) :
  first five rows are empty: giving up

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 2116 > 1' in
coercion to 'logical(1)'

Warning in is.null(lt$hessian) || is.na(lt$hessian): Detection function is not
strictly monotonic!

AIC= 10800.102


Half-normal key function with cosine(2,3,4,5) adjustments selected.

Warning in mrds::check.mono(model, n.pts = 20): Detection function is not
strictly monotonic!
```

```r
amak.hr <- ds(amakihi, transect="point", key="hr", convert_units = conv, truncation=82.5)
```

```
Starting AIC adjustment term selection.

Fitting hazard-rate key function

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e816181e19.txt' had status
1

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 4 > 1' in
coercion to 'logical(1)'
```

```
AIC= 10807.549

Fitting hazard-rate key function with cosine(2) adjustments

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e865de191c.txt' had status
1

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 1849 > 1' in
coercion to 'logical(1)'

AIC= 10809.55


Hazard-rate key function selected.
```

```
amak.hr.obs <- ds(amakihi, transect="point", key="hr", formula=~OBs, convert_units = conv,
                  truncation=82.5)
```

```
Model contains covariate term(s): no adjustment terms will be included.

Fitting hazard-rate key function

Error in covar_fields[i] <- colnames(data)[index] :
  replacement has length zero

AIC= 10778.448
```

```
amak.hr.mas <- ds(amakihi, transect="point", key="hr", formula=~MAS, convert_units = conv,
                  truncation=82.5)
```

```
Model contains covariate term(s): no adjustment terms will be included.
Fitting hazard-rate key function

Error in covar_fields[i] <- colnames(data)[index] :
  replacement has length zero

AIC= 10805.629
```

```
amak.hr.obs.mas <- ds(amakihi, transect="point", key="hr", formula=~OBs+MAS, convert_units
                      truncation=82.5)
```

```
Model contains covariate term(s): no adjustment terms will be included.
Fitting hazard-rate key function

Error in covar_fields[i] <- colnames(data)[index] :
  replacement has length zero

AIC= 10777.376
```

```
toc()
```

```
70.39 sec elapsed
```

```
default <- c(amak.hn$ddf$lnl, amak.hr$ddf$lnl,
             amak.hr.obs$ddf$lnl, amak.hr.mas$ddf$lnl, amak.hr.obs.mas$ddf$lnl)
```

Amakihi running only R code

With `skip_mcds=TRUE` and `skip_R=FALSE`

```
tic()
amak.hn <- ds(amakihi, transect="point", key="hn", convert_units = conv,
              truncation=82.5, skip_mcds=TRUE, skip_R=FALSE)
```

```
Starting AIC adjustment term selection.

Fitting half-normal key function

AIC= 10833.841

Fitting half-normal key function with cosine(2) adjustments

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 1764 > 1' in
coercion to 'logical(1)'
```

```
AIC= 10820.154

Fitting half-normal key function with cosine(2,3) adjustments

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 1849 > 1' in
coercion to 'logical(1)'

AIC= 10809.39

Fitting half-normal key function with cosine(2,3,4) adjustments

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 1936 > 1' in
coercion to 'logical(1)'

AIC= 10799.122

Fitting half-normal key function with cosine(2,3,4,5) adjustments

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 2025 > 1' in
coercion to 'logical(1)'

Warning in check.mono(result, n.pts = control$mono.points): Detection function
is not strictly monotonic!

AIC= 10799.105

Fitting half-normal key function with cosine(2,3,4,5,6) adjustments

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 2116 > 1' in
coercion to 'logical(1)'

Warning in is.null(lt$hessian) || is.na(lt$hessian): Detection function is not
strictly monotonic!

AIC= 10800.102


Half-normal key function with cosine(2,3,4,5) adjustments selected.

Warning in mrds::check.mono(model, n.pts = 20): Detection function is not
strictly monotonic!
```

```
amak.hr <- ds(amakihi, transect="point", key="hr", convert_units = conv,
              truncation=82.5, skip_mcds=TRUE, skip_R=FALSE)
```

```
Starting AIC adjustment term selection.

Fitting hazard-rate key function

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 4 > 1' in
coercion to 'logical(1)'

AIC= 10807.549

Fitting hazard-rate key function with cosine(2) adjustments

Warning in is.null(lt$hessian) || is.na(lt$hessian): 'length(x) = 1849 > 1' in
coercion to 'logical(1)'

AIC= 10809.55


Hazard-rate key function selected.
```

```
amak.hr.obs <- ds(amakihi, transect="point", key="hr", formula=~OBs, convert_units = conv,
                  truncation=82.5, skip_mcds=TRUE, skip_R=FALSE)
```

```
Model contains covariate term(s): no adjustment terms will be included.

Fitting hazard-rate key function

AIC= 10778.448
```

```
amak.hr.mas <- ds(amakihi, transect="point", key="hr", formula=~MAS, convert_units = conv,
                  truncation=82.5, skip_mcds=TRUE, skip_R=FALSE)
```

```
Model contains covariate term(s): no adjustment terms will be included.

Fitting hazard-rate key function

AIC= 10805.629
```

```
amak.hr.obs.mas <- ds(amakihi, transect="point", key="hr", formula=~OBs+MAS, convert_units
                      truncation=82.5, skip_mcds=TRUE, skip_R=FALSE)
```

```
Model contains covariate term(s): no adjustment terms will be included.

Fitting hazard-rate key function

AIC= 10777.376
```

```
toc()
```

```
60.58 sec elapsed
```

```
Ronly <- c(amak.hn$ddf$lnl, amak.hr$ddf$lnl,
           amak.hr.obs$ddf$lnl, amak.hr.mas$ddf$lnl, amak.hr.obs.mas$ddf$lnl)
```

Amakihi running only FORTRAN code

With `skip_mcds=FALSE` and `skip_R=TRUE`

```
tic()
amak.hn <- ds(amakihi, transect="point", key="hn", convert_units = conv,
              truncation=82.5, skip_mcds=FALSE, skip_R=TRUE)
```

```
Starting AIC adjustment term selection.

Fitting half-normal key function

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e856b5ea2.txt' had status
1

AIC= 10833.841
```

```
Fitting half-normal key function with cosine(2) adjustments

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e867f24dbf.txt' had status
1

AIC= 10820.154

Fitting half-normal key function with cosine(2,3) adjustments

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e85c876f4c.txt' had status
1

AIC= 10809.378

Fitting half-normal key function with cosine(2,3,4) adjustments

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e83d2d21f0.txt' had status
1

AIC= 10799.122

Fitting half-normal key function with cosine(2,3,4,5) adjustments

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e8695762d2.txt' had status
1
```

```
Warning in check.mono(result, n.pts = control$mono.points): Detection function
is not strictly monotonic!

Warning in check.mono(result, n.pts = control$mono.points): Detection function
is not strictly monotonic!

AIC= 10799.018

Fitting half-normal key function with cosine(2,3,4,5,6) adjustments

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e855bb185c.txt' had status
3

Error in read.table(statsfile, row.names = NULL) :
  first five rows are empty: giving up
Error in if (lt$message == "FALSE CONVERGENCE") { :
  argument is of length zero



Error in model fitting, returning: half-normal key function with cosine(2,3,4,5) adjustments


  Error: Error in if (lt$message == "FALSE CONVERGENCE") { :
  argument is of length zero

Warning in mrds::check.mono(model, n.pts = 20): Detection function is not
strictly monotonic!
```

```r
amak.hr <- ds(amakihi, transect="point", key="hr", convert_units = conv,
              truncation=82.5, skip_mcds=FALSE, skip_R=TRUE)
```

```
Starting AIC adjustment term selection.

Fitting hazard-rate key function
```

```
Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e82f58133.txt' had status
1

AIC= 10807.549

Fitting hazard-rate key function with cosine(2) adjustments

Warning in system(paste0(path_to_MCDS_dot_exe, " 0, ",
test_file$command.file.name), : running command
'C:/Users/erexs/Documents/R/win-library/4.1/mrds/MCDS.exe 0,
C:\Users\erexs\AppData\Local\Temp\Rtmpi4Anp3\cmdtmp56e85dc5376.txt' had status
1

AIC= 10808.852


Hazard-rate key function selected.
```

```
amak.hr.obs <- ds(amakihi, transect="point", key="hr", formula=~OBs, convert_units = conv,
                  truncation=82.5, skip_mcds=FALSE, skip_R=TRUE)
```

```
Model contains covariate term(s): no adjustment terms will be included.

Fitting hazard-rate key function

Error in covar_fields[i] <- colnames(data)[index] :
  replacement has length zero
Error in if (ddfobj$type == "hr" && lt$par[1] < sqrt(.Machine$double.eps)) { :
  missing value where TRUE/FALSE needed



All models failed to fit!

Error in ds(amakihi, transect = "point", key = "hr", formula = ~OBs, convert_units = conv, :
```

```
amak.hr.mas <- ds(amakihi, transect="point", key="hr", formula=~MAS, convert_units = conv,
                  truncation=82.5, skip_mcds=FALSE, skip_R=TRUE)
```

```
Model contains covariate term(s): no adjustment terms will be included.
Fitting hazard-rate key function

Error in covar_fields[i] <- colnames(data)[index] :
  replacement has length zero
Error in if (ddfobj$type == "hr" && lt$par[1] < sqrt(.Machine$double.eps)) { :
  missing value where TRUE/FALSE needed



All models failed to fit!

Error in ds(amakihi, transect = "point", key = "hr", formula = ~MAS, convert_units = conv, :
```

```
amak.hr.obs.mas <- ds(amakihi, transect="point", key="hr", formula=~OBs+MAS, convert_units
                      truncation=82.5, skip_mcds=FALSE, skip_R=TRUE)
```

```
Model contains covariate term(s): no adjustment terms will be included.
Fitting hazard-rate key function

Error in covar_fields[i] <- colnames(data)[index] :
  replacement has length zero
Error in if (ddfobj$type == "hr" && lt$par[1] < sqrt(.Machine$double.eps)) { :
  missing value where TRUE/FALSE needed



All models failed to fit!

Error in ds(amakihi, transect = "point", key = "hr", formula = ~OBs + : No models could be f
```

```
toc()
```

```
12.81 sec elapsed
```

```
FORTRANonly <- c(amak.hn$ddf$lnl, amak.hr$ddf$lnl,
                 amak.hr.obs$ddf$lnl, amak.hr.mas$ddf$lnl, amak.hr.obs.mas$ddf$lnl)
```

Likelihood comparison

```
likeframe <- data.frame(default=default,
                        Ronly=Ronly)
#                         FORTonly=FORTRANonly)
knitr::kable(likeframe, digits=3)
```

default	Ronly
-5394.553	-5394.553
-5401.775	-5401.775
-5385.224	-5385.224
-5399.815	-5399.815
-5383.688	-5383.688