Package 'faoutlier'

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Version 0.7.7

Type Package

Title Influential Case Detection Methods for Factor Analysis and Structural Equation Models

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Description Tools for detecting and summarize influential cases that can affect exploratory and confirmatory factor analysis models as well as structural equation models more generally (Chalmers, 2015, <doi:10.1177/0146621615597894>; Flora, D. B., LaBrish, C. & Chalmers, R. P., 2012, <doi:10.3389/fpsyg.2012.00055>).

Depends R (>= 3.0.2), sem, mvtnorm, parallel

Imports methods, lattice, lavaan, mirt (>= 1.32.1), MASS, pbapply (>= 1.3-0)

ByteCompile yes

LazyLoad yes

LazyData yes

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Repository CRAN

License GPL (>= 2)

URL https://github.com/philchalmers/faoutlier

RoxygenNote 7.3.2

NeedsCompilation no

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Contents

`faoutlier` *Influential case detection methods for FA and SEM*

Description

Influential case detection methods for factor analysis and SEM

Details

Implements robust Mahalanobis methods, generalized Cook's distances, likelihood ratio tests, model implied residuals, and various graphical methods to help detect and summarize influential cases that can affect exploratory and confirmatory factor analyses.

Author(s)

Phil Chalmers <rphilip.chalmers@gmail.com>

References

Chalmers, R. P. & Flora, D. B. (2015). faoutlier: An R Package for Detecting Influential Cases in Exploratory and Confirmatory Factor Analysis. *Applied Psychological Measurement, 39*, 573-574. doi:10.1177/0146621615597894

Flora, D. B., LaBrish, C. & Chalmers, R. P. (2012). Old and new ideas for data screening and assumption testing for exploratory and confirmatory factor analysis. *Frontiers in Psychology, 3*, 1-21. doi:10.3389/fpsyg.2012.00055

`forward.search` *Forward search algorithm for outlier detection*

Description

The forward search algorithm begins by selecting a homogeneous subset of cases based on a maximum likelihood criteria and continues to add individual cases at each iteration given an acceptance criteria. By default the function will add cases that contribute most to the likelihood function and that have the closest robust Mahalanobis distance, however model implied residuals may be included as well.

Usage

```
forward.search(
  data,
  model,
  criteria = c("GOF", "mah"),
  n.subsets = 1000,
  p.base = 0.4,
  print.messages = TRUE,
  ...
)

## S3 method for class 'forward.search'
print(x, ncases = 10, stat = "GOF", ...)

## S3 method for class 'forward.search'
plot(
  x,
  y = NULL,
  stat = "GOF",
  main = "Forward Search",
  type = c("p", "h"),
  ylab = "obs.resid",
  ...
)
```

Arguments

data	matrix or data.frame
model	if a single numeric number declares number of factors to extract in exploratory factor analysis. If class(model) is a sem (semmod), or lavaan (character), then a confirmatory approach is performed instead
criteria	character strings indicating the forward search method Can contain 'GOF' for goodness of fit distance, 'mah' for Mahalanobis distance, or 'res' for model implied residuals
n.subsets	a scalar indicating how many samples to draw to find a homogeneous starting base group
p.base	proportion of sample size to use as the base group
print.messages	logical; print how many iterations are remaining?
...	additional parameters to be passed
x	an object of class forward.search
ncases	number of final cases to print in the sequence
stat	type of statistic to use. Could be 'GOF', 'RMR', or 'gCD' for the model chi squared value, root mean square residual, or generalized Cook's distance, respectively
y	a null value ignored by plot

main	the main title of the plot
type	type of plot to use, default displays points and lines
ylab	the y label of the plot

Details

Note that forward.search is not limited to confirmatory factor analysis and can apply to nearly any model being studied where detection of influential observations is important.

Author(s)

Phil Chalmers <rphilip.chalmers@gmail.com>

References

Chalmers, R. P. & Flora, D. B. (2015). faoutlier: An R Package for Detecting Influential Cases in Exploratory and Confirmatory Factor Analysis. *Applied Psychological Measurement, 39*, 573-574. doi:10.1177/0146621615597894

Flora, D. B., LaBrish, C. & Chalmers, R. P. (2012). Old and new ideas for data screening and assumption testing for exploratory and confirmatory factor analysis. *Frontiers in Psychology, 3*, 1-21. doi:10.3389/fpsyg.2012.00055

Mavridis, D., & Moustaki, I. (2008). Detecting Outliers in Factor Analysis Using the Forward Search Algorithm. *Multivariate Behavioral Research, 43*, 453-475, doi:10.1080/00273170802285909

See Also

gCD, GOF, LD, robustMD, setCluster

Examples

```
## Not run:

#run all internal gCD and GOF functions using multiple cores
setCluster()

#Exploratory
nfact <- 3
(FS <- forward.search(holzinger, nfact))
(FS.outlier <- forward.search(holzinger.outlier, nfact))
plot(FS)
plot(FS.outlier)

#Confirmatory with sem
model <- sem::specifyModel()
  F1 -> Remndrs,    lam11
  F1 -> SntComp,    lam21
  F1 -> WrdMean,    lam31
  F2 -> MissNum,    lam41
  F2 -> MxdArit,    lam52
  F2 -> OddWrds,    lam62
```

```
  F3 -> Boots,      lam73
  F3 -> Gloves,     lam83
  F3 -> Hatchts,    lam93
  F1 <-> F1,   NA,     1
  F2 <-> F2,   NA,     1
  F3 <-> F3,   NA,     1


(FS <- forward.search(holzinger, model))
(FS.outlier <- forward.search(holzinger.outlier, model))
plot(FS)
plot(FS.outlier)

#Confirmatory with lavaan
model <- 'F1 =~  Remndrs + SntComp + WrdMean
F2 =~ MissNum + MxdArit + OddWrds
F3 =~ Boots + Gloves + Hatchts'

(FS <- forward.search(holzinger, model))
(FS.outlier <- forward.search(holzinger.outlier, model))
plot(FS)
plot(FS.outlier)



## End(Not run)
```

---

gCD *Generalized Cook's Distance*

Description

Compute generalize Cook's distances (gCD's) for exploratory and confirmatory FA. Can return DFBETA matrix if requested. If mirt is used, then the values will be associated with the unique response patterns instead.

Usage

```
gCD(data, model, vcov_drop = FALSE, progress = TRUE, ...)

## S3 method for class 'gCD'
print(x, ncases = 10, DFBETAS = FALSE, ...)

## S3 method for class 'gCD'
plot(
  x,
  y = NULL,
  main = "Generalized Cook Distance",
  type = c("p", "h"),
```

```
  ylab = "gCD",
  ...
)
```

Arguments

data	matrix or data.frame
model	if a single numeric number declares number of factors to extract in exploratory factor analysis (requires complete dataset, i.e., no missing). If class(model) is a sem (semmod), or lavaan (character), then a confirmatory approach is performed instead
vcov_drop	logical; should the variance-covariance matrix of the parameter estimates be based on the unique data[-i,] models (Pek and MacCallum, 2011) or original data?
progress	logical; display the progress of the computations in the console?
...	additional parameters to be passed
x	an object of class gCD
ncases	number of extreme cases to display
DFBETAS	logical; return DFBETA matrix in addition to gCD? If TRUE, a list is returned
y	a NULL value ignored by the plotting function
main	the main title of the plot
type	type of plot to use, default displays points and lines
ylab	the y label of the plot

Details

Note that gCD is not limited to confirmatory factor analysis and can apply to nearly any model being studied where detection of influential observations is important.

Author(s)

Phil Chalmers <rphilip.chalmers@gmail.com>

References

Chalmers, R. P. & Flora, D. B. (2015). faoutlier: An R Package for Detecting Influential Cases in Exploratory and Confirmatory Factor Analysis. *Applied Psychological Measurement, 39*, 573-574. doi:10.1177/0146621615597894

Flora, D. B., LaBrish, C. & Chalmers, R. P. (2012). Old and new ideas for data screening and assumption testing for exploratory and confirmatory factor analysis. *Frontiers in Psychology, 3*, 1-21. doi:10.3389/fpsyg.2012.00055

Pek, J. & MacCallum, R. C. (2011). Sensitivity Analysis in Structural Equation Models: Cases and Their Influence. Multivariate Behavioral Research, 46(2), 202-228.

See Also

LD, obs.resid, robustMD, setCluster

Examples

```
## Not run:

#run all gCD functions using multiple cores
setCluster()

#Exploratory
nfact <- 3
(gCDresult <- gCD(holzinger, nfact))
(gCDresult.outlier <- gCD(holzinger.outlier, nfact))
plot(gCDresult)
plot(gCDresult.outlier)

#-----------------------------------------------------------------------
#Confirmatory with sem
model <- sem::specifyModel()
   F1 -> Remndrs,    lam11
  F1 -> SntComp,    lam21
  F1 -> WrdMean,    lam31
  F2 -> MissNum,    lam41
  F2 -> MxdArit,    lam52
  F2 -> OddWrds,    lam62
  F3 -> Boots,      lam73
  F3 -> Gloves,     lam83
  F3 -> Hatchts,    lam93
  F1 <-> F1,   NA,     1
  F2 <-> F2,   NA,     1
  F3 <-> F3,   NA,     1

(gCDresult2 <- gCD(holzinger, model))
(gCDresult2.outlier <- gCD(holzinger.outlier, model))
plot(gCDresult2)
plot(gCDresult2.outlier)

#-----------------------------------------------------------------------
#Confirmatory with lavaan
model <- 'F1 =~  Remndrs + SntComp + WrdMean
F2 =~ MissNum + MxdArit + OddWrds
F3 =~ Boots + Gloves + Hatchts'

(gCDresult2 <- gCD(holzinger, model, orthogonal=TRUE))
(gCDresult2.outlier <- gCD(holzinger.outlier, model, orthogonal=TRUE))
plot(gCDresult2)
plot(gCDresult2.outlier)

# categorical data with mirt
library(mirt)
data(LSAT7)
```

```
dat <- expand.table(LSAT7)
model <- mirt.model('F = 1-5')
result <- gCD(dat, model)
plot(result)

mod <- mirt(dat, model)
res <- mirt::residuals(mod, type = 'exp')
cbind(res, gCD=round(result$gCD, 3))


## End(Not run)
```

GOF *Goodness of Fit Distance*

Description

Compute Goodness of Fit distances between models when removing the i_{th} case. If mirt is used, then the values will be associated with the unique response patterns instead.

Usage

```
GOF(data, model, M2 = TRUE, progress = TRUE, ...)

## S3 method for class 'GOF'
print(x, ncases = 10, digits = 5, ...)

## S3 method for class 'GOF'
plot(
  x,
  y = NULL,
  main = "Goodness of Fit Distance",
  type = c("p", "h"),
  ylab = "GOF",
  absolute = FALSE,
  ...
)
```

Arguments

data	matrix or data.frame
model	if a single numeric number declares number of factors to extract in exploratory factor analysis (requires complete dataset, i.e., no missing). If class(model) is a sem (semmod), or lavaan (character), then a confirmatory approach is performed instead. Finally, if the model is defined with mirt::mirt.model() then distances will be computed for categorical data with the mirt package
M2	logical; use the M2 statistic for when using mirt objects instead of G2?

progress	logical; display the progress of the computations in the console?
...	additional parameters to be passed
x	an object of class GOF
ncases	number of extreme cases to display
digits	number of digits to round in the printed result
y	a NULL value ignored by the plotting function
main	the main title of the plot
type	type of plot to use, default displays points and lines
ylab	the y label of the plot
absolute	logical; use absolute values instead of deviations?

Details

Note that GOF is not limited to confirmatory factor analysis and can apply to nearly any model being studied where detection of influential observations is important.

Author(s)

Phil Chalmers <rphilip.chalmers@gmail.com>

References

Chalmers, R. P. & Flora, D. B. (2015). faoutlier: An R Package for Detecting Influential Cases in Exploratory and Confirmatory Factor Analysis. *Applied Psychological Measurement, 39*, 573-574. doi:10.1177/0146621615597894

Flora, D. B., LaBrish, C. & Chalmers, R. P. (2012). Old and new ideas for data screening and assumption testing for exploratory and confirmatory factor analysis. *Frontiers in Psychology, 3*, 1-21. doi:10.3389/fpsyg.2012.00055

See Also

gCD, LD, obs.resid, robustMD, setCluster

Examples

```
## Not run:

#run all GOF functions using multiple cores
setCluster()

#Exploratory
nfact <- 3
(GOFresult <- GOF(holzinger, nfact))
(GOFresult.outlier <- GOF(holzinger.outlier, nfact))
plot(GOFresult)
plot(GOFresult.outlier)

## include a progress bar
```

```
GOFresult <- GOF(holzinger, nfact, progress = TRUE)

#-----------------------------------------------------------------------
#Confirmatory with sem
model <- sem::specifyModel()
  F1 -> Remndrs,    lam11
  F1 -> SntComp,    lam21
  F1 -> WrdMean,    lam31
  F2 -> MissNum,    lam42
  F2 -> MxdArit,    lam52
  F2 -> OddWrds,    lam62
  F3 -> Boots,      lam73
  F3 -> Gloves,     lam83
  F3 -> Hatchts,    lam93
  F1 <-> F1,   NA,     1
  F2 <-> F2,   NA,     1
  F3 <-> F3,   NA,     1

(GOFresult <- GOF(holzinger, model))
(GOFresult.outlier <- GOF(holzinger.outlier, model))
plot(GOFresult)
plot(GOFresult.outlier)

#-----------------------------------------------------------------------
#Confirmatory with lavaan
model <- 'F1 =~  Remndrs + SntComp + WrdMean
F2 =~ MissNum + MxdArit + OddWrds
F3 =~ Boots + Gloves + Hatchts'

(GOFresult <- GOF(holzinger, model, orthogonal=TRUE))
(GOFresult.outlier <- GOF(holzinger.outlier, model, orthogonal=TRUE))
plot(GOFresult)
plot(GOFresult.outlier)


# categorical data with mirt
library(mirt)
data(LSAT7)
dat <- expand.table(LSAT7)
model <- mirt.model('F = 1-5')
result <- GOF(dat, model)
plot(result)


## End(Not run)
```

---

holzinger *Description of holzinger data*

Description

A sample of 100 simulated cases from the infamous Holzinger dataset using 9 variables.

Author(s)

Phil Chalmers <rphilip.chalmers@gmail.com>

References

Chalmers, R. P. & Flora, D. B. (2015). faoutlier: An R Package for Detecting Influential Cases in Exploratory and Confirmatory Factor Analysis. *Applied Psychological Measurement, 39*, 573-574. doi:10.1177/0146621615597894

Flora, D. B., LaBrish, C. & Chalmers, R. P. (2012). Old and new ideas for data screening and assumption testing for exploratory and confirmatory factor analysis. *Frontiers in Psychology, 3*, 1-21. doi:10.3389/fpsyg.2012.00055

---

holzinger.outlier *Description of holzinger data with 1 outlier*

Description

A sample of 100 simulated cases from the infamous Holzinger dataset using 9 variables, but with 1 outlier added to the dataset. The first row was replaced by adding 2 to five of the observed variables (odd-numbered items) and subtracting 2 from the other four observed variables (even-numbered items).

Author(s)

Phil Chalmers <rphilip.chalmers@gmail.com>

References

Chalmers, R. P. & Flora, D. B. (2015). faoutlier: An R Package for Detecting Influential Cases in Exploratory and Confirmatory Factor Analysis. *Applied Psychological Measurement, 39*, 573-574. doi:10.1177/0146621615597894

Flora, D. B., LaBrish, C. & Chalmers, R. P. (2012). Old and new ideas for data screening and assumption testing for exploratory and confirmatory factor analysis. *Frontiers in Psychology, 3*, 1-21. doi:10.3389/fpsyg.2012.00055

LD *Likelihood Distance*

Description

Compute likelihood distances between models when removing the i_{th} case. If there are no missing data then the GOF will often provide equivalent results. If mirt is used, then the values will be associated with the unique response patterns instead.

Usage

```
LD(data, model, progress = TRUE, ...)

## S3 method for class 'LD'
print(x, ncases = 10, digits = 5, ...)

## S3 method for class 'LD'
plot(
  x,
  y = NULL,
  main = "Likelihood Distance",
  type = c("p", "h"),
  ylab = "LD",
  absolute = FALSE,
  ...
)
```

Arguments

data	matrix or data.frame
model	if a single numeric number declares number of factors to extract in exploratory factor analysis (requires complete dataset, i.e., no missing). If class(model) is a sem (semmod), or lavaan (character), then a confirmatory approach is performed instead. Finally, if the model is defined with mirt::mirt.model() then distances will be computed for categorical data with the mirt package
progress	logical; display the progress of the computations in the console?
...	additional parameters to be passed
x	an object of class LD
ncases	number of extreme cases to display
digits	number of digits to round in the printed result
y	a NULL value ignored by the plotting function
main	the main title of the plot
type	type of plot to use, default displays points and lines
ylab	the y label of the plot
absolute	logical; use absolute values instead of deviations?

Details

Note that LD is not limited to confirmatory factor analysis and can apply to nearly any model being studied where detection of influential observations is important.

Author(s)

Phil Chalmers <rphilip.chalmers@gmail.com>

References

Chalmers, R. P. & Flora, D. B. (2015). faoutlier: An R Package for Detecting Influential Cases in Exploratory and Confirmatory Factor Analysis. *Applied Psychological Measurement, 39*, 573-574. doi:10.1177/0146621615597894

Flora, D. B., LaBrish, C. & Chalmers, R. P. (2012). Old and new ideas for data screening and assumption testing for exploratory and confirmatory factor analysis. *Frontiers in Psychology, 3*, 1-21. doi:10.3389/fpsyg.2012.00055

See Also

gCD, GOF, obs.resid, robustMD, setCluster

Examples

```
## Not run:

#run all LD functions using multiple cores
setCluster()

#Exploratory
nfact <- 3
(LDresult <- LD(holzinger, nfact))
(LDresult.outlier <- LD(holzinger.outlier, nfact))
plot(LDresult)
plot(LDresult.outlier)

## add a progress meter
LDresult <- LD(holzinger, nfact, progress = TRUE)

#------------------------------------------------------------------
#Confirmatory with sem
model <- sem::specifyModel()
  F1 -> Remndrs,    lam11
  F1 -> SntComp,    lam21
  F1 -> WrdMean,    lam31
  F2 -> MissNum,    lam42
  F2 -> MxdArit,    lam52
  F2 -> OddWrds,    lam62
  F3 -> Boots,      lam73
  F3 -> Gloves,     lam83
  F3 -> Hatchts,    lam93
  F1 <-> F1,   NA,     1
```

```
  F2 <-> F2,   NA,     1
  F3 <-> F3,   NA,     1

(LDresult <- LD(holzinger, model))
(LDresult.outlier <- LD(holzinger.outlier, model))
plot(LDresult)
plot(LDresult.outlier)

#-----------------------------------------------------------------------
#Confirmatory with lavaan
model <- 'F1 =~  Remndrs + SntComp + WrdMean
F2 =~ MissNum + MxdArit + OddWrds
F3 =~ Boots + Gloves + Hatchts'

(LDresult <- LD(holzinger, model, orthogonal=TRUE))
(LDresult.outlier <- LD(holzinger.outlier, model, orthogonal=TRUE))
plot(LDresult)
plot(LDresult.outlier)

# categorical data with mirt
library(mirt)
data(LSAT7)
dat <- expand.table(LSAT7)
model <- mirt.model('F = 1-5')
LDresult <- LD(dat, model)
plot(LDresult)


## End(Not run)
```

`obs.resid` *Model predicted residual outliers*

Description

Compute model predicted residuals for each variable using regression estimated factor scores.

Usage

```
obs.resid(data, model, ...)

## S3 method for class 'obs.resid'
print(x, restype = "obs", ...)

## S3 method for class 'obs.resid'
plot(
  x,
  y = NULL,
  main = "Observed Residuals",
```

```
  type = c("p", "h"),
  restype = "obs",
  ...
)
```

Arguments

data	matrix or data.frame
model	if a single numeric number declares number of factors to extract in exploratory factor analysis. If class(model) is a sem (semmod), or lavaan (character), then a confirmatory approach is performed instead
...	additional parameters to be passed
x	an object of class obs.resid
restype	type of residual used, either 'obs' for observation value (inner product), 'res' or 'std_res' for unstandardized and standardized for each variable, respectively
y	a NULL value ignored by the plotting function
main	the main title of the plot
type	type of plot to use, default displays points and lines

Author(s)

Phil Chalmers <rphilip.chalmers@gmail.com>

References

Chalmers, R. P. & Flora, D. B. (2015). faoutlier: An R Package for Detecting Influential Cases in Exploratory and Confirmatory Factor Analysis. *Applied Psychological Measurement, 39*, 573-574. doi:10.1177/0146621615597894

Flora, D. B., LaBrish, C. & Chalmers, R. P. (2012). Old and new ideas for data screening and assumption testing for exploratory and confirmatory factor analysis. *Frontiers in Psychology, 3*, 1-21. doi:10.3389/fpsyg.2012.00055

See Also

gCD, LD, robustMD

Examples

```
## Not run:
data(holzinger)
data(holzinger.outlier)

#Exploratory
nfact <- 3
(ORresult <- obs.resid(holzinger, nfact))
(ORresult.outlier <- obs.resid(holzinger.outlier, nfact))
plot(ORresult)
```

```
plot(ORresult.outlier)

#-----------------------------------------------------------------------
#Confirmatory with sem
model <- sem::specifyModel()
   F1 -> Remndrs,    lam11
  F1 -> SntComp,    lam21
  F1 -> WrdMean,    lam31
  F2 -> MissNum,    lam41
  F2 -> MxdArit,    lam52
  F2 -> OddWrds,    lam62
  F3 -> Boots,      lam73
  F3 -> Gloves,     lam83
  F3 -> Hatchts,    lam93
  F1 <-> F1,   NA,     1
  F2 <-> F2,   NA,     1
  F3 <-> F3,   NA,     1

(ORresult <- obs.resid(holzinger, model))
(ORresult.outlier <- obs.resid(holzinger.outlier, model))
plot(ORresult)
plot(ORresult.outlier)

#-----------------------------------------------------------------------
#Confirmatory with lavaan
model <- 'F1 =~  Remndrs + SntComp + WrdMean
F2 =~ MissNum + MxdArit + OddWrds
F3 =~ Boots + Gloves + Hatchts'

(obs.resid2 <- obs.resid(holzinger, model, orthogonal=TRUE))
(obs.resid2.outlier <- obs.resid(holzinger.outlier, model, orthogonal=TRUE))
plot(obs.resid2)
plot(obs.resid2.outlier)


## End(Not run)
```

---

robustMD *Robust Mahalanobis*

Description

Obtain Mahalanobis distances using the robust computing methods found in the MASS package. This function is generally only applicable to models with continuous variables.

Usage

```
robustMD(data, method = "mve", ...)

## S3 method for class 'robmah'
```

```
print(x, ncases = 10, digits = 5, ...)

## S3 method for class 'robmah'
plot(x, y = NULL, type = "xyplot", main, ...)
```

Arguments

data	matrix or data.frame
method	type of estimation for robust means and covariance (see cov.rob)
...	additional arguments to pass to MASS::cov.rob()
x	an object of class robmah
ncases	number of extreme cases to print
digits	number of digits to round in the final result
y	empty parameter passed to plot
type	type of plot to display, can be either 'qqplot' or 'xyplot'
main	title for plot. If missing titles will be generated automatically

Author(s)

Phil Chalmers <rphilip.chalmers@gmail.com>

References

Chalmers, R. P. & Flora, D. B. (2015). faoutlier: An R Package for Detecting Influential Cases in Exploratory and Confirmatory Factor Analysis. *Applied Psychological Measurement, 39*, 573-574. doi:10.1177/0146621615597894

Flora, D. B., LaBrish, C. & Chalmers, R. P. (2012). Old and new ideas for data screening and assumption testing for exploratory and confirmatory factor analysis. *Frontiers in Psychology, 3*, 1-21. doi:10.3389/fpsyg.2012.00055

See Also

gCD, obs.resid, LD

Examples

```
## Not run:
data(holzinger)
output <- robustMD(holzinger)
output
plot(output)
plot(output, type = 'qqplot')

## End(Not run)
```

`setCluster` *Define a parallel cluster object to be used in internal functions*

Description

This function defines a object that is placed in a relevant internal environment defined in faoutlier. Internal functions will utilize this object automatically to capitalize on parallel processing architecture. The object defined is a call from `parallel::makeCluster()`. Note that if you are defining other parallel objects (for simulation designs, for example) it is not recommended to define a cluster.

Usage

```
setCluster(spec, ..., remove = FALSE)
```

Arguments

`spec`	input that is passed to `parallel::makeCluster()`. If no input is given the maximum number of available local cores will be used
`...`	additional arguments to pass to `parallel::makeCluster`
`remove`	logical; remove previously defined cluster object?

Author(s)

Phil Chalmers <rphilip.chalmers@gmail.com>

References

Chalmers, R. P. & Flora, D. B. (2015). faoutlier: An R Package for Detecting Influential Cases in Exploratory and Confirmatory Factor Analysis. *Applied Psychological Measurement, 39*, 573-574. doi:10.1177/0146621615597894

Flora, D. B., LaBrish, C. & Chalmers, R. P. (2012). Old and new ideas for data screening and assumption testing for exploratory and confirmatory factor analysis. *Frontiers in Psychology, 3*, 1-21. doi:10.3389/fpsyg.2012.00055

Examples

```
## Not run:

#make 4 cores available for parallel computing
setCluster(4)

#' #stop and remove cores
setCluster(remove = TRUE)

#use all available cores
setCluster()


## End(Not run)
```

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