Package ‘zonator’

May 18, 2020

Type Package

Title Utilities for Zonation Spatial Conservation Prioritization Software

Version 0.6.0

Date 2020-05-16

License FreeBSD

Encoding UTF-8

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Description Create new analysis setups and deal with results of Zonation conservation prioritization software <https://github.com/cbig/zonation-core>. This package uses data available in the 'zdat' (7.7 MB) package for building the vignettes.

Imports ggplot2 (>= 2.0.0), methods, RColorBrewer, raster, reshape2, rgdal

Depends R (>= 2.15.2)

Suggests knitr, rasterVis, rmarkdown, testthat, zdat (>= 0.1.0)

StagedInstall yes

Additional_repositories https://jlehtoma.github.io/drat

URL https://cbig.github.io/zonator/

BugReports https://github.com/cbig/zonator/issues

VignetteBuilder knitr

RoxygenNote 7.1.0

NeedsCompilation no

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Repository CRAN

Date/Publication 2020-05-18 08:50:02 UTC
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**check_names**

A function check feature/group names.

**Description**

Checks a vector of names only contains unique items and if they're not, unique names will be created. Also, the items must be suitable for columns names. Function is strict so that if the vector is not valid or it cannot be coerced to be one an error is induced.

**Usage**

```r
check_names(x)
```

**Arguments**

- `x`: Charcter or numeric vector.

**Value**

Valid vector of the original size.
check_path

A function to deal with potentially relative paths.

Description

Checks if a path can be resolved (i.e. whether it exists). An additional parameter parent.path can be provided, in which case x is appended to it and the concatenated path is checked for existence. If the path cannot be resolved, raise an error.

Usage

check_path(x, parent.path = NULL, require.file = FALSE)

Arguments

x Character string path.
parent.path Character string root path.
require.file Logical indicating if a file is required for return or if an existing parent folder is enough

Value

A cleaned character string

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

check_zonation

Check if Zonation is installed.

Description

Check if Zonation is installed.

Usage

check_zonation(exe = "zig3")

Arguments

exe Character string for overriding the default Zonation executable (default: zig3).
clean_str

Value
A logical indicating whether requested Zonation executable is found.

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>

Examples
## Not run:
check_zonation("zig4")
## End(Not run)

clean_str
Clean leading and trailing whitespaces from a given string. Additionally, all occurrences of multiple whitespaces are replaced with a single whitespace.

Description
Clean leading and trailing whitespaces from a given string. Additionally, all occurrences of multiple whitespaces are replaced with a single whitespace.

Usage
clean_str(x)

Arguments
x Character string.

Value
An absolute path to a file of NULL if the path does not exist.

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>
Compare matrices in various ways.

Description

Function can be used to compare two Zonation output rasters with one of the following functions (part of zonator package):

- correlation
- substraction
- frequency (NOT IMPLEMENTED)
- coverage

Usage

comp(x, y, fun = "correlation", ...)

Arguments

x Numeric matrix.
y Numeric matrix.
fun Function used for the numeric comparison.
... Further arguments passed on to selected comparison function.

Value

A DataFrame with each row containing columns title, count, and catid

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

correlation substraction frequency coverage
copy_zvariant

Copy existing variant as a new Zvariant object.

Description

Corresponding files on the file system are immediately created. In order to modify the variant, manipulate the returned Zvariant object and use `save_zvariant` method.

Usage

```r
copy_zvariant(x, name, dir)
```

## S4 method for signature 'Zvariant,character,character'

```r
copy_zvariant(x, name, dir)
```

Arguments

- `x`: Zvariant object.
- `name`: Character string naming the copied variant.
- `dir`: Character string directory where the new variant is created on file system.

Details

If the variant being copied has results, they are not copied to the new variant.

Value

Zvariant object

Note

Relative paths in spp-file are translated into absolute paths as otherwise dealing with them might be tricky.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

- Zvariant-class
- save_zvariant
correlation

Correlation between two matrices.

Description

Calculate correlation between two matrices using cor. A group of specific threshold can be set, in which case the correlations are calculated incrementally for values above the thresholds.

Usage

correlation(x, y, method = "kendall", thresholds = c(0))

Arguments

x       Numeric matrix.
y       Numeric matrix.
method  Character string correlation method used (default: 'kendall').
thresholds Numeric vector of thresholds used (default: c(0)).

Value

A list with 2 items:

thresholds  Correlations between 2 matrices with values above a given threshold.
total       Overall correlation between the 2 matrices.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

cor

cost

Get cost data of a Z* object.

Description

Returns the "cost_needed_for_top_fraction" column from Zonation curves file. Note that the cost is the same in curves and grp_curves files. pr_lost is always included in the returned data, but no other columns are included.
Usage

cost(x)

## S4 method for signature 'Zresults'
cost(x)

## S4 method for signature 'Zvariant'
cost(x)

Arguments

x Z* object.

Details

Method implementation in class Zvariant is just a thin wrapper for passing the arguments to variant’s codeZresults object.

Value

data.frame object with two columns:

- pr_lostProportion of landscape lost.
- costCost of a given fraction of the solution.

If no results are available, return NA.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

Zresults-class Zvariant-class

create_spp

Generate spp_file based on a directory of input rasters.

Description

Generate spp_file based on a directory of input rasters.
create_spp

Usage

create_spp(
    filename = "filelist.spp",
    weight = 1,
    alpha = 1,
    bqp = 1,
    bqp_p = 1,
    cellrem = 0.25,
    spp_file_dir,
    recursive = FALSE,
    spp_file_pattern = ".+\.\.(tif|img)$",
    override_path = NULL
)

Arguments

filename character string defining the name of the spp file created.
weight numeric template value for weights.
alpha numeric template value for alpha values.
bqp numeric template value for bqp values.
bqp_p numeric template value for bqp_p values.
cellrem numeric template value for cellrem values.
spp_file_dir character path or a vector of paths to target dir.
recursive Logical defining whether files in spp_file_dir should be listed recursively.
spp_file_pattern pattern used to match raster files.
override_path character path used to override the dirpath in input raster file paths. In case recursive = TRUE, then there can be an arbitrary number of subdirectories and override path is used only up until the spp_file_dir. This way the correct subdirectory structure is retained.

Value

invisible(TRUE), function is used for side effects.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>
Description

Based on a set of input arguments, creates a new Zonation project on the file system following a particular folder and file layout.

Usage

create_zproject(
  name,
  dir,
  variants,
  dat_template_file = NULL,
  spp_template_file = NULL,
  spp_template_dir = NULL,
  overwrite = FALSE,
  debug = FALSE,
  ...
)

Arguments

name  Character string name for the project. A new directory named by name will be created in a location specified by dir.
dir   Character string path pointing to a location to be created.
variants Character vector of names for new variants. Ignored if using an existing project.
dat_template_file Character path to a dat file template. If no template is specified, uses the template distributed with zonator. Ignored if using an existing project.
spp_template_file Character path to a spp file template. If this or spp_template_dir are not specified, uses the template distributed with zonator. Ignored if using an existing project.
spp_template_dir Character path to directory containing biodiversity feature rasters. If this or spp_template_file are not specified, uses the template distributed with zonator. If both are defined, then spp_template_dir overrides. Ignored if using an existing project.
overwrite logical should existing project be overwritten (default: FALSE).
debug   logical defining if debugging level for logging should be used (default: FALSE).
...    additional arguments passed to create_spp.
**Value**

Invisible(NULL).

**Note**

This function is used only for the intended side-effect of creating a new Zonation project. To load the project as an instance of Zproject-class, see load_zproject.

**Author(s)**

Joona Lehtomaki <joona.lehtomaki@gmail.com>

**See Also**

load_zproject and create_spp.

---

**cross_jaccard**

*Calculate Jaccard coefficients between all the RasterLayers within a single RasterStack.*

**Description**

This method is a utility method that is intended to be used to compare top-fractions of the landscape. Thus, x.max and y.max for jaccard are fixed to 1.0.

**Usage**

```r
cross_jaccard(stack, thresholds, ...)
```

**Arguments**

- `stack` : RasterStack-object.
- `thresholds` : Numeric vector values of thresholds.
- `...` : additional arguments passed on to jaccard.

**Value**

Dataframe with Jaccard coefficients between all the RasterLayers.

**Author(s)**

Joona Lehtomaki <joona.lehtomaki@gmail.com>

**See Also**

jaccard
curves

Get curves results data of a Z* object.

Description

pr_lost is always included in the returned data, but other columns can be specified using cols argument.

Usage

curves(x, cols = NULL, groups = FALSE, lost.lower = 0, lost.upper = 1)

## S4 method for signature 'ZCurvesDataFrame'
curves(x, cols = NULL)

## S4 method for signature 'ZGroupCurvesDataFrame'
curves(x, cols = NULL)

## S4 method for signature 'Zresults'
curves(x, cols = NULL, groups = FALSE, lost.lower = 0, lost.upper = 1)

## S4 method for signature 'Zvariant'
curves(x, cols = NULL, groups = FALSE, lost.lower = 0, lost.upper = 1)

Arguments

x Z* object.

cols numeric or character vector of columns to be returned

groups logical indicating whether group curves data should be returned.

lost.lower numeric defining the lower limit of pr_lost to be included [0.0, 0.99] (default: 0.0)

lost.upper numeric defining the upper limit of pr_lost to be included [0.01, 1.0] (default: 1.0)

Details

Arguments upper and lower can be used to define a specific range of pr_lost to be returned.

Method implementation in class Zvariant is just a thin wrapper for passing the arguments to variant’s codeZresults object.

Value

ZCurvesDataFrame or ZGroupCurvesDataFrame containing the (selected) curves file data. If column names are provided, but none are found, return NA.
decimalplaces

Description

Find out the number of decimal places in a number.

Original implementation from https://stackoverflow.com/questions/5173692/how-to-return-number-of-decimal-places-in-r

Usage

decimalplaces(x, true_number = FALSE)

Arguments

x Float or double numeric number.
true_number Logical setting whether the true number (see notes) of decimal places.

Value

Integer number of decimal places. Maximum

Note

R usually restricts the number of decimal to 9 in printing etc. Unless true_number = TRUE, return 9 and give a warning.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>
ds_alpha

**Calculate alpha value for distribution smoothing.**

**Description**

alpha-value of biodiversity feature-specific scale of landscape use. The value indicates the range of connectivity of biodiversity features. For example, it may refer to how a species uses the surrounding landscape. This value can be calculated based on, for example, the dispersal capability or the home range sizes of the species.

**Usage**

\[
\text{ds\_alpha}(\text{landscape}\_\text{use}, \text{ratio})
\]

**Arguments**

- **landscape\_use** Use of landscape (in relation to connectivity) in given map units. Note that if the units used here differ from the real map units of the biodiversity feature the ratio between two must be set using `ratio` argument.
- **ratio** Defines the ratio between units used in `landscape\_use` and the actual map units in the biodiversity feature. E.g. if the map unit of a feature is m and use of landscape is defined as 1.5 km, then ratio should be set to 1000.

**Value**

numerical alpha.

**Author(s)**

Joona Lehtomaki <joona.lehtomaki@gmail.com>

**See Also**

Zonation manual.

**Examples**

\[
\text{ds\_alpha}(1.5, 1000)
\]
featurenames

Feature names of Zonation variant.

Description

Get and set names for analysis features used a given Zonation variant.

Usage

featurenames(x)

featurenames(x) <- value

## S4 method for signature 'ZCurvesDataFrame'
featurenames(x)

## S4 replacement method for signature 'ZCurvesDataFramen<Character'
featurenames(x) <- value

## S4 method for signature 'Zresults'
featurenames(x)

## S4 method for signature 'Zvariant'
featurenames(x)

## S4 replacement method for signature 'Zvariant<Character'
featurenames(x) <- value

Arguments

x Z* object.

value character vector of feature names to be assigned. Can be named or not.

Details

Argument x can be an instance of one the following Z* classes:

- Zvariant
- Zresults

Value

Character vector of spp feature names.

Note

spp features have by default names that are derived from the feature raster file path.
features_info

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

Zvariant-class Zresults-class groupnames groups

Examples

## Not run:
setup.dir <- system.file("extdata/tutorial/basic", package="zonator")
tutorial.project <- create_zproject(setup.dir)
variant.caz <- get_variant(tutorial.project, "01")

# Feature names for a Zvariant object
featurenames(variant.caz)

# Feature names for a Zresults object
results.caz <- results(variant.caz)
featurenames(results.caz)

## End(Not run)

features_info

Get the features info component of Zresults.

Description

Returns the data in *.features_info.txt results standard output of Zonation if present.

Usage

features_info(x)

## S4 method for signature 'Zresults'
features_info(x)

## S4 method for signature 'Zvariant'
features_info(x)

Arguments

x Z* object.
Details

Argument x can be an instance of one the following Z* classes:

• Zvariant
• Zresults

Value
data.frame containing the features info data.

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also
Zvariant-class Zresults-class groupnames groups

Examples

## Not run:
setup.dir <- system.file("extdata/tutorial/basic", package="zonator")
tutorial.project <- create_zproject(setup.dir)
variant.caz <- get_variant(tutorial.project, "01")

# Feature names for a Zvariant object
features_info(variant_caz)

## End(Not run)
file_path_sans_ext

Value

Character string relative file path.

Note

Both path and relative_to must be in absolute form.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

Description

Re-implementation of `file_path_sans_ext` in tools. This version can handle "." just before the file extension, unlike the original implementation.

Usage

`file_path_sans_ext(x, compression = FALSE)`

Arguments

- `x` Character vector giving file paths.
- `compression` Logical: should compression extension '.gz', '.bz2' or '.xz' be removed first?

Value

File path without the file extension.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>
**get_dat_param**  
*Get a specified run setting parameter value*

**Description**
Essentially these are parameter values corresponding to Zonation dat-files. This function is used to get values of given parameter. In the current implementation, sections have no meaning.

**Usage**
```r
get_dat_param(x, parameter, warn_missing = TRUE)
```

## S4 method for signature 'Zvariant'
```r
get_dat_param(x, parameter, warn_missing = TRUE)
```

**Arguments**
- **x**  
  Zvariant object.
- **parameter**  
  Character string name of the parameter.
- **warn_missing**  
  Logical indicating a warning should be raised if the parameter is not used.

**Value**
Character string value of the parameter. If requested parameter is a valid Zonation parameter but not used currently, returns NA.

**Author(s)**
Joona Lehtomaki <joona.lehtomaki@gmail.com>

**See Also**
- `Zvariant-class` and `set_dat_param`.

---

**get_tutorialdir**  
*Get the directory of Zonation tutorial.*

**Description**
Get the directory of Zonation tutorial.

**Usage**
```r
get_tutorialdir()
```
get_variant

Value

path Character path to Zonation tutorial directory.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

get_variant                                     Get a specified variant in a Zonation project

Description

Get a specified variant in a Zonation project

Usage

get_variant(x, index)

## S4 method for signature 'Zproject'
get_variant(x, index)

Arguments

x Zproject object.

index int or string index defining the variant required.

Value

Zvariant object

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

Zproject-class and Zvariant-class
groupnames  

Get group names for a class Zvariant instance.

Description

Group names can be assigned to a Zvariant or Zresults object. This is a replacement function for variant group names. If the particular variant doesn't use groups the gives a warning.

Usage

```r
  groupnames(x)
  groupnames(x) <- value
  ## S4 method for signature 'ZGroupCurvesDataFrame'
  groupnames(x)
  ## S4 method for signature 'Zresults'
  groupnames(x)
  ## S4 method for signature 'Zvariant'
  groupnames(x)
  ## S4 replacement method for signature 'Zvariant,character'
  groupnames(x) <- value
```

Arguments

- `x`  
  Zvariant object.
- `value`  
  named character vector.

Details

All current group codes must be found in the keys, i.e. there can't be missing values. Argument value can, however, contain keys that are not in the current group codes.

Value

A character vector containing the group names. If there are no groups, return NA.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

- `Zvariant-class groupnames groups`
- `Zvariant-class groupnames Zresults groups`
groups

Get group codes of a class Zvariant instance.

Description

If the particular variant doesn’t use groups or doesn’t have them assigned, return NA. Note that here 'groups' means the first column in Zonation groups file ('output group').

Usage

groups(x)

groups(x) <- value

## S4 method for signature 'Zvariant'
groups(x)

## S4 replacement method for signature 'Zvariant,numeric'
groups(x) <- value

Arguments

x

Zvariant object.

value

numeric vector of group ids. Vector length must match to the number of features, no recycling is done.

Value

A numeric vector containing the group ids. If there are no groups, return NA.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

Zvariant-class
has_results

Check which results a Z* object has.

Description

If the results are available (i.e. variants have been run) then the variant should have a list object containing the results.

Usage

has_results(x)

## S4 method for signature 'Zresults'
has_results(x)

## S4 method for signature 'Zvariant'
has_results(x)

Arguments

x  Zvariant-class or Zresults object.

Details

The value returned is a list of logical where key of each element corresponds to a specific type of results.

Value

list of logical values

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

Zvariant-class
**jaccard**  
*Calculate the Jaccard coefficient.*

**Description**

The Jaccard coefficient measures similarity between sample sets, and is defined as the size of the intersection divided by the size of the union of the sample sets. The Jaccard coefficient can be calculated for a subset of rasters provided by using the threshold argument.

**Usage**

```r
ejaccard(  
x,  
y,  
x.min = 0,  
x.max = 1,  
y.min = 0,  
y.max = 1,  
warn.uneven = FALSE,  
limit.tolerance = 4,  
disable.checks = FALSE  
)
```

**Arguments**

- `x`: raster object.
- `y`: raster object.
- `x.min`: Numeric minimum threshold value for `x` to be used (default 0.0).
- `x.max`: Numeric maximum threshold value for `x` to be used (default 1.0).
- `y.min`: Numeric minimum threshold value for `y` to be used (default 0.0).
- `y.max`: Numeric maximum threshold value for `y` to be used (default 1.0).
- `warn.uneven`: Logical indicating whether a warning is raised if the compared raster coverages are very (>20x) uneven.
- `limit.tolerance`: Integer values that defines to which precision `x` and `y` limits are rounded to. This helps e.g. with values that close to 0 but not quite 0 (default: 4, i.e. round(x, 4)).
- `disable.checks`: Logical indicating if the input limit values are checked against the actual raster values in `x` and `y`.

**Details**

Min and max values must be provided for both RasterLayer objects `x` and `y`. Method can be used with RasterLayers of any value range, but the defaults [0.0, 1.0] are geared towards comparing Zonation rank priority rasters. Limits provided are inclusive.
leaf_tags

Find all the leaf tags in a potentially nested list. The generic form of a list is tag = value; find all the tags in a list.

Description

Find all the leaf tags in a potentially nested list. The generic form of a list is tag = value; find all the tags in a list.

Usage

leaf_tags(x, omit_sections = FALSE)

Arguments

x
List to be searched.

omit_sections
Logical indicating if sections should be omitted from vector names.

Value

Characted vector of tags.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

Examples

l <- list("a" = 1, "b" = list("c" = 3, "d" = 4), "e" = 5)
leaf_tags(l)
load_zproject  

**Load a Zonation project.**

**Description**

Loads an existing Zonation project as an object of `Zproject-class`. Individual variants within the Zonation project are parsed into `Zvariant-class` objects and potential results into `Zresults-class` objects.

**Usage**

```r
load_zproject(root, debug = FALSE)
```

**Arguments**

- `root` Character string path pointing to an existing directory (with potentially bat-files in it) or to a new directory to be created.
- `debug` logical defining if debugging level for logging should be used.

**Value**

A `Zproject` object.

**Author(s)**

Joona Lehtomaki <joona.lehtomaki@gmail.com>

**See Also**

`Zproject-class`, `Zvariant-class` and `create_zproject`

---

map_indexes  

**Map vector to actual column indexes.**

**Description**

Compare a vector of column names or indexes against another vector which is known to be true.

**Usage**

```r
map_indexes(x, y)
```

**Arguments**

- `x` Character or numeric vector of possible matches.
- `y` Character or numeric vector of true values.
  
  `x` and `y` must be of the same length.
Value
A numeric vector of the same length of x and y containing matched column indexes.

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>

---

\textbf{names,Zproject-method} \textit{Names of variants in Zproject}

Description
Get the names of all the variants within a given \texttt{Zproject}.

Usage

\begin{verbatim}
## S4 method for signature 'Zproject'
names(x)
\end{verbatim}

Arguments

\begin{itemize}
  \item \texttt{x} \texttt{Zproject} object.
\end{itemize}

---

\textbf{nfeatures} \textit{Get the number of feature included in a Zonation variant}

Description
Get the number of feature included in a Zonation variant

Usage

\begin{verbatim}
nfeatures(x)
\end{verbatim}

## S4 method for signature 'Zvariant'
nfeatures(x)

Arguments

\begin{itemize}
  \item \texttt{x} \texttt{Zvariant} object.
\end{itemize}

Value
int number of variants
nvariants

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also
Zvariant-class

Description
Get the number of variants included in a Zonation project

Usage
nvariants(x)

## S4 method for signature 'Zproject'
nvariants(x)

Arguments
x Zproject object.

Value
int number of variants

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also
Zproject-class and Zvariant-class
opendir

*Open the directory of a Zproject using the system file browser.*

**Description**
Currently support Windows Explorer (Windows) and Dolphin (Linux/KDE).

**Usage**

```r
opendir(x)
```

```r
## S4 method for signature 'Zproject'
opendir(x)
```

**Arguments**

- `x`: a `Zproject` object.

**Value**

`invisible`

**Author(s)**

Joona Lehtomaki <joona.lehtomaki@gmail.com>

**See Also**

`Zproject-class` and `Zvariant-class`

---

outdir

*Get path to output directory.*

**Description**

Zonation variant has an output directory defined in project bat-file. This is of course the same path as in the results of the particular variant.

**Usage**

```r
outdir(x)
```

```r
## S4 method for signature 'Zresults'
outdir(x)
```

```r
## S4 method for signature 'Zvariant'
outdir(x)
```
parse_bat

Arguments

- `Zvariant-class` or `Zresults` object.

Value

character string path to output directory location.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

`Zvariant-class` `Zresults-class`

Description

The main issues faced between different platforms are the name of the executable, ways of calling it, and path separators. Relative file paths need to be expanded into full absolute paths.

Usage

parse_bat(bat.file, exe = NULL)

Arguments

- `bat.file` Character string path to a Zonation batch (bat) file.
- `exe` Character string for overriding the Zonation executable specified in the bat-file.

Value

A character string command sequence suitable for execution.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>
performance

Get performance levels.

Description

Method returns performance levels at specified levels of cell removal for particular features (either for individual features or groups from a Zresults object).

Usage

```r
performance(x, pr.lost, features = "all", groups = FALSE, melted = FALSE)
```

## S4 method for signature 'Zresults'
performance(x, pr.lost, features = NULL, groups = FALSE, melted = FALSE)

Arguments

- **x**: Zresults object.
- **pr.lost**: numeric vector containing the fractions of landscape lost for which the feature/group performance values are wanted (default: 'all').
- **features**: character vector of features names to be extracted. Must match with feature names in curves data.
- **groups**: logical indicating whether group curves data should be used (default: FALSE).
- **melted**: logical indicating whether the data.frame returned should be in melted format (default: FALSE).

Value

Data frame containing the curves file data for selected fractions of landscape lost. First column is pr_lost. If feature names are provided and none are viable, return NA.

Note

In the current implementation, only average performance levels for groups are returned.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

Zresults-class read_curves read_grp_curves
Description

Generic plotting function for plotting feature performance curves. The method does some data pre-processing specific to \texttt{ZCurvesDataFrame} object before passing the data and arguments for \texttt{plot_curves}.

Usage

```r
## S4 method for signature 'ZCurvesDataFrame,missing'
plot(
  x,
  min = FALSE,
  mean = FALSE,
  w.mean = FALSE,
  ext = FALSE,
  subs = NULL,
  ...
)
```

Arguments

- \texttt{x} \texttt{ZCurvesDataFrame} object.
- \texttt{min} logical plot the minimum feature performance of a group (default: FALSE).
- \texttt{mean} logical plot the minimum feature performance of a group (default: FALSE). If no other statistic is used, mean will always be plotted. If other statistic(s) are plotted and mean is to be disabled, this will have to be done by setting \texttt{mean} explicitly to FALSE.
- \texttt{w.mean} logical plot the weighted mean feature performance of a group (default: FALSE).
- \texttt{ext} logical plot extinction risk of a group (default: FALSE).
- \texttt{subs} character vector defining the names of features (subset of all features) to be plotted.
- \texttt{...} Additional arguments passed on to \texttt{plot_curves}.

Note

If no other statistic is selected, \texttt{mean} will be set to TRUE and plotted.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>
plot,ZGroupCurvesDataFrame,missing-method

Plot Zonation performance curves for groups.

Description

Generic plotting function for plotting group performance curves. The method does some data pre-
processing specific to ZGroupCurvesDataFrame object before passing the data and arguments for
plot_curves.

Usage

```r
## S4 method for signature 'ZGroupCurvesDataFrame,missing'
plot(
  x,
  min = FALSE,
  mean = FALSE,
  w.mean = FALSE,
  max = FALSE,
  ext = FALSE,
  subs = NULL,
  ...
)
```

Arguments

- `x` ZGroupCurvesDataFrame object.
- `min` logical plot the minimum feature performance of a group (default: FALSE).
- `mean` logical plot the minimum feature performance of a group (default: FALSE). If no other statistic is used, mean will always be plotted. If other statistic(s) are plotted and mean is to be disabled, this will have to be done by setting `mean` explicitly to FALSE.
- `w.mean` logical plot the weighted mean feature performance of a group (default: FALSE).
- `max` logical plot the maximum feature performance of a group (default: FALSE).
- `ext` logical plot extinction risk of a group (default: FALSE).
- `subs` character vector defining the names of groups (subset of all groups) to be plotted.
- `...` Additional arguments passed on to `plot_curves`.

Note

If no other statistic is selected, `mean` will be set to TRUE and plotted.

See Also

`read_curves` and `plot_curves`. 

---

plot,ZGroupCurvesDataFrame,missing-method

Plot Zonation performance curves for groups.

Description

Generic plotting function for plotting group performance curves. The method does some data pre-
processing specific to ZGroupCurvesDataFrame object before passing the data and arguments for
plot_curves.

Usage

```r
## S4 method for signature 'ZGroupCurvesDataFrame,missing'
plot(
  x,
  min = FALSE,
  mean = FALSE,
  w.mean = FALSE,
  max = FALSE,
  ext = FALSE,
  subs = NULL,
  ...
)
```

Arguments

- `x` ZGroupCurvesDataFrame object.
- `min` logical plot the minimum feature performance of a group (default: FALSE).
- `mean` logical plot the minimum feature performance of a group (default: FALSE). If no other statistic is used, mean will always be plotted. If other statistic(s) are plotted and mean is to be disabled, this will have to be done by setting `mean` explicitly to FALSE.
- `w.mean` logical plot the weighted mean feature performance of a group (default: FALSE).
- `max` logical plot the maximum feature performance of a group (default: FALSE).
- `ext` logical plot extinction risk of a group (default: FALSE).
- `subs` character vector defining the names of groups (subset of all groups) to be plotted.
- `...` Additional arguments passed on to `plot_curves`.

Note

If no other statistic is selected, `mean` will be set to TRUE and plotted.

See Also

`read_curves` and `plot_curves`. 

---

plot,ZGroupCurvesDataFrame,missing-method

Plot Zonation performance curves for groups.

Description

Generic plotting function for plotting group performance curves. The method does some data pre-
processing specific to ZGroupCurvesDataFrame object before passing the data and arguments for
plot_curves.

Usage

```r
## S4 method for signature 'ZGroupCurvesDataFrame,missing'
plot(
  x,
  min = FALSE,
  mean = FALSE,
  w.mean = FALSE,
  max = FALSE,
  ext = FALSE,
  subs = NULL,
  ...
)
```

Arguments

- `x` ZGroupCurvesDataFrame object.
- `min` logical plot the minimum feature performance of a group (default: FALSE).
- `mean` logical plot the minimum feature performance of a group (default: FALSE). If no other statistic is used, mean will always be plotted. If other statistic(s) are plotted and mean is to be disabled, this will have to be done by setting `mean` explicitly to FALSE.
- `w.mean` logical plot the weighted mean feature performance of a group (default: FALSE).
- `max` logical plot the maximum feature performance of a group (default: FALSE).
- `ext` logical plot extinction risk of a group (default: FALSE).
- `subs` character vector defining the names of groups (subset of all groups) to be plotted.
- `...` Additional arguments passed on to `plot_curves`.

Note

If no other statistic is selected, `mean` will be set to TRUE and plotted.
plot_hist

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also
read_curves and plot_curves.

Create a ggplot2 histogram of a RasterLayer.

Usage
plot_hist(
  x,
  mask.obj = NULL,
  add.mean = FALSE,
  add.median = FALSE,
  save.dir = "",
  binwidth = 0.05,
  title = NULL
)

Arguments
x RasterLayer object containing the spatial data.
mask.obj RasterLayer object optionally used for masking only specific parts of x.
add.mean Boolean whether a vertical blue line is added to the plot indicating the mean value of x.
add.median Boolean whether a vertical red line is added to the plot indicating the median value of x.
save.dir Character path (folder) for saving the plot as an image.
binwidth Double value of bindwidth for geom_bar.
title Character string title of the plot.

Value
a ggplot object containing the plot.

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>
ppa_lsm

Get ppa.lsm results data of a Z* object.

Description

Simple getter-method for ppa.lsm information (if used) contained in Zonation results.

Usage

ppa_lsm(x)

## S4 method for signature 'Zresults'
ppa_lsm(x)

Arguments

x

Z* object.

Value

Data frame containing PPA LSM data items 1 and 3 combined (See Zresults-class for more details). If no results are available, give a warning.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

Zresults-class read_curves read_grp_curves

print,Zvariant-method

Print Zvariant information.

Description

Generic printing function

Usage

## S4 method for signature 'Zvariant'
print(x)
Arguments

x

ZVariant object.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

---

Rank raster

Get Zonation result rank raster.

Description

Getter method for rank priority raster included in Zonation results. Rank raster is one of the main outputs of Zonation.

Usage

rank_raster(x)

## S4 method for signature 'Zresults'
rank_raster(x)

## S4 method for signature 'Zvariant'
rank_raster(x)

Arguments

x

Zresults or Zvariant object.

Details

Since a given Zvariant object can only have 1 rank priority raster, this method only calls the rank_raster method of a Zresults object associated with the Zvariant object.

Value

RasterLayer object. If no results are available, give a warning.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

Zresults-class
rank_rasters

Get Zonation result rank rasters of a project.

Description

Each Zproject object has a set of variants and their results associated with it. This method will get the selected available rank rasters (1 per variant) and create a RasterStack object.

Usage

rank_rasters(x, variants = NULL)

## S4 method for signature 'Zproject'
rank_rasters(x, variants = NULL)

Arguments

x Zproject object.

variants a numeric (IDs) or character (name) vector defining which variants are included in the returned stack (default: NULL means all).

Details

Argument variants can be used to define which variants are included, the default is to return all. Method will give a warning if a variant doesn’t have a rank raster associated with it. If none of the variants have a rank raster, then a NA is returned.

Value

RasterStack object. If no rank rasters are available at all, return NA.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

rank_raster get_variant
**read_bat**

*Read Zonation-specific (MS Windows) batch file.*

**Description**

Batch files include calls to Zonation core and look like following: call zig3.exe -r [INPUT\_PATH].dat [INPUT\_PATH].spp [OUTPUT\_PATH].txt 0.0 0 1.0 0

**Usage**

read_bat(infile)

**Arguments**

infile  Character string input file path.

**Value**

List of parsed bat-parameters.

**Author(s)**

Joona Lehtomaki <joona.lehtomaki@gmail.com>

---

**read_curves**

*Read in performance curves produced by Zonation.*

**Description**

Header is automatically generated based on the number of features in the file. If you need to read in grouped curves files, use `read_grp_curves` instead.

**Usage**

read_curves(infile)

**Arguments**

infile  Character file path to .curves.txt file.

**Value**

Curves object with all the information in the curves file. If the requested file does not exist, return NA.
**Description**

Read a dat file (Windows-style ini-file) for configuration information.

**Usage**

`read_dat(infile)`

**Arguments**

- `infile` Character string input file path.

**Value**

List of parsed ini-parameters.

**Note**

Adapted from http://bit.ly/11e4Jh0

**Author(s)**

Joona Lehtomaki <joona.lehtomaki@gmail.com>
read_features_info

Description
Read a features info file.

Usage
read_features_info(infile)

Arguments
infile Character string input file path.

Value
Data frame of parsed features info data.

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>

read_groups

Description
Read a groups file.

Usage
read_groups(infile)

Arguments
infile Character string input file path.

Value
Data frame of parsed groups parameters.

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>
read_grp_curves  
Read in performance curves for grouped features produced by Zonation.

Description
Header is automatically generated based on the number of groups in the file. If you need to read in individual curves files, use read_curves instead.

Usage
read_grp_curves(infile)

Arguments
infile  Character file path to .curves.txt file.

Value
A DataFrame with all the information in the curves file. If the requested file does not exist, return NA.

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also
read_curves

read_ppa_lsm  
Read Zonation post-processing analysis (ppa) result file.

Description
Read Zonation post-processing analysis (ppa) result file.

Usage
read_ppa_lsm(x)

Arguments
x  Character string input file path.
read_result_rasters

Value

List of 3 data frames: 1. Most important species in units x 2. Average proportion remaining over all spp in units 3. Data fractions in units

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

---

read_result_rasters  Read Zonation-specific raster result files.

Description

Input rasters are given as raster names (i.e. without the raster file extension). Additional root (folder) path and file extension can be provided to construct the full paths.

Usage

read_result_rasters(rasters, path = NULL, format = NULL)

Arguments

rasters  Character vector of raster names.
path  Character string indication an optional root path that is prepended to each rasters names.
format  Character string indicating the raster format used (i.e. the file extension).

Value

A RasterStack object of result rasters.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>
### read_spp

*Read Zonation variant specific spp-file.*

**Description**

Read Zonation variant specific spp-file.

**Usage**

```r
read_spp(infile)
```

**Arguments**

- `infile` Character string input file path.

**Value**

data.frame of parsed spp data.

**Author(s)**

Joona Lehtomaki <joona.lehtomaki@gmail.com>

---

### regroup_curves

*Re-calculate group curves data.*

**Description**

When results grouping is changed group-specific curves data has to be re-calculated. Normally group curves file is produced by Zonation based on the groupings provided by the user. Same information can almost completely (except for ext-values) be calculated afterwards from the feature-specific curves files.

**Usage**

```r
regroup_curves(x, weights, group.ids)
```

**Arguments**

- `x` Data frame of feature specific representation levels.
- `weights` numeric vector for feature specific weights
- `group.ids` numeric vector of new group codes. Number of groups must match with columns in `x`. 
Details

This function calculates the following stats for \texttt{Zvariant} object based on a vector of new group IDs:

- \texttt{min}: Minimum value of representation on each iteration among features within a group.
- \texttt{mean}: Mean value of representation on each iteration among features within a group.
- \texttt{max}: Maximum value of representation on each iteration among features within a group.
- \texttt{w.mean}: Weighted (based on feature weight) mean value of representation on each iteration among features within a group.

Value

\texttt{ZGroupCurvesDataFrame} with new group statistics.

Note

Current implementation does not calculate values for \texttt{ext2} (extinction risk). Column \texttt{ext2} is retained in the returned data frame for compatibility, but column will be populated with NAs.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

---

\texttt{require_package} \hspace{1em} \texttt{Requires a given package and if not present installs and loads it.}

Description

Requires a given package and if not present installs and loads it.

Usage

\texttt{require_package(package, \ldots)}

Arguments

- \texttt{package} \hspace{1em} Character name of a package.
- \texttt{\ldots} \hspace{1em} Additional arguments passed on to \texttt{install.packages}.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>
**results**

*Getter method for results (Zresults) in a class Zvariant object.*

**Description**

Since not all changes to Zvariant are reflected to its Zresults (e.g. feature and group names) there may quite a lot runtime patching going on.

**Usage**

```r
results(x)
```

```r
## S4 method for signature 'Zvariant'
results(x)
```

**Arguments**

- `x` : Zvariant object.

**Details**

Results are returned even if only part of them are available.

**Value**

Zresults object. If variant doesn’t have any results return NA.

**Author(s)**

Joona Lehtomaki <joona.lehtomaki@gmail.com>

**See Also**

- `Zresults-class`

---

**run_bat**

*Try to run a given batch (bat) files.*

**Description**

Try to run a given batch (bat) files.

**Usage**

```r
run_bat(bat.file, exe = "zig3")
```
**save_zvariant**

**Arguments**

- **bat.file**: Character string path to a Zonation batch (bat) file.
- **exe**: Character string for overriding the default Zonation executable (default: zig3).

**Value**

A logical indicating whether running the batch file was successful.

**Author(s)**

Joona Lehtomaki <joona.lehtomaki@gmail.com>

---

**save_zvariant**

Saves the current state of an instance of **Zvariant-class** on the file system. **Zvariant** object tracks the location of relevant files, but the root path can be changed. If it is not changed, then the current files can be overwritten.

**Description**

Saves the current state of an instance of **Zvariant-class** on the file system. **Zvariant** object tracks the location of relevant files, but the root path can be changed. If it is not changed, then the current files can be overwritten.

**Usage**

```
save_zvariant(x, dir = "", overwrite = FALSE, debug_msg = FALSE)
```

```r
## S4 method for signature 'Zvariant'
save_zvariant(x, dir = "", overwrite = FALSE, debug_msg = FALSE)
```

**Arguments**

- **x**: **Zvariant** object.
- **dir**: Character string path to the root directory where the variant is created.
- **overwrite**: Logical indicating whether files should be overwritten if they exist.
- **debug_msg**: Logical setting whether extra debugging information should be printed.

**Value**

Invisible NULL. This method is used only for it's side effects.

**Author(s)**

Joona Lehtomaki <joona.lehtomaki@gmail.com>
See Also

Zvariant-class

selection_coverage  Intersection of two coverages.

Description

Calculate how much two coverages (as defined by values greater than a given threshold in two numeric matrices) overlap.

Usage

selection_coverage(x, y, thresholds)

Arguments

x  Numeric matrix.
y  Numeric matrix.
thresholds  Numeric vector of thresholds used.

Value

A list with 2 items:
thresholds  Correlations between 2 matrices with values above a given threshold.
total  Overall correlation between the 2 matrices.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

set_dat_param  Set a specified run setting parameter value

Description

Essentially these are parameter values corresponding to Zonation dat-files. This function is used to set values of given parameter. In the current implementation, sections have no meaning.

Usage

set_dat_param(x, parameter, value)

## S4 method for signature 'Zvariant'
set_dat_param(x, parameter, value)
show.Zvariant-method

Arguments

- `x` Zvariant object.
- `parameter` Character string name of the parameter.
- `value` Character string or numeric value of the parameter.

Value

- `x` Zvariant object.

Note

Method does not check for the sanity of the values provided.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

`Zvariant-class` and `get_dat_param`.

Description

Generic printing function

Usage

```r
## S4 method for signature 'Zvariant'
show(object)
```

Arguments

- `object` ZVariant object.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>
sppdata

Simple getter method for spp data in a class Zvariant object.

Description

Method will also return group column with spp data if it exists.

Data can be assigned independent of whether groups are used or not. Since groups information is stored separately in groups slot, groups information must also be updated independently.

Usage

sppdata(x, group.names = FALSE)

sppdata(x) <- value

# S4 method for signature 'Zvariant'
sppdata(x, group.names = FALSE)

# S4 replacement method for signature 'Zvariant, data.frame'
sppdata(x) <- value

Arguments

x Zvariant object.

group.names boolean indicating whether group codes (FALSE) or names (TRUE) are used to indicate group. (default: FALSE)

value data frame that must match the number and names of columns in sppdata (see sppdata).

Value

Data frame (object’s spp.data)

Note

Everytime spp data is set, groups information is deleted as there is now straightforward way of preserving and/or imputing group information.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also

Zvariant-class
sppweights

Get biodiversity feature weights of a Zonation variant

Description
Get biodiversity feature weights of a Zonation variant
Set biodiversity feature weights of a Zonation variant

Usage
sppweights(x)
sppweights(x) <- value

## S4 method for signature 'Zvariant'
sppweights(x)

## S4 replacement method for signature 'Zvariant,numeric'
sppweights(x) <- value

Arguments
x Zvariant object.
value numeric vector with the length equal to the number of features in the variant

Value
A numeric vector of weights

Note
The weight vector must be exactly the correct length, no recycling is done. Vector elements must be coercible to numeric.

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also
Zvariant-class
variants

Get all variants in a Zonation project

Description
Get all variants in a Zonation project

Usage
variants(x)

Arguments
x Zproject object.

Value
A list of Zvariant objects

Author(s)
Joona Lehtomaki <joona.lehtomaki@gmail.com>

See Also
Zproject-class and Zvariant-class

write_dat

Write a Zonation run configuration (dat) file.

Description
The function takes a nested list of values and writes it to a dat file (a Windows style .ini-file).

Usage
write_dat(x, filename, overwrite = FALSE)

Arguments
x List containing the data to be written.
filename String file path.
overwrite Logical indicating whether the file should be overwritten.
Value
   Invisible null.

Note
   Only 1 level of nestedness is accepted.

Author(s)
   Joona Lehtomaki <joona.lehtomaki@gmail.com>

Examples
   ```
   ## Not run:
   dat <- list("Settings" = list("removal_rule" = 1, use_groups = 1))
   write_dat(dat, "settings.dat")
   
   ## End(Not run)
   ```

---

The `ZCurvesDataFrame` class

Description
   `ZCurvesDataFrame` class inherits class `data.frame`.

Details
   Class does no implement new methods, but it is used to override some behaviour such as plot. Usually `ZCurvesDataFrame` object belongs to a `Zresults` object.

Slots
   `is.feature`: Logical indicating whether column is actually a feature.

Note
   If user modifies or subsets `ZCurvesDataFrame` in a funtion it is up to the user to update the indexes in slot `is.feature`

Author(s)
   Joona Lehtomaki <joona.lehtomaki@gmail.com>
The **ZGroupCurvesDataFrame** class

**Description**

ZGroupCurvesDataFrame class inherits class data.frame.

**Details**

Class does no implement new methods, but it is used to override some behaviour such as plot. Usually ZGroupCurvesDataFrame object belongs to a **Zresults** object.

**Slots**

is.group: Logical indicating whether column is actually a group.

**Note**

If user modifies or subsets ZGroupCurvesDataFrame in a function it is up to the user to update the indexes in slot is.group

**Author(s)**

Joona Lehtomaki <joona.lehtomaki@gmail.com>

---

**zlegend**

Get various Zonation legends

**Description**

Zonation result rank rasters can be displayed in various color schemes.

**Usage**

zlegend(x)

**Arguments**

x String character name for the color scheme.
Details
Each color scheme is a list with following item:

values: Value breaks in the rank priority map
labels: Labels to be used in the map legend
colors: Colors used for the value classes

Following color schemes are available:

1. "spectral"

Value
A list color scheme.

Note
Color schemes are stored in env\$options.

Author(s)
Joonu Lehtomaki <joona.lehtomaki@gmail.com>

Examples

zlegend("spectral")

zparameters
Get all Zonation run configuration parameters.

Description
This set of parameters is all that is accepted by Zonation.

Usage

zparameters(just_names = FALSE)

Arguments

just_names Logical indicating if only the parameter names should be returned.

Value
Characted vector of parameter names or a list of (parameter = section) structure.
Note

Parameters are hard-coded to this package and know nothing of potential future developments with Zonation.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

Zproject

The Zproject class

Description

Zproject class represents a Zonation project, i.e. all the input and output files and folders.

Details

A project contains one or more variants of particular Zonation analysis setup. A single variant is represented as an instance of Zvariant-class.

Slots

root: Character string path pointing to the root (dir) of the project.
variants: List of objects of class Zvariant-class.

Author(s)

Joona Lehtomaki <joona.lehtomaki@gmail.com>

Zresults

The Zresults class

Description

Zresults class represents a full set of Zonation results associated with a single variant (instance of class Zvariant-class).

Details

Slots of class Zresults can be queried using the $-operator.
**Zvariant**

**Slots**

- **root**: Character string path pointing to the root (dir) of the results.
- **modified**: Character timestamp for when results were last modified.
- **run.info**: Character file path for run info file.
- **curves**: Data frame of curve (performance) results.
- **grp.curves**: Data frame of group curve (performance) results.
- **rank**: RasterLayer object of rank priority.
- **wrscr**: RasterLayer object of weighted range-size corrected richness.
- **prop**: RasterLayer object of the proportional loss of distribution.
- **ppa.lsm**: Data frame containing PPA LSM data items 1 and 3.
- **features.info**: Data frame containing features info data.

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**Zvariant**  
*The Zvariant class*

**Description**

`Zvariant` class represents a Zonation analysis variant with the associated parameters.

**Details**

Currently `Zvariant` must be instantiated based on an existing Zonation batch file. If the variant has been run, then the results are also associated with the instance of `Zvariant-class`.

**Slots**

- **name**: Character string name of the variant.
- **bat.file**: Character string path to a Zonation-style batch file.
- **dat.data**: List holding the parsed data from Zonation dat-file
- **spp.data**: Data frame holding the parsed data from Zonation spp-file
- **output.dir**: Character string path to the output directory.
- **groups**: Data frame holding the parsed data from Zonation groups-file
- **call.params**: List of parsed call parameters from the batch file.
- **condition.layers**: Data frame holding the parsed data from condition file.
- **results**: List holding the results (data frames).
- **results_dirty**: Logical indicating if the current object data (dat.data and spp.data) has been changed when results are present. If TRUE, data has changed and results may have been produced using different data.
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