Package ‘RSurvey’

October 12, 2022

Title  Geographic Information System Application
Version  0.9.3
Description  A geographic information system (GIS) graphical user interface (GUI) that provides data viewing, management, and analysis tools.
Depends  R (>= 3.1.0)
Imports  colorspace, graphics, grDevices, inlmisc, MBA, methods, raster, rgdal, rgeos, sp, stats, tcltk, utils
Suggests  dichromat, leaflet, rgl, XML
SystemRequirements  Tcl/Tk (>= 8.5), Tktable (>= 2.9, optional)
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Copyright  This software is in the public domain because it contains materials that originally came from the United States Geological Survey (USGS), an agency of the United States Department of Interior. For more information, see the official USGS copyright policy at https://www2.usgs.gov/visual-id/credit_usgs.html
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R topics documented:

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BuildHistogram

GUI: Histogram Input Parameters

Description

A graphical user interface (GUI) for specifying input parameters for the hist function.

Usage

BuildHistogram(d, var.names = NULL, var.default = 1L,
processed.rec = NULL, parent = NULL)
CheckEntry

Arguments

\begin{description}
\item[d] list, data.frame, matrix, or numeric. Vector(s) of values for which the histogram is desired.
\item[var.names] character. Names corresponding to each vector (column) in argument \texttt{d}.
\item[var.default] character or integer. Vector name or index in argument \texttt{d}.
\item[processed.rec] integer. Vector of record indexes for processed data.
\item[parent] tkwin. GUI parent window
\end{description}

Value

NULL

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

See Also

\begin{itemize}
\item plot.histogram
\end{itemize}

Examples

\begin{verbatim}
## Not run:
  BuildHistogram(iris)
## End(Not run)
\end{verbatim}

Control Content in Entry Widget

Description

This function enforces content control on entry widgets.

Usage

\begin{verbatim}
CheckEntry(obj.class, ent.str = "")
\end{verbatim}

Arguments

\begin{description}
\item[obj.class] character. Name of object class, either \texttt{real}, \texttt{integer}, or \texttt{logical}
\item[ent.str] character. Value from entry widget
\end{description}

Value

Returns a character string that can be easily converted to the desired object class.
**ChooseColor**

**Author(s)**

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

**Examples**

CheckEntry("numeric", "3.14ab")
CheckEntry("integer", "3.")

---

**ChooseColor**

*GUI: Color Picker*

**Description**

A graphical user interface (GUI) for selecting a color.

**Usage**

ChooseColor(col, parent = NULL)

**Arguments**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>col</td>
<td>character. Initial color, see ‘Value’ section</td>
</tr>
<tr>
<td>parent</td>
<td>tkwin. GUI parent window</td>
</tr>
</tbody>
</table>

**Value**

Returns a selected color in terms of its RGB components, a string of the form "#RRGGBB" where each of the pairs RR, GG, BB consist of two hexadecimal digits giving a value in the range 00 to FF.

**Author(s)**

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

**See Also**

col2rgb

**Examples**

```r
## Not run:
ChooseColor(col = "#669933")
```

## End(Not run)
ChoosePch

**GUI: Plotting Symbol Picker**

**Description**

A graphical user interface (GUI) for selecting a plotting symbol to use.

**Usage**

ChoosePch(pch = NA, parent = NULL)

**Arguments**

- pch: numeric or character. Initial plotting symbol
- parent: tkwin. GUI parent window

**Value**

Returns an object of class numeric or integer, specifying the selected plotting symbol.

**Author(s)**

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

**See Also**

- points

**Examples**

```r
## Not run:
ChoosePch(pch = "+")
## End(Not run)
```

---

**Data**

*Set or Query Data and Parameters*

**Description**

This function is used to set or query parameters and their attributes.

**Usage**

Data(option, value, which.attr = NULL, clear.proj = FALSE, clear.data = FALSE, replace.all = NULL)
Arguments

<table>
<thead>
<tr>
<th>name</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>option</td>
<td>character. Parameter name, see ‘Parameters’ section.</td>
</tr>
<tr>
<td>value</td>
<td>Parameter value specified for option (optional)</td>
</tr>
<tr>
<td>which.attr</td>
<td>character. A non-empty character string specifying which attribute is to be accessed.</td>
</tr>
<tr>
<td>clear.proj</td>
<td>logical. If true, basic graphical user interface (GUI) preferences will be saved and all other data removed.</td>
</tr>
<tr>
<td>clear.data</td>
<td>logical. If true, only datasets will be removed.</td>
</tr>
<tr>
<td>replace.all</td>
<td>list. A replacement list of parameter values.</td>
</tr>
</tbody>
</table>

Value

If value is given, the object specified by option is returned. A NULL value is returned for objects not yet assigned a value and where no default value is available. Default values are specified internally within this function.

Data

Imported unprocessed data is saved to the data frame data.raw, see ImportText. Processed point data is saved to the data frame data.pts, and interpolated surface data is saved to the list data.grd.

Parameters

Parameters undefined elsewhere in the help documentation include:

<table>
<thead>
<tr>
<th>name</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ver</td>
<td>package version number</td>
</tr>
<tr>
<td>win.loc</td>
<td>default horizontal and vertical location for GUI placement in pixels.</td>
</tr>
</tbody>
</table>

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

Examples

```r
# set a parameter
Data("test1", 3.14159265)
Data("test2", list(id = "PI", val = 3.14159265))

# retrieve a parameter value
Data("test1")
Data("test2")
Data(c("test2", "id"))
Data(c("test2", "val"))

# get all parameter values
d <- Data()

# remove all saved parameter values
Data(replace.all = list())
```
DefineGrid

# recover saved parameter values
Data(replace.all = d)

---

**GUI: Define Interpolation Grid**

**Description**

A graphical user interface (GUI) for defining the interpolation grid.

**Usage**

DefineGrid(grid = NULL, parent = NULL)

**Arguments**

- **grid**
  - list. Interpolation grid object, see ‘Value’ section.

- **parent**
  - tkwin. GUI parent window

**Value**

Returns an object of class list with the following components:

- **opt**
  - an integer indicating the option that will be used to define the interpolation grid. Where opt = 1 indicates grid boundaries based on the extent of point data and a resolution of 100 rows and 100 columns; opt = 2 indicates grid boundaries based on the extent of point data and a cell resolution defined by the res component; opt = 3 indicates that the grid geometry is explicitly defined by the geo component.

- **res**
  - numeric vector of length 2 with components x and y giving the grid spacing along the x- and y-axis, respectively.

- **geo**
  - numeric vector of length 6 with components nrows and ncols giving the number of rows and columns, and xmn, xmx, ymn, and ymx giving the limits of the grid boundary along the x- and y-axis.

**Author(s)**

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

**Examples**

```r
## Not run:
DefineGrid()

## End(Not run)
```
**Description**

A graphical user interface (GUI) for viewing and editing table formatted data.

**Usage**

```
EditData(d, col.names = names(d), row.names = NULL, col.formats = NULL,
         read.only = FALSE, changelog = NULL, win.title = "Data",
         parent = NULL)
```

**Arguments**

- `d` list, matrix, or data.frame. Data used to populate the data table.
- `col.names` character. Vector of column names.
- `row.names` character. Vector of row names.
- `col.formats` character. Vector of format conversion specification strings, see `sprintf` and `strftime`.
- `read.only` logical. Specifies whether the data table is in read only mode.
- `changelog` data.frame. History of all data table edits, see ‘Value’ section.
- `win.title` character. String to display as the title of the dialog box.
- `parent` tkwin. GUI parent window

**Details**

Row titles are taken from the row names attribute of argument `d`. Pattern searches are performed using `grep`. Edits are reflected in the `changelog`.

**Value**

Returns `NULL` if no edits were made; otherwise, new values of `d` and `changelog` are returned as components in a list. The `changelog` data table contains the following variables:

- `timestamp` a date-time value that identifies when the edit event occurred.
- `record` row name
- `variable` column name
- `old` value before editing
- `new` value after editing

**Note**

Requires the Tcl package `Tktable`. 
EditFunction

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

See Also

BuildHistogram

Examples

## Not run:
```r
tcltk::tclRequire("Tktable", warn = TRUE)

n <- 1000L
V1 <- sample(c(1:9, NA), n, replace = TRUE)
V2 <- sample(LETTERS, n, replace = TRUE)
V3 <- as.POSIXct(rnorm(n, mean = 0, sd = 1e6), origin = "2010-01-01")
V4 <- sample(V1 * pi, n)
d <- data.frame(V1, V2, V3, V4)
col.names <- c("Integers", "Letters", "DateTime", "Numeric")
col.formats <- c("%d", "%s", "%m/%d/%Y %H:%M", ")
obj <- EditData(d, col.names, col.formats)
str(obj)

rownames(d) <- paste0(sample(LETTERS, n, replace = TRUE), seq_len(n))
EditData(d, read.only = TRUE)

colnames(d) <- NULL
rownames(d) <- NULL
EditData(d, read.only = TRUE)
```

## End(Not run)

EditFunction

GUI: Function Editor

Description

A graphical user interface (GUI) for defining functions in the R language.

Usage

```r
EditFunction(cols, index = NULL, fun = NULL, value.length = NULL, value.class = NULL, win.title = "Edit Function", parent = NULL)
```
Arguments

cols list. y
index integer. An element index number in cols.
fun character. Existing function, only used if index = NULL
value.length integer. Required length for the evaluated function.
value.class character. Required class for the evaluated function.
win.title character. String to display as the title of the dialog box.
parent tkwin. GUI parent window

Details

This GUI is appropriate for deriving new variables in a pre-existing data frame or query building.

Value

Returns an object of class list with the following components:

fun user defined function (when evaluated, this string must be parseable).
class object class for the evaluated function.
summary default summary for the evaluated function.
sample first non-missing value for the evaluated function.

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

See Also

EvalFunction

Examples

## Not run:
d <- list(x = 1:10, y = 10:1)
Data("data.raw", d)
cols <- list()
cols[[1]] <- list(id = "X", index = 1, fun = "\"X\"\")
cols[[2]] <- list(id = "Y", index = 2, fun = "\"Y\"\")
cols[[3]] <- list(id = "New Variable", fun = "\"X\" + \"Y\"\")
EditFunction(cols, index = 3)

## End(Not run)
EditText

Description

A graphical user interface (GUI) for viewing and editing text.

Usage

```
EditText(txt, read.only = FALSE, win.title = "View Text",
         is.fixed.width.font = FALSE, parent = NULL)
```

Arguments

- `txt` character. Text used to populate the window.
- `read.only` logical. Specifies whether the text is read only.
- `win.title` character. Title of the dialog box.
- `is.fixed.width.font` logical. Specifies whether a fixed-width font be used.
- `parent` tkwin. GUI parent window

Value

Returns an object of class character with edited text.

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

Examples

```r
## Not run:
txt <- c(""Hills cherish the ambition",
         "to turn into partial",
         "differential equations"",
         "",
         "-Donald Hall")
new.txt <- EditText(txt, is.fixed.width.font = TRUE)

EditText(txt, read.only = TRUE)

## End(Not run)
```
EvalFunction

Parse and Evaluate an RSurvey Expression

Description

This function parses and evaluates a character string representation of an RSurvey expression.

Usage

EvalFunction(txt, cols)

Arguments

txt character. A string representation of an R function.
cols list. See ManageVariables

Value

Returns the result of evaluating the text expression.

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

See Also

parse, eval

Examples

d <- list(x = 1:10, y = 10:1)
Data("data.raw", d)
cols <- list()
cols[[1]] <- list(id = "X", index = 1, fun = "\"X\"")
cols[[2]] <- list(id = "Y", index = 2, fun = "\"Y\"")
EvalFunction("\"Y\"", cols)
EvalFunction("\"X\" + \"Y\"", cols)
EvalFunction("rnorm(12)", cols)
ExportData

GUI: Export Data

Description

A graphical user interface (GUI) for exporting data to text files, shapefiles, or R data files.

Usage

ExportData(file.type = "txt", parent = NULL)

Arguments

file.type character. Output file type: either txt for text files, rda for R-data files, or shp for shapefiles.

parent tkwin. GUI parent window

Value

Saves the GUI options in the export component of Data. List components of export include:

- processed indicates whether exported data are limited to processed records.
- fmts indicates whether a header line of conversion specification format strings is written (text only).
- cols indicates whether a header line of column names is written (text only).
- rows indicates whether the row names are written (text only).
- comment indicates whether to write comments using the comment character, com (text only).
- sep field separator character (text only).
- dec string used for decimal points (text only).
- nas string interpreted as NA value (text only).
- com comment character (text only).
- qmethod a string specifying how to deal with embedded double quote characters when quoting strings (text only).
- quote if true, any character or factor columns will be surrounded by double quotes (text only).
- encoding declares the encoding to be used on the file (text only).
- eol the character to print at the end of each line (text only).
- zip indicate whether the file should be compressed using gzip, bzip2, or xz (text only).
- changelog indicate if a separate text file should be written with the change log (text only).
- ascii if true, an ASCII representation of the data is written (R data only).
Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

See Also

write.table, save, writeOGR

Examples

```r
## Not run:
Data(replace.all = obj)
ExportData(file.type = "txt")
## End(Not run)
```

Format

GUI: Build C-Style String Formats

Description

A graphical user interface (GUI) for the system sprintf C-library function.

Usage

```r
Format(sample = pi, fmt = ",", parent = NULL)
```

Arguments

- `sample`: logical, integer, numeric, character, or factor. Sample value
- `fmt`: character. Conversion specification format, see `sprintf`
- `parent`: tkwin. GUI parent window

Value

Returns a character string.

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

See Also

format
Examples

```r
## Not run:
Format(sample = pi, fmt = "%3.8f")
Format(sample = 3L)
Format(sample = TRUE)
Format(sample = "string")
## End(Not run)
```

---

### Description

A graphical user interface (GUI) for converting between character representations and objects of class `POSIXt` or `Date`.

### Usage

```r
FormatDateTime(sample = as.POSIXct("1991-08-25 20:57:08"), fmt = ",",
parent = NULL)
```

### Arguments

- `sample`: POSIXt or Date. Sample date-time
- `fmt`: character. Conversion specification format
- `parent`: tkwin. GUI parent window

### Value

Returns a character string representing the formatted date-time value.

### Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

### See Also

`strptime`, `format`

### Examples

```r
## Not run:
new.fmt <- FormatDateTime(fmt = "%A %B %d %I:%M %p")
FormatDateTime(Sys.Date())
## End(Not run)
```
GetBitmapImage

Create Icon Bitmap Image

Description

Create a small TK bitmap image.

Usage

GetBitmapImage(type)

Arguments

type character. Icon image type, see ‘Details’

Details

Icon image types include: left, right, up, down, top, bottom, upleft, upright, downleft, downright, next, previous, copy, paste, find, delete, view, info, plus, minus, print, and histogram. A recommended editor for bitmap design is Paul Obermeier’s poBitmap tool; specify a square icon 11 pixels on each side.

Value

An image of class tclObj.

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

See Also

tkimage.create

Examples

## Not run:

types <- c("left", "right", "up", "down", "top", "bottom", "upleft", "upright", "downleft", "downright", "next", "previous", "copy", "paste", "find", "delete", "view", "info", "plus", "minus", "print", "histogram")

Fun <- function(k) print(types[k])

tt <- tcltk::tktoplevel(padx = 50, pady = 50)
i <- 0
j <- 0
d <- 5

for (k in seq_along(types)) {
  img <- paste("img", k, sep = ".")
  but <- paste("but", k, sep = ".")
  assign(img, GetBitmapImage(types[k]))
assign(but, tcltk::ttkbutton(tt, width = 2, image = get(img),
  command = local({k <- k; function() Fun(k)})))
tcltk::tkgrid(get(but), row = i, column = j, padx = 5, pady = 5)
i <- k %/% d
j <- ifelse(j < d - 1, j + 1, 0)

## End(Not run)

GetFile

GUI: Select File to Open or Save As

Description
A graphical user interface (GUI) for selecting files to open or save.

Usage
GetFile(cmd = c("Open", "Save As"), file = NULL, exts = NULL,
  initialdir = NULL, initialfile = NULL, defaultextension = NULL,
  win.title = cmd, multi = FALSE, parent = NULL)

Arguments

  cmd character. Specifies whether an "Open" or "Save As" file management pop up
dialog box is implemented.
  file character. File name that the data are to be read from. Alternatively, file can
be a readable text-mode connection.
  exts character. Vector of default file extensions.
  initialdir character. Files in this directory will be displayed in the dialog box.
  initialfile character. File name to display in the dialog box.
  defaultextension character. String appended to the file name if the user enters a file name without
an extension.
  win.title character. String to display as the title of the dialog box.
  multi logical. If true, multiple files may be selected.
  parent tkwin. GUI parent window

Value
If multi is false, returns the file path as a character object with the following attributes:

  directory directory containing the file
  name file name
  extension file extension
  type file type

Otherwise, a list is returned containing a object of class character for each file.
**Author(s)**

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

**Examples**

```r
## Not run:
GetFile()

## End(Not run)
```

---

**ImportDataset**

*GUI: Import Data from Package Dataset*

**Description**

A graphical user interface (GUI) for importing data from selected R package datasets.

**Usage**

```r
ImportDataset(classes = NULL, parent = NULL)
```

**Arguments**

- **classes** character. The object classes of data sets that can be loaded. Set to `NULL` to enable loading for all object classes.
- **parent** `tkwin`. GUI parent window

**Value**

Returns an object of list class with the following components:

- **d** table data
- **src** vector of length 3 that includes the dataset name, package name, and access date.

**Author(s)**

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

**See Also**

- `data`
### Description

A graphical user interface (GUI) for loading selected data sets from an Open XML Spreadsheet file ('.xlsx').

### Usage

`ImportSpreadsheet(parent = NULL)`

### Arguments

- `parent` : tkwin. GUI parent window

### Value

Returns an object of list class with the following components:

- `d` : table data
- `src` : vector of length 2 that includes the pathname of the spreadsheet file and access date.

### Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

### References

The code in this function was derived with permission from Schaun Wheeler's `xlsxToR` function, accessed on 2014-01-01.

### Examples

```r
## Not run:
obj <- ImportDataset(c("data.frame", "matrix"))

## End(Not run)
```

```r
## Not run:
obj <- ImportSpreadsheet()

## End(Not run)
```
**ImportText**

*GUI: Import Data from Text File*

**Description**

A graphical user interface (GUI) for reading table formatted data from a text file.

**Usage**

ImportText(parent = NULL)

**Arguments**

parent tkwin. GUI parent window

**Details**

This GUI is a wrapper for the `read.table` function. Data connections are defined as the path to the file to be opened, a complete URL (e.g., http://, https://, ftp:// or file://), or windows clipboard. Files are limited to text format (e.g., `.tsv` `.csv`, or `.txt`); however, they can be compressed by gzip, bzip2, or xz with additional extension `.gz`, `.bz2`, or `.xz`, respectively.

Conversion specification formats are the character representation of object types used to: identify column classes prior to reading in data, and format values for printing. Conversion specifications are based on C-style string formatting commands for numeric, integer, and character object classes, see `sprintf`; for example, a format string of " Calendar date and time objects of class POSIXct are defined by the ISO C99 / POSIX standard, see `strftime`; for example, "02/26/2010 02:05:39 PM" is represented using "

Comments located above data records and header lines are preserved; all other comments are ignored. Requires the specification of a comment character.

Performance issues associated with reading in large files can be alleviated by specifying formats in a header line, and giving the maximum number of rows to read in.

**Value**

Sets the following components in `Data`:

- **data.raw** imported data table.
- **cols** a list with length equal to the current number of data variables. Each component in cols is linked to a specific variable, see `ManageVariables`.
- **comment** vector of comment strings
- **import** a list of saved GUI options

Components of the import list include:

- **source** a vector of length 2 that includes the pathname of the text file and access date.
LaunchGui

fmts  indicates whether the file contains the conversion specification format strings of the variables.
cols  indicates whether the file contains the names of the variables.
skip  Number of lines skipped before data is read.
sep   Field separator string
dec   Used in the file for decimal points.
na    String interpreted as NA values.
quote Set of quoting characters
comment Comment character
encoding Encoding that was assumed for input strings, see Encoding.
str.as.fact If true, character variables are converted to factors.

Note

Requires the Tcl package Tktable.

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

See Also

read.table

Examples

## Not run:
ImportText()

## End(Not run)
ManagePackages

Value
Queries and sets the vars list component of Data. The components of vars include:

\( x, y, z \) index number for the corresponding coordinate-dimension variable in cols, see ManageVariables function for details.

Author(s)
J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

Examples
```r
## Not run:
LaunchGui()

## End(Not run)
```

ManagePackages

GUI: Package Manager

Description
This function installs R packages suggested by RSurvey. If a suggested package is unavailable on the local computer, an attempt is made to acquire the package from CRAN using an existing network connection.

Usage
ManagePackages()

Value
NULL

Author(s)
J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

See Also
install.packages, requireNamespace

Examples
```r
## Not run:
ManagePackages()

## End(Not run)
```
Description

A graphical user interface (GUI) for managing and manipulating polygons that is based on the rgeos package.

Usage

ManagePolygons(polys = NULL, poly.data = NULL, poly.crop = NULL, 
                 crs = sp::CRS(as.character(NA)), parent = NULL)

Arguments

polys list. A list of polygons, components are objects of class gpc.poly.
poly.data character. Name of the polygon that defines the data boundary limits.
poly.crop character. Name of the polygon that defines the crop region for interpolated data.
crs CRS. Default coordinate reference system
parent tkwin. GUI parent window

Details

The text file representation of a polygon is of the following format:

<number of contours>
<number of points in first contour>
<hole flag>
x1 y1
x2 y2
...
<number of points in second contour>
<hole flag>
x1 y1
x2 y2
...

The hole flag is either 1 to indicate a hole, or 0 for a regular contour. See the read.polyfile function for details.

Value

Returns an object of class list with components polys, poly.data, poly.crop, and crs (see ‘Arguments’ section).
Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

See Also

polyfile, gUnion, SetPolygons

Examples

```r
## Not run:
ManagePolygons()

## End(Not run)
```

ManageVariables    GUI: Variable Manager

Description

A graphical user interface (GUI) for managing variables in the data table.

Usage

```r
ManageVariables(cols, vars, query, changelog, parent = NULL)
```

Arguments

- `cols` list. See ‘Value’ section
- `vars` list. See ‘Value’ section
- `query` character. See ‘Value’ section
- `changelog` data.frame. See ‘Value’ section
- `parent` tkwin. GUI parent window

Details

This GUI lets you: (1) specify the names and format of variables; (2) add new variables based on user defined functions, see EditFunction; (3) display data in a spreadsheet, see EditData; and (4) remove and (or) reorder variables in the data table.
Value

Returns an object of class list with components cols and vars. The cols object is a list whose length is equal to the current number of data variables. Each component in cols is linked to a specific variable, and contains the following components:

- **name**: variable name
- **format**: conversion specification format (optional)
- **id**: unique identifier that is created from name.
- **fun**: expression evaluated when computing the variables vector of values.
- **index**: variable's component index number in the data.raw data table, see ImportText. Only required for variables directly linked to data columns in data.raw.
- **class**: data class of the vector object.
- **summary**: summary of the variable’s descriptive statistics (see summary).
- **comments**: user comments

The vars object is a list with components:

- **x, y, z, sort.on**: the index number of the corresponding state variable in cols. These indexes are updated to reflect the removal and (or) reordering of variables in cols.
- **query**: if required, variable names are updated.
- **changelog**: if required, names in the variable component are updated.

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

Examples

```r
## Not run:
Data(replace.all = obj)
ManageVariables(obj$cols, obj$vars, obj$query, obj$changelog)
## End(Not run)
```

---

**Plot3d**

*Plot Points and Surface in 3D*

Description

This function renders raster and point data in three-dimensional (3D) space.
Plot3d

Usage

Plot3d(r = NULL, p = NULL, xlim = NULL, ylim = NULL, zlim = NULL,
vasp = NULL, hasp = NULL, cex.pts = 1, n = NULL,
color.palette = grDevices::terrain.colors, maxpixels = 5e+05)

Arguments

r
RasterLayer. Gridded surface data

p
SpatialPointsDataFrame. Spatial point data

xlim
numeric. Vector of length 2 giving the minimum and maximum values for the x-axis.

ylim
numeric. Vector of length 2 giving the minimum and maximum values for the y-axis.

zlim
numeric. Vector of length 2 giving the minimum and maximum values for the z-axis.

vasp
numeric. The z/x aspect ratio for spatial axes.

hasp
numeric. The y/x aspect ratio for spatial axes. Defaults to 1 (one unit on the x-axis equals one unit on the y-axis) when r is projected,

cex.pts
numeric. Amount by which point symbols should be magnified relative to the default.

n
integer. Number of contour levels desired.

color.palette
function. Color palette to be used to assign colors in the plot.

maxpixels
integer. Maximum number of cells to use for the plot.

Details

The interpolated surface is rendered using rgl, a 3D visualization device system for R based on OpenGL. The mouse is used for interactive viewpoint navigation where the left, right, and center mouse buttons rotate the scene, rotate the scene around the x-axis, and zooms the display, respectively.

Value

Used for the side-effect of a new plot generated.

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

See Also

matplot, boxplot
## Examples

```r
## Not run:
Plot3d()
rgl::rgl.quit()

## End(Not run)
```

---

### Description

A progress bar that shows the status of long-running operations.

### Usage

```r
ProgressBar(win.title = "Progress Bar", label = ", maximum = 100, nsteps = NULL, min.nsteps = 10L, parent = NULL)

SetProgressBar(pb, value, label = NULL, step = NULL)
```

### Arguments

- `win.title` character. String to display as the title of the dialog box.
- `label` character. String to display in the dialog box.
- `maximum` numeric. Maximum value for the progress bar. The minimum value is zero.
- `nsteps` numeric. Total number of increments the progress bar will make.
- `min.nsteps` numeric. Minimum number of increments. If greater than `nsteps`, the dialog box is not opened.
- `parent` `tkwin`. Graphical user interface parent window
- `pb` `ProgressBar`. Object returned from `ProgressBar`, see ‘Value’ section.
- `value` numeric. Value for the progress bar, between zero and `maximum`.
- `step` numeric. Number of progress bar increments. If equal to `nsteps`, the dialog box will close.

### Value

For `ProgressBar` an object of class "ProgressBar" and mode list is returned. Components of the list object include:

- `GetValue` function that returns the value of the progress bar.
- `MoveProgressBar` function that moves progress bar, passes a numeric argument.
- `SetLabel` function that sets label in the dialog box, passes a character argument.
DestroyWindow function that closes the dialog box.
GetWindowState function that returns false if the dialog box has been closed, otherwise true.
nsteps see ‘Arguments’ section

For SetProgressBar, the previous value of the progress bar. An error is returned if the progress has terminated prematurely.

Author(s)
J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

References
The code in this function was derived from the tkProgressBar function, version v3.0.2.

Examples
## Not run:
maximum <- 10
label <- "Estimated time to completion is being calculated\u2026"
pb <- ProgressBar(label = label, maximum = maximum, nsteps = maximum)

for (i in seq_len(maximum)) {
  est.time <- system.time(Sys.sleep(1))[["elapsed"]][maximum - i]
  label <- paste("Estimated time to completion is", round(est.time, "secs")
  ans <- try(SetProgressBar(pb, value = i, label = label, step = i))
  if (inherits(ans, "try-error")) break
}
## End(Not run)

---

**Rename**

**Description**
A graphical user interface (GUI) for renaming values in a vector of character strings.

**Usage**

`Rename(names = NULL, cur.name = NULL, win.title = NULL, parent = NULL)`

**Arguments**

- `names` character. Vector of character strings
- `cur.name` character. Sets the combo box value, name must be included in names.
- `win.title` character. String to display as the title of the dialog box.
- `parent` tkwin. GUI parent window
Value

Returns a character vector with updated values of names.

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

Examples

```r
## Not run:
Rename(names = c("Name1", "Name2", "Name3"), cur.name = "Name2")

## End(Not run)
```

Search

GUI: Search Data Table

Description

A graphical user interface (GUI) for establishing find and replace arguments in a data table.

Usage

```r
Search(is.replace = FALSE, defaults = NULL, parent = NULL)
```

Arguments

- `is.replace`: logical. If true, the replace component is included.
- `defaults`: list. See ‘Value’ section
- `parent`: tkwin. GUI parent window

Value

Returns an object of list class with the following components:

- `find.what`: string to search for
- `replace.with`: replacement string
- `is.match.word`: indicates whether matches be restricted to whole words only.
- `is.match.case`: indicates whether the search is case sensitive.
- `is.reg.exp`: if true, the search is made using regular expression; that is, a pattern that describes a set of strings.
- `is.search.col`: indicates whether the search is limited to a single column.
- `is.perl`: indicates whether Perl style regular expressions should be used.
- `is.replace.first`: indicates whether to replace for only the first instance.
- `is.search.sel`: indicates whether the search limited to selected cells.
Author(s)
J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

Examples

```r
## Not run:
Search()

## End(Not run)
```

---

### SetAxesLimits

GUI: Axes Limits

#### Description

A graphical user interface (GUI) for specifying axes limits.

#### Usage

```r
SetAxesLimits(lim = NULL, parent = NULL)
```

#### Arguments

- **lim**: list. Contains the current plotting limits, see ‘Value’ section.
- **parent**: tkwin. GUI parent window

#### Value

Returns an object of class list containing the following components:

- `x1, x2`: minimum and maximum x value.
- `y1, y2`: minimum and maximum y value.
- `z1, z2`: minimum and maximum z value.
- `x1.chk, x2.chk`: if true, a default value is used for the minimum and maximum x value.
- `y1.chk, y2.chk`: if true, a default value is used for the minimum and maximum y value.
- `z1.chk, z2.chk`: if true, a default value is used for the minimum and maximum z value.
- `x`: vector of x limits (`x1,x2`), default is (NA,NA).
- `y`: vector of y limits (`y1,y2`), default is (NA,NA).
- `z`: vector of z limits (`z1,z2`), default is (NA,NA).

Author(s)
J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center
## Not run:
```r
SetAxesLimits()
```
## End(Not run)

---

**SetConfiguration**

### GUI: Window and Plotting Parameters

#### Description

A graphical user interface (GUI) for specifying universal plotting parameters.

#### Usage

```r
SetConfiguration(parent = NULL)
```

#### Arguments

- **parent**
  - tkwin. GUI parent window

#### Value

Queries and sets the following components of `Data`:

- **cex.pts**
  - amount by which point symbols should be magnified relative to the default value, 1.0. For example, `cex.pts = 0.5` reduces the point symbol to half of its default size.

- **nlevels**
  - approximate number of contour levels desired.

- **asp.yx, asp.zx**
  - the y/x and z/x aspect ratios, respectively.

- **legend.loc**
  - position of the points legend in the main plot region: `bottomleft`, `topleft`, `topright`, or `bottomright` to denote legend location.

- **scale.loc**
  - position of the scale bar in the main plot region: `bottomleft`, `topleft`, `topright`, or `bottomright` to denote scale location.

- **arrow.loc**
  - Position of the north arrow in the main plot region: `bottomleft`, `topleft`, `topright`, or `bottomright` to denote arrow location.

- **useRaster**
  - if true, a bitmap raster is used to plot the gridded data instead of using polygons.

- **draw.key**
  - if true, a color key should be drawn for the gridded data.

- **dms.tick**
  - if true and the gridded data is projected, the axes tickmarks are specified in degrees, minutes, and decimal seconds (DMS).

- **contour.lines**
  - if true, contour lines will be plotted on the 2D interpolated surface.

- **make.intervals**
  - if true, represent point values within intervals. See `findInterval` function for details. Unused if `quantile.breaks` is true.
proportional indicates whether proportional circle symbols should be used to represent the point data.
quantile.breaks if true, breaks in the point data are set to the sample quantiles.
bg.lines if true, grids and graticules are drawn.

Note
Re-importing data does not affect values specified in this GUI.

Author(s)
J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

Examples
## Not run:
SetConfiguration()
## End(Not run)

---

**SetCrs**

**GUI: Coordinate Reference System**

**Description**
A graphical user interface (GUI) for specifying PROJ.4 arguments associated with a coordinate reference system (CRS). The arguments must be entered exactly as in the PROJ.4 documentation, in particular there cannot be any white space in +<arg>=<value> strings, and successive such strings can only be separated by blanks.

**Usage**

SetCrs(crs = sp::CRS(as.character(NA)), parent = NULL)

**Arguments**

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>crs</td>
<td>CRS. Coordinate reference system described using PROJ.4 arguments.</td>
</tr>
<tr>
<td>parent</td>
<td>tkwin. GUI parent window</td>
</tr>
</tbody>
</table>

**Value**

Returns an updated value of the crs argument.

**Author(s)**
J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center
See Also

CRS, checkCRSArgs

Examples

## Not run:
SetCrs("+init=epsg:4326")

## End(Not run)

---

### Description

A graphical user interface (GUI) for specifying labels to add to a plot.

#### Usage

```
SetPlotAnnotation(parent = NULL)
```

#### Arguments

- **parent** tkwin. GUI parent window

#### Value

Queries and sets the following components of Data:

- **credit** mapping credit note
- **explanation** explanation of gridded-data values.
- **legend.title** title to be placed at the top of the points legend.
- **legend.subtitle** subtitle to be placed at the top of the points legend.

#### Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

#### Examples

## Not run:
SetPlotAnnotation()

## End(Not run)
SetPolygonLimits  GUI: Polygon Limits

Description

A graphical user interface (GUI) for specifying polygon limits.

Usage

SetPolygonLimits(poly.names = NULL, poly.data = NULL, poly.crop = NULL, parent = NULL)

Arguments

poly.names character. Vector of polygon names
poly.data character. Name of the polygon that defines the data limits boundary.
poly.crop character. Name of the polygon that defines the crop region for interpolated data.
parent tkwin. GUI parent window

Value

Queries and sets the following components of Data:

credit mapping credit note
explanation explanation of gridded-data values.
legend.title title to be placed at the top of the points legend.
legend.subtitle subtitle to be placed at the top of the points legend.

Author(s)

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

Examples

```r
## Not run:
SetPolygonLimits(c("Polygon1", "Polygon2", "Polygon3"))
```

## End(Not run)
**SetSortOrder**

GUI: Sort Order

---

**Description**

A graphical user interface (GUI) for specifying the variable used to sort the data set.

**Usage**

SetSortOrder(col.ids, sort.on = NULL, parent = NULL)

**Arguments**

- `col.ids` character. Vector of variable names
- `sort.on` integer. Index for the variable used to sort the data set.
- `parent` tkwin. GUI parent window

**Value**

Returns an object of integer class that specifies the index of the variable used to sort the data set. Attributes for this object include: decreasing, a logical value indicating if the sort order is increasing or decreasing; and na.last, a logical value for controlling the treatment of NAs during sorting. If true, missing values in the data are put last; otherwise, they are put first; if NA, they are removed.

**Author(s)**

J.C. Fisher, U.S. Geological Survey, Idaho Water Science Center

**See Also**

order

**Examples**

```r
## Not run:
col.ids <- c("Variable1", "Variable2", "Variable3")
sort.on <- 2
attr(sort.on, "decreasing") <- TRUE
attr(sort.on, "na.last") <- FALSE
SetSortOrder(col.ids, sort.on)

## End(Not run)
```
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