

Package ‘gpairs’

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Title The Generalized Pairs Plot

Imports grid, barcode, lattice, vcd, MASS, colorspace, methods

Enhances YaleToolkit

Description

Offers a generalization of the scatterplot matrix based on the recognition that most datasets include both categorical and quantitative information. Traditional grids of scatterplots often obscure important features of the data when one or more variables are categorical but coded as numerical. The generalized pairs plot offers a range of displays of paired combinations of categorical and quantitative variables. Emerson et al. (2013) <[DOI:10.1080/10618600.2012.694762](https://doi.org/10.1080/10618600.2012.694762)>.

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Author John W. Emerson [aut, cre],
Walton A. Green [aut],
Liya Xiang [ctb]

Maintainer John W. Emerson <john.emerson@yale.edu>

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Contents

gpairs	2
Leaves	5
Index	8

gpairs

*Generalized Pairs Plots***Description**

Produces a matrix of plots showing pairwise relationships between quantitative and categorical variables in a complex data set.

Usage

```
gpairs(x,
       upper.pars = list(scatter = "points",
                        conditional = "barcode",
                        mosaic = "mosaic"),
       lower.pars = list(scatter = "points",
                        conditional = "boxplot",
                        mosaic = "mosaic"),
       diagonal = "default",
       outer.margins = list(bottom = unit(2, "lines"),
                            left = unit(2, "lines"),
                            top = unit(2, "lines"),
                            right = unit(2, "lines")),
       xlim = NULL,
       outer.labels = NULL, outer.rot = c(0, 90), gap = 0.05,
       buffer = 0.02, reorder = NULL, cluster.pars = NULL,
       stat.pars = NULL, scatter.pars = NULL,
       bwplot.pars = NULL, stripplot.pars = NULL, barcode.pars=NULL,
       mosaic.pars = NULL, axis.pars = NULL, diag.pars = NULL,
       whatis = FALSE)
```

```
corrgram(x)
```

Arguments

x	a data frame (or matrix the relationships between whose columns are to be examined). Any combination of quantitative and categorical variables is acceptable.
upper.pars	see Details
lower.pars	see Details
diagonal	by default, the diagonal from the top left to the bottom right is used for displaying the variable names (and, in our version, the marginal distributions of the variables); diagonal="other" will place the diagonal running from the top right down to the bottom left.
outer.margins	a list of length 4 with units as components named bottom, left, top, and right, giving the outer margins; the default uses two lines of text. A vector of length 4 with units (ordered properly) will work, as will a vector of length 4 with numeric values (interpreted as lines).

<code>xylim</code>	optionally specify a single range to be used as <code>xlim</code> and <code>ylim</code> where appropriate. Note that if this option causes cropping, it will fail to work in barcode panels.
<code>outer.labels</code>	the default is <code>NULL</code> , for alternating axis labels around the perimeter. If <code>"all"</code> , all labels are printed, and if <code>"none"</code> no labels are printed.
<code>outer.rot</code>	a 2-vector (x, y) rotating the top/bottom outer labels x degrees and the left/right outer labels y degrees. Only works for categorical labels of boxplot and mosaic panels.
<code>gap</code>	the gap between the tiles; defaulting to 0.05 of the width of a tile.
<code>buffer</code>	the fraction by which to expand the range of quantitative variables to provide plots that will not truncate plotting symbols. Defaults to 0 percent of range currently.
<code>reorder</code>	currently only support for the string <code>"cluster"</code> , which reorders the columns according to the output of <code>hclust</code> . Note that factors are coerced to numbers by replacing them with integers, which implicitly assumes what is probably an arbitrary ordering.
<code>cluster.pars</code>	a list with two elements named <code>dist.method</code> and <code>hclust.method</code> . These are passed respectively to <code>dist</code> and <code>hclust</code> . <code>NULL</code> is equivalent to <code>list(dist.method = "euclidean", hclust.method = "complete")</code> .
<code>stat.pars</code>	<code>NULL</code> is equivalent to <code>list(fontsize = 7, signif = 0.05, verbose = FALSE, use.color = TRUE, missing = 'missing', just = 'centre')</code> ; <code>stat.pars\(verbose)</code> can be <code>TRUE</code> (providing 5 statistics), <code>FALSE</code> (providing 2 statistics), or <code>NA</code> (nothing). The string <code>missing</code> is used in summaries where there are missing values; <code>fontsize</code> and <code>just</code> control the size and justification of the text summaries (see <code>grid.text</code> and <code>gpar</code>). The <code>use.color=FALSE</code> option provides an alternative summary of the strength of the correlation (see Green and Hickey (2006)). This is only used with <code>scatter="stats"</code> in <code>upper.pars</code> and <code>lower.pars</code> .
<code>scatter.pars</code>	<code>NULL</code> is equivalent to <code>list(pch = 1, size = unit(0.25, "char"), col = "black", frame.fill = NULL, border.col = "black")</code> .
<code>bwplot.pars</code>	<code>NULL</code> , passed to <code>bwplot</code> for producing boxplots.
<code>stripplot.pars</code>	<code>NULL</code> is equivalent to <code>list(pch = 1, size = unit(0.5, 'char'), col = 'black', jitter = FALSE)</code> .
<code>barcode.pars</code>	<code>NULL</code> is equivalent to <code>list(nint = 0, ptsize = unit(0.25, "char"), ptpch = 1, bcspace = NULL, use.points = FALSE)</code> .
<code>mosaic.pars</code>	<code>NULL</code> . Currently <code>shade</code> , <code>gp_labels</code> , <code>gp</code> , and <code>gp_args</code> are passed through to <code>strucplot</code> for producing mosaic tiles.
<code>axis.pars</code>	<code>NULL</code> is equivalent to <code>list(n.ticks = 5, fontsize = 9)</code> .
<code>diag.pars</code>	<code>NULL</code> is equivalent to <code>list(fontsize = 9, show.hist = TRUE, hist.color = 'black')</code> .
<code>whatis</code>	default is <code>FALSE</code> ; <code>TRUE</code> returns <code>whatis(x)</code> .

Details

In some cases, the graphics device can not be resized after production of the plot because of the way rotation of barcodes is performed.

upper.pars and lower.pars are lists possibly containing named elements 'scatter', 'conditional' and 'mosaic'. Each element of the list is a string implementing the following options: scatter = exactly one of ('points', 'lm', 'ci', 'symlm', 'loess', 'corrgram', 'stats', 'qqplot'); 'conditional' = exactly one of ('boxplot', 'stripplot', 'barcode'); mosaic='mosaic' (only option currently implemented).

corrgram() is just a wrapper to gpairs() producing a 'corrgram' in the style of Michael Friendly.

Value

If whatis=TRUE, the value is a data frame containing variable names, types, numbers of missing values, numbers of distinct values, precisions, maxima and minima.

Author(s)

John W. Emerson, Walton Green; thanks to Michael Friendly for augmenting the functionality with arguments to strucplot and to Liya Xiang for the September 2024 fixes related to grid graphics rotation (via package barcode) and the display problems with boxplot tiles from package lattice that plagued some environments.

References

- Emerson, John W. (1998) "Mosaic Displays in S-PLUS: A General Implementation and a Case Study." *Statistical Computing and Graphics Newsletter* Vol. 9, No. 1, 1998.
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- Green, W. A. (2006) "Loosening the CLAMP: An exploratory graphical approach to the Climate Leaf Analysis Multivariate Program." *Palaeontologia Electronica* 9(2):9A.

See Also

[pairs](#), [splom](#), [mosaicplot](#), [strucplot](#), [bwplot](#), [barcode](#), [stripplot](#).

Examples

```
allexamples <- FALSE

y <- data.frame(A=c(rep("red", 100), rep("blue", 100)),
               B=c(rnorm(100), round(rnorm(100, 5, 1), 1)), C=runif(200),
               D=c(rep("big", 150), rep("small", 50)),
               E=rnorm(200), stringsAsFactors=TRUE)

gpairs(y)

data(iris)
gpairs(iris)
if (allexamples) {
  gpairs(iris, upper.pars = list(scatter = 'stats'),
```

```

      scatter.pars = list(pch = substr(as.character(iris$Species), 1, 1),
                          col = as.numeric(iris$Species)),
      stat.pars = list(verbose = FALSE))
gpairs(iris, lower.pars = list(scatter = 'corrgram'),
       upper.pars = list(conditional = 'boxplot', scatter = 'loess'),
       scatter.pars = list(pch = 20))
}

data(Leaves)
gpairs(Leaves[1:10], lower.pars = list(scatter = 'loess'))
if (allexamples) {
  gpairs(Leaves[1:10], upper.pars = list(scatter = 'stats'),
        lower.pars = list(scatter = 'corrgram'),
        stat.pars = list(verbose = FALSE), gap = 0)
  corrgram(Leaves[, -33])
}

runexample <- FALSE
if (runexample) {
  data(NewHavenResidential)
  gpairs(NewHavenResidential)
}

```

Leaves

Morphological descriptions of leaf floras

Description

Measurements of the percentages of leaves in 31 morphological (or architectural) categories found in 245 leaf floras from 4 studies.

Usage

```
data(Leaves)
```

Format

A data frame with 245 observations on the following 33 variables.

Lobd a numeric vector giving percentage Lobed leaves

Entr a numeric vector giving percentage Entire leaves

TReg a numeric vector giving percentage leaves with Regular Teeth

TC1s a numeric vector giving percentage leaves with Close Teeth

TRnd a numeric vector giving percentage leaves with Round Teeth

TAcu a numeric vector giving percentage leaves Acute Teeth

TCmp a numeric vector giving percentage leaves with Compound Teeth

ZNan a numeric vector giving percentage Nanophyll leaves
 ZLe1 a numeric vector giving percentage Leptophyll1 leaves
 ZLe2 a numeric vector giving percentage Leptophyll2 leaves
 ZMi1 a numeric vector giving percentage Microphyll1 leaves
 ZMi2 a numeric vector giving percentage Microphyll2 leaves
 ZMi3 a numeric vector giving percentage Microphyll3 leaves
 ZMe1 a numeric vector giving percentage Megaphyll1 leaves
 ZMe2 a numeric vector giving percentage Megaphyll2 leaves
 ZMe3 a numeric vector giving percentage Megaphyll3 leaves
 AEmg a numeric vector giving percentage leaves with Emarginate Apexes
 ARnd a numeric vector giving percentage leaves with Round Apexes
 AAcu a numeric vector giving percentage leaves with Acute Apexes
 AAtn a numeric vector giving percentage leaves with Attenuate Apexes
 BCor a numeric vector giving percentage leaves with Cordate Bases
 BRnd a numeric vector giving percentage leaves with Round Bases
 BAcu a numeric vector giving percentage leaves with Acute Bases
 Rl1 a numeric vector giving percentage leaves with aspect ratio less than 1:1 (i.e. wider than long)
 Rb12 a numeric vector giving percentage leaves with aspect ratio between 1:1 and 1:2
 Rb23 a numeric vector giving percentage leaves with aspect ratio between 1:2 and 1:3
 Rb34 a numeric vector giving percentage leaves with aspect ratio between 1:3 and 1:4
 Rgt4 a numeric vector giving percentage leaves with aspect ratio between greater than 1:4
 SObo a numeric vector giving percentage Obovate leaves
 SElp a numeric vector giving percentage Elliptical leaves
 SOvt a numeric vector giving percentage Ovate leaves
 MAT a numeric vector giving mean annual temperature in degrees Centigrade
 Study a factor with levels Wolfe173 Jacobs Gregory Kowalski

Details

Data consists of a data frame with 245 rows and 33 columns (variables). The rows represent floras (collections of plants from a defined locality); the first 31 variables are percentages of leaves in each flora in each of 31 morphological categories; the 32nd variable is mean annual temperature of the area from which the floras was collected in degrees C, and the 33rd is a factor indicating which of 4 published studies the floras come from. See cited publications for more details.

Source

Green, W. A. (2006) Loosening the CLAMP: An exploratory graphical approach to the Climate Leaf Analysis Multivariate Program *Palaeontologia Electronica* 9(2):9A.

References

- Gregory-Wodzicki, K. M. (2000) Relationships between leaf morphology and climate, Bolivia: implications for estimating paleoclimate from fossil floras. *Paleobiology* 26(4):668–688.
- Jacobs, B. F. (1999) Estimation of rainfall variables from leaf characters in tropical Africa. *Palaeogeography, Palaeoclimatology, Palaeoecology* 145:231–250.
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- Wolfe, J.A., (1993), A method of obtaining climatic parameters from leaf assemblages. *U.S. Geological Survey Bulletin* 2040, 73 pp.

Examples

```
data(Leaves)
## maybe str(Leaves) ; plot(Leaves) ...
```

Index

- * **datasets**
 - Leaves, [5](#)
- * **multivariate**
 - gpairs, [2](#)
- * **ts**
 - gpairs, [2](#)

- barcode, [4](#)
- bwplot, [4](#)

- corrgram(gpairs), [2](#)

- dist, [3](#)

- gpairs, [2](#)
- gpar, [3](#)
- grid.text, [3](#)

- hclust, [3](#)

- Leaves, [5](#)

- mosaicplot, [4](#)

- pairs, [4](#)

- splom, [4](#)
- stripplot, [4](#)
- strucplot, [4](#)