

Package: radviz3d (via r-universe)

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Title 3D Radial Visualization

Version 2.3.1

Description Creating 3D radial visualizations of multivariate data.
The package extends traditional radial coordinate visualization (RadViz) techniques to three-dimensional space, enabling enhanced exploration and analysis of high-dimensional datasets through interactive 3D plots. Zhu, Dai & Maitra (2022) <doi:10.1080/10618600.2021.2020129>.

Depends R (>= 3.5.0)

License GPL (>= 2)

Encoding UTF-8

LazyData true

Imports rgl (>= 0.100.19)

Suggests MixSim, gtools

RoxygenNote 7.1.1

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celadons	<i>Compositions of ancient Chinese celdon pieces</i>
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Description

This dataset contains compositional data of ancient Chinese celdon from Longquan and Jingdezhen kiln from North Song to Ming Dynasties.

Usage

celadons

Format

A data frame with 19 variables and 88 observations.

mf Manufacturer of the celdon piece: FLQ for Jingdezhen and LG for Longquan

era The manufacturing time and part of the celdon piece in "time-part" format. There are two different parts (body (b) and glaze (g)) and four times (Song Dynasty (S), Yuan Dynasty (Y), Ming Dynasty(M) and Qing Dynasty (QC)).

Al2O3, CaO, CuO, Fe2O3, K2O, MgO, MnO, Na2O, P2O5, PbO2, Rb2O, SiO2, SrO, TiO2, Y2O3, ZnO, ZrO2
The contents of chemical components.

Gtrans	<i>G-transformation function</i>
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Description

function to transform discrete or mixture of discrete and continuous datasets to continuous datasets with marginal normal(0,1).

Usage

Gtrans(data, cl = NULL, VariableSelection = FALSE, p_threshold = 0.05, ...)

Arguments

<code>data</code>	The dataset to be transforms. The dataset can be discrete in all columns, continuous in all columns or a mixture of continuous columns and discrete columns.
<code>cl</code>	The class information of the dataset. This is not required when <code>VariableSelection = FALSE</code> .
<code>VariableSelection</code>	Logical. If true, anova will be performed to each variable to see whether there is a difference among groups for that variable. The variable associated with Bonferroni adjusted p-value larger than a threshold will be removed.
<code>p_threshold</code>	The threshold for adjusted p-value in variable selection when <code>VariableSelection = TRUE</code> .
<code>...</code>	Additional arguments passed to internal functions.

Value

A transformed continuous dataset with the same copula as the input dataset and marginal normal(0,1).

<code>mrp</code>	<i>Max-Ratio Projection function</i>
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Description

function to project high-dimensional datasets to lower dimension with max-ratio projection.

Usage

```
mrp(data, cl, nproj = 4, message = TRUE, ...)
```

Arguments

<code>data</code>	The dataset to apply MRP. Each row is an observation.
<code>cl</code>	The class identification for each observation. The length of <code>cl</code> should be the same as the number of rows of <code>data</code> .
<code>nproj</code>	The number of max-ratio directions to be used in projecting the original data to the projected data.
<code>message</code>	Logical. Whether to show the accumulative variance explained by the projection directions or not.
<code>...</code>	Additional arguments passed to internal functions.

Value

A list with the elements

<code>projected_df</code>	The projected data with selected number of max-ratio directions.
<code>pccumvar</code>	The cumulative variance explained by the max-ratio principal components.

overlap_mat_sim	<i>Overlap matrices for simulated data</i>
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Description

This is a list containing three overlap matrices corresponding to the sim_data datasets, showing class separability.

Usage

```
overlap_mat_sim
```

Format

A list of 3 matrices, each 5x5, representing overlap between classes

radialvis3d	<i>3D Radial Visualization function</i>
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Description

3D Radial Visualization function

Usage

```
radialvis3d(  
  data,  
  domrp = TRUE,  
  doGtrans = FALSE,  
  sqrt_scale = FALSE,  
  cl = NULL,  
  color = NULL,  
  pch = 16,  
  colorblind = FALSE,  
  axes = FALSE,  
  point.cex = 1,  
  with.coord.labels = TRUE,  
  coord.labels = NULL,  
  coord.font = 2,  
  coord.cex = 1.1,  
  with.class.labels = TRUE,  
  class.labels = levels(factor(cl)),  
  class.labels.locations = NULL,  
  opt.anchor.order = FALSE,  
  alpha = 0.02,
```

```

    lwd = 1,
    axes.col = "black",
    ret.trans = FALSE,
    ...
)

```

Arguments

<code>data</code>	The dataset to visualize. Each row is an observation.
<code>domrp</code>	Logical. If true, MRP is applied to the original dataset. The default number of PCs used is <code>npc = 4</code> .
<code>doGtrans</code>	Logical. If true, Gtrans is applied to the original dataset. @seealso Gtrans .
<code>sqrt_scale</code>	Logical. If true, the distance of the points to be visualization will be augmented to square root of the original distance to make points further away from the origin.
<code>c1</code>	The class identification for each observation. The length of <code>c1</code> should be the same as the number of rows of data. If specified, different classes would be visualized with different colors.
<code>color</code>	The colors for different classes. If not specified, <code>rainbow</code> is used.
<code>pch</code>	The point character to be used. It is an integer or a vector of integers of the same length of the row of the dataset. See points for a complete list of characters.
<code>colorblind</code>	Logical. The colors for different classes. If true, points are colorblind friendly. If false, <code>rainbow</code> is used.
<code>axes</code>	Logical. If true, Cartesian axes would be plotted.
<code>point.cex</code>	The size of the data point in RadViz3D. The default value is 1.
<code>with.coord.labels</code>	Logical. If true, labels of coordinates will be added to the visualization.
<code>coord.labels</code>	The labels for components of the dataset. When <code>domrp = TRUE</code> , the <code>coord.labels</code> will be changed to "Xi" representing the <i>i</i> th direction obtained with MRP.
<code>coord.font</code>	The font for labels of components.
<code>coord.cex</code>	The size of the labels of components.
<code>with.class.labels</code>	Logical. If true, class labels will be added to the visualization.
<code>class.labels</code>	The labels for different classes in the dataset.
<code>class.labels.locations</code>	Locations to put labels for each class. If not specified, an optimal location for each class would be calculated.
<code>opt.anchor.order</code>	Logical. If true, the optimal order of anchor points corresponding to the components would be calculated. This is a very time consuming procedure. Not recommended if the number of components is larger than 6.
<code>alpha</code>	The alpha value that controls the transparency of the sphere in 3d visualization
<code>lwd</code>	The line width in the visualization
<code>axes.col</code>	Colors of the axes, if needed to be displayed
<code>ret.trans</code>	Logical parameter, returns the Radviz3D transformation if TRUE
<code>...</code>	Some other parameters from mrp and Gtrans and rgl functions.

Value

A list with the elements

mrp.res The result of MRP is the argument domrp = TRUE. See also [mrp](#).

Examples

```
radialvis3d(data = iris[,-5], cl = iris[,5], domrp = TRUE)
```

sarscov2.us.variants *COVID-19 US variants dataset*

Description

This is a compositional dataset of the COVID-19 variants in the US from 6/19/2021 to 9/18/2021.

Usage

```
sarscov2.us.variants
```

Format

A data frame of 140 observations and 14 variables.

group The date.

type weighted

region Region of the US labelled by numbers.

B.1.1.194, B.1.1.7, B.1.351, B.1.525, B.1.526, B.1.621, B.1.628, B.1.637, Delta, Other*, P.1 COVID-19 variants compositions.

sim_data *Simulated datasets for testing*

Description

This is a list containing three simulated datasets, each with 500 observations and 5 classes, used for testing visualization methods.

Usage

```
sim_data
```

Format

A list of 3 data frames, each with 500 observations and 6 variables:

class Factor with 5 levels representing different classes

X1, X2, X3, X4, X5 Numeric variables with simulated data

wine

Chemical compositions of wine

Description

The dataset contains chemical compositions of wines from 3 cultivars

Usage

wine

Format

A data frame of 178 observations and 14 variables:

cultivar The cultivar where the wine is produced

Ahl, Ash, Alk, Color, Flvds, Hue, Malic, Mg, Nonfp, ODDil, Phnls, Prol, Pthyns The content of chemical compositions of the wine

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