

Package ‘svdvis’

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Type Package

Title Singular Value Decomposition Visualization

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Description Visualize singular value decompositions (SVD), principal component analysis (PCA), factor analysis (FA) and related methods.

Imports ggplot2, GGally, gridExtra, scales, reshape2, RColorBrewer, grDevices

License GPL-2

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svdvis-package

Singular Value Decomposition Visualization

Description

Visualize singular value decompositions (SVD), principal component analysis (PCA), factor analysis (FA) and related methods.

Details

Package: svdvis
Type: Package
Version: 1
License: GPL-2
Depends: ggplot2, GGally, gridExtra, scales, reshape2, RColorBrewer, grDevices

Providing convenient visualization functions for paired scatterplots, heat maps, parallel coordinates, and radial coordinates. The package is developed for the outputs from singular value decompositions (SVD), principal component analysis (PCA), factor analysis (FA), and related methods. Particularly, it focuses on exploring and visualizing multidimensional vectors (singular vectors, principal components, or factors) from dimension reduction techniques or latent variable models.

Author(s)

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radviz

Radial Coordinates Plots

Description

Creates radial coordinates plots, with m variables (rows) and n samples (columns). Each variable is mapped onto a circle, using data points as spring constants. Each column is re-scaled to have numeric values between 0 and 1.

Usage

```
radviz(dat, group = NULL, color = NULL, hjust = 0, vjust = 0,  
alpha = 1)
```

Arguments

<code>dat</code>	A matrix with m rows and n columns, where columns represent dimensions.
<code>group</code>	A vector of length m , specifying groups (e.g., phenotypes or conditions for m samples).
<code>color</code>	A vector of hex color codes to represent groups.
<code>hjust</code>	A parameter to horizontally adjust axis names around the circle; <code>hjust</code> arguments for <code>geom_text</code>
<code>vjust</code>	A parameter to vertically adjust axis names around the circle; <code>vjust</code> arguments for <code>geom_text</code>
<code>alpha</code>	A numeric value for transparency.

Value

`svd.radial` creates and draws a figure, which is a ggplot object.

Author(s)

Neo Christopher Chung <nchchung@gmail.com>

References

Ankerst M., Keim D. A., Kriegel H.-P. Circle Segments: A Technique for Visually Exploring Large Multidimensional Data Sets, IEEE Visualization, 1996.

K.A. Olsen, R.R. Korfhage, K.M. Sochats, M.B. Spring and J.G. Williams. Visualisation of a Document Collection: The VIBE System, Information Processing and Management, Vol. 29, No. 1, pp. 69-81, Pergamon Press Ltd, 1993.

See Also

[svd.radial](#)

Examples

```
set.seed(1234)
dat = matrix(rnorm(9*4), 9, 4, dimnames=list(paste(1:9), letters[1:4]))
radviz(dat, group=c(rep("Group 1",3),rep("Group 2",3),rep("Group 3",3)))
```

svd.heatmap

Visualizing Singular Vectors or Principal Components by Heatmaps

Description

Creates a heatmap from selected singular vectors or principal components. Principal components can be plotted by setting `weights = "sv"`. Colors for heatmap can be specified by optional arguments `low` and `high` colors.

Usage

```
svd.heatmap(svd.obj, r = NULL, group = NULL, weights = NULL,
            alpha = 0.7, low = "#FFFFFF", high = "#9E0142")
```

Arguments

svd.obj	A list, resulted from applying svd to a dataset, with u, d, and v corresponding to left singular vector, singular values, and right singular vectors, respectively. Alternatively, supply singular vectors, v.
r	A positive integer to use only the first r vectors in visualization. If not specified, all vectors available in svd.obj\$v are visualized.
group	A vector of length n, specifying groups (e.g., phenotypes or conditions for n samples).
weights	A vector of length r. If "sv", singular values contained in svd.obj\$d[1:r] are used.
alpha	A numeric value for transparency.
low	A hex color code to color the lowest value.
high	A hex color code to color the highest value.

Value

svd.heatmap creates and draws a figure, which is a ggplot object.

Author(s)

Neo Christopher Chung <nchchung@gmail.com>

Examples

```
set.seed(1234)
dat = matrix(rnorm(1000), 100, 10)
svd.obj = svd(dat)
colnames(svd.obj$v) = paste0("V", 1:10)
rownames(svd.obj$v) = paste0("Sample", 1:10)
svd.heatmap(svd.obj, r=5)
```

svd.parallel	<i>Visualizing Singular Vectors or Principal Components by Parallel Coordinates Plots</i>
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Description

Creates a Parallel Coordinates Plot from selected singular vectors or principal components. Principal components can be plotted by setting weights = "sv". Since it largely uses ggparcoord from the GGally package, optional arguments for ggparcoord can be specified.

Usage

```
svd.parallel(svd.obj, r = NULL, weights = NULL, group = NULL,  
            alpha = 0.7, ...)
```

Arguments

svd.obj	A list, resulted from applying svd to a dataset, with u, d, and v corresponding to left singular vector, singular values, and right singular vectors, respectively. Alternatively, supply singular vectors, v.
r	A positive integer to use only the first r vectors in visualization. If not specified, all vectors available in svd.obj\$v are visualized.
weights	A vector of length r. If "sv", singular values contained in svd.obj\$d[1:r] are used.
group	A vector of length n, specifying groups (e.g., phenotypes or conditions for n samples).
alpha	A numeric value for transparency.
...	Additional arguments to pass onto ggparcoord.

Value

svd.parallel creates and draws a figure, which is a ggplot object.

Author(s)

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See Also

[ggparcoord](#)

Examples

```
set.seed(1234)  
dat = matrix(rnorm(1000), 100, 10)  
svd.obj = svd(dat)  
colnames(svd.obj$v) = paste0("V", 1:10)  
rownames(svd.obj$v) = paste0("Sample", 1:10)  
svd.parallel(svd.obj, r=4)
```

svd.radial	<i>Visualizing Singular Vectors or Principal Components by Radial Coordinates Plots</i>
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Description

Creates a Radial Coordinates Plot from selected singular vectors or principal components. Principal components can be plotted by setting `weights = "sv"`. It uses the `radviz` function, optional arguments for `radviz` can be specified.

Usage

```
svd.radial(svd.obj, r = NULL, weights = NULL, group = NULL, alpha = 1,
...)
```

Arguments

<code>svd.obj</code>	A list, resulted from applying <code>svd</code> to a dataset, with <code>u</code> , <code>d</code> , and <code>v</code> corresponding to left singular vector, singular values, and right singular vectors, respectively. Alternatively, supply singular vectors, <code>v</code> .
<code>r</code>	A positive integer to use only the first <code>r</code> vectors in visualization. If not specified, all vectors available in <code>svd.obj\$v</code> are visualized.
<code>weights</code>	A vector of length <code>r</code> . If "sv", singular values contained in <code>svd.obj\$d[1:r]</code> are used.
<code>group</code>	A vector of length <code>n</code> , specifying groups (e.g., phenotypes or conditions for <code>n</code> samples).
<code>alpha</code>	A numeric value for transparency.
<code>...</code>	Additional arguments to pass onto <code>radviz</code> .

Value

`svd.radial` creates and draws a figure, which is a `ggplot` object.

Author(s)

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See Also

[radviz](#)

Examples

```
set.seed(1234)
dat = matrix(rnorm(1000), 100, 10)
svd.obj = svd(dat)
colnames(svd.obj$v) = paste0("V", 1:10)
rownames(svd.obj$v) = paste0("Sample", 1:10)
svd.radial(dat, group=c(rep("Group1", 5), rep("Group2", 5)))
```

svd.scatter	<i>Visualizing Singular Vectors or Principal Components by Scatterplot Matrices</i>
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Description

Creates a set of multiple scatter plots from all pairs of selected singular vectors or principal components. Principal components can be plotted by setting `weights = "sv"`. Since it largely uses `ggpairs` from the `GGally` package, optional arguments for `ggpairs` can be specified.

Usage

```
svd.scatter(svd.obj, r = NULL, group = NULL, weights = NULL,
            alpha = 0.7, axisLabels = "none", ...)
```

Arguments

<code>svd.obj</code>	A list, resulted from applying <code>svd</code> to a dataset, with <code>u</code> , <code>d</code> , and <code>v</code> corresponding to left singular vector, singular values, and right singular vectors, respectively. Alternatively, supply singular vectors, <code>v</code> .
<code>r</code>	A positive integer to use only the first <code>r</code> vectors in visualization. If not specified, all vectors available in <code>svd.obj\$v</code> are visualized.
<code>group</code>	A vector of length <code>n</code> , specifying groups (e.g., phenotypes or conditions for <code>n</code> samples).
<code>weights</code>	A vector of length <code>r</code> . If <code>"sv"</code> , singular values contained in <code>svd.obj\$d[1:r]</code> are used.
<code>alpha</code>	A numeric value for transparency.
<code>axisLabels</code>	Set to either <code>"none"</code> (default), <code>"show"</code> , or <code>"internal"</code> .
<code>...</code>	Additional arguments to pass onto <code>ggpair</code> .

Value

`svd.scatter` creates and draws a figure, which is a `ggpair` object.

Author(s)

Neo Christopher Chung <nchchung@gmail.com>

See Also[ggpairs](#)**Examples**

```
set.seed(1234)
dat = matrix(rnorm(1000), 100, 10)
svd.obj = svd(dat)
colnames(svd.obj$v) = paste0("V", 1:10)
svd.scatter(svd.obj, r=3, group=c(rep("Group1",5), rep("Group2",5)))
```

svd.scree

*Scree plot***Description**

Creates a scree plot, where percentages of variance explained (PVE) by singular vectors are plotted. Additional customizations can be done by adding ggplot2 functions to the output.

Usage

```
svd.scree(svd.obj, subr = NULL, maintitle = "Scree Plot",
  axis.title.x = "Singular Vectors",
  axis.title.y = "Percent Variance Explained")
```

Arguments

svd.obj	A list, resulted from applying svd to a dataset, with u, d, and v corresponding to left singular vector, singular values, and right singular vectors, respectively. Alternatively, supply a vector of singular values, d.
subr	An optional positive integer to display PVE corresponding to the first subr singular values.
maintitle	A figure title (by default, "Scree Plot").
axis.title.x	A title for x axis (by default, "Singular Vectors").
axis.title.y	A title for y axis (by default, "Percent Variance Explained").

Value

svd.scree creates and draws a figure, which is a ggplot2 when subr=NULL or a gtable object when subr is specified.

Author(s)

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Examples

```
set.seed(1234)
dat = matrix(rnorm(1000), 100, 10)
svd.obj = svd(dat)
colnames(svd.obj$v) = paste0("V", 1:10)
svd.scree(svd.obj)
```

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