Package ‘textplot’

August 18, 2021

<table>
<thead>
<tr>
<th>Type</th>
<th>Package</th>
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<tbody>
<tr>
<td>Title</td>
<td>Text Plots</td>
</tr>
<tr>
<td>Version</td>
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<tr>
<td>Maintainer</td>
<td>Jan Wijffels <a href="mailto:jwijffels@bnosac.be">jwijffels@bnosac.be</a></td>
</tr>
<tr>
<td>Description</td>
<td>Visualise complex relations in texts. This is done by providing functionalities for displaying text co-occurrence networks, text correlation networks, dependency relationships as well as text clustering and semantic text 'embeddings'. Feel free to join the effort of providing interesting text visualisations.</td>
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<td>License</td>
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<tr>
<td>URL</td>
<td><a href="https://github.com/bnosac/textplot">https://github.com/bnosac/textplot</a></td>
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<tr>
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<tr>
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<td>Suggests</td>
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<td>VignetteBuilder</td>
<td>knitr</td>
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<tr>
<td>Author</td>
<td>Jan Wijffels [aut, cre, cph], BNOSAC [cph], Sacha Epskamp [ctb, cph] (code in R/matrix_reduction.R adapted from the qgraph package version 1.4.0 which is GPL-2 licensed), Ingo Feinerer and Kurt Hornik [ctb, cph] (partial code in R/textplot_corlines.R adapted from the tm package version 0.4 which is GPL-2 licensed)</td>
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Example Biterm Topic Model

**Description**

The object is a BTM topic model created with the BTM package. It was created on a subset of all CRAN packages, namely package which are part of the NaturalLanguageProcessing and Machine-Learning task views.

Timepoint of creation was 2020-04-10.

**Examples**

```r
library(BTM)
data(example_btm, package = 'textplot')
example_btm
str(example_btm)
```

Example word embedding matrix

**Description**

A matrix with 25-dimensional word embeddings, constructed upon the be_parliament_2020 dataset in the doc2vec R package

**Examples**

```r
data(example_embedding, package = 'textplot')
head(example_embedding)
```
**example_embedding_clusters**

*Example words emitted in a ETM text clustering model*

**Description**

Example words emitted in a ETM text clustering model constructed upon the be_parliament_2020 dataset in the doc2vec R package

**Examples**

```r
data(example_embedding_clusters, package = 'textplot')
head(example_embedding_clusters)
terminology <- split(example_embedding_clusters, example_embedding_clusters$cluster)
lapply(terminology, head, n = 5)
```

---

**example_udpipe**

*Example annotation of text using udpipe*

**Description**

The object is a data.frame of the annotation of the text: "UDPipe provides tokenization, tagging, lemmatization and dependency parsing of raw text"

**Examples**

```r
data(example_udpipe)
str(example_udpipe)
```

---

**plot.BTM**

*Plot function for a BTM object*

**Description**

Plot biterms as a clustered graph. The graph is constructed by assigning each word to a topic and within a topic of words biterm frequencies are shown.
Usage

```r
## S3 method for class 'BTM'
plot(
  x,
  biterms = terms(x, type = "biterms")$biterms,
  top_n = 7,
  which,
  labels = seq_len(x$K),
  title = "Biterm topic model",
  subtitle = list(),
  ...
)
```

Arguments

- `x` an object of class `BTM` with a biterm topic model
- `biterms` a data.frame with columns term1, term2, topic with all biterms and the topic these were assigned to. Defaults to the biterms used to construct the model.
- `top_n` integer indicating to limit to displaying the top_n terms for each topic. Defaults to 7.
- `which` integer vector indicating to display only these topics. See the examples.
- `labels` a character vector of names. Should be of the same length as the number of topics in the data.
- `title` character string with the title to use in the plot
- `subtitle` character string with the subtitle to use in the plot
- `...` not used

Value

an object of class ggplot

See Also

- `BTM`, `textplot_bitermclusters.default`

Examples

```r
library(igraph)
library(BTM)
library(ggraph)
library(ggforce)
library(concaveman)
data(example_btm, package = 'textplot')

model <- example_btm

plot(model, title = "BTM model", top_n = 3)
```
library(BTM)
library(data.table)
library(udpipe)

## Annotate text with parts of speech tags
data("brussels_reviews", package = "udpipe")
anno <- subset(brussels_reviews, language %in% "nl")
anno <- data.frame(doc_id = anno$id, text = anno$feedback, stringsAsFactors = FALSE)
anno <- udpipe(anno, "dutch", trace = 10)

## Get cooccurrences of nouns / adjectives and proper nouns
biterms <- as.data.table(anno)
biterms <- biterms[, cooccurrence(x = lemma, relevant = upos %in% c("NOUN", "PROPN", "ADJ"), skipgram = 2), by = list(doc_id)]

## Build the BTM model
set.seed(123456)
x <- subset(anno, upos %in% c("NOUN", "PROPN", "ADJ"))
x <- x[, c("doc_id", "lemma")]
model <- BTM(x, k = 5, beta = 0.01, iter = 2000, background = TRUE, biterms = biterms, trace = 100)
plot(model)

plot(model, title = "BTM model", top_n = 3, labels = 1:model$K)
plot(model, title = "BTM model", which = 7:15)
plot(model, title = "BTM model", subtitle = "First 5 topics", which = 1:5, top_n = 10)
plot(model, title = "Biterm topic model", subtitle = "First 8 topics", which = 1:8, top_n = 7)

plot(model, title = "Biterm topic model", subtitle = "some topics", top_n = 7, which = c(3, 4, 5, 6, 7, 9, 12, 16, 20), labels = topiclabels)
Description

Barplot of a frequency table using lattice

Usage

textplot_bar(x, ...)

## Default S3 method:
textplot_bar(
  x,
  panel = "Effect",
  total = sum(x),
  top = 40,
  col.panel = "lightgrey",
  col.line = "lightblue",
  lwd = 3,
  cextext = 0.5,
  addpct = FALSE,
  cexpct = 0.75,
  textpos = 3,
  pctpos = 1,
  v = NULL,
  col.abline = "red",
  ...
)

Arguments

x 
a table to plot or a data.frame with the first column the label and the second
column the frequency

... other arguments passed on to lattice::dotplot

panel character string what to put into the panel

total integer with the total. Defaults to sum(x). Is used to plot the table counts as a
percentage. In which case this is divided by the total.

top integer indicating to plot only the first 'top' table elements. Defaults to 40.

col.panel color of the panel. Defaults to lightgrey.

col.line color of the line. Passed on to the col argument in lattice::panel.lines

lwd width of the line. Passed on to the lwd argument in lattice::panel.lines

cextext numeric with the cex of the text with the counts plotted. Passed on to lattice::panel.text.

addpct logical indicating to add the percent with lattice::panel.text

cexpct numeric with the cex of the text plotted when using addpct. Passed on to
lattice::panel.text.

textpos passed on to the pos argument of panel.text to indicate where to put the text of
the frequencies
textplot_bitermclusters

Description

Plot biterm cluster groups. The graph is constructed by assigning each word to a topic and
within a topic of words biterm frequencies are shown.

Usage

textplot_bitermclusters(x, ...)

# Default S3 method:
textplot_bitermclusters(
  x, 
  biterms,
which,  
labels = seq_len(length(table(biterms$topic))),  
title = "Biterm topic model",  
subtitle = list(),  
...  
)

Arguments

x a list of data.frames, each containing the columns token and probability corresponding to how good a token is emitted by a topic. The list index is assumed to be the topic number

... not used

biterms a data.frame with columns term1, term2, topic with all biterms and the topic these were assigned to

which integer vector indicating to display only these topics. See the examples.

labels a character vector of names. Should be of the same length as the number of topics in the data.

title character string with the title to use in the plot

subtitle character string with the subtitle to use in the plot

Value

an object of class ggplot

Examples

library(igraph)
library(ggraph)
library(concaveman)
library(ggplot2)
library(BTM)
data(example_btm, package = 'textplot')
group_terms <- terms(example_btm, top_n = 3)
group_biterms <- example_btm$biterms$biterms

textplot_bitermclusters(x = group_terms, biterms = group_biterms)
textplot_bitermclusters(x = group_terms, biterms = group_biterms,  
title = "BTM model", subtitle = "Topics 7-15",  
which = 7:15, labels = seq_len(example_btm$K))

group_terms <- terms(example_btm, top_n = 10)
textplot_bitermclusters(x = group_terms, biterms = group_biterms,  
title = "BTM model", subtitle = "Topics 1-5",  
which = 1:5, labels = seq_len(example_btm$K))

group_terms <- terms(example_btm, top_n = 7)
textplot_bitermclusters(x = group_terms, biterms = group_biterms, title = "Biterm topic model", subtitle = "some topics", which = c(3, 4, 5, 6, 7, 9, 12, 16, 20), labels = topiclabels)

---

**textplot_cooccurrence**  
*Plot term cooccurrences as a network*

**Description**  
Plot term cooccurrences in a graph structure

**Usage**  
`textplot_cooccurrence(x, ...)`

## Default S3 method:  
`textplot_cooccurrence(x, terms, top_n = 50, title = "Term cooccurrences", subtitle = list(), vertex_color = "darkgreen", edge_color = "grey", base_family = "", ... )`

**Arguments**

- `x` a data.frame with columns `term1`, `term2` and `cooc` indicating how many times 2 terms are occurring together  
- `...` other parameters passed on to `ggraph::geom_node_text`  
- `terms` a character vector with terms to only plot. Prevails compared to using `top_n`  
- `top_n` integer indicating to show only the top n occurrences as in `head(x, n = top_n)`  
- `title` character string with the title to use in the plot
textplot_correlation_glasso

subtitle character string with the subtitle to use in the plot
vertex_color character with the color of the label of each node. Defaults to darkgreen.
edge_color character with the color of the edges between the nodes. Defaults to grey.
base_family character passed on to theme_void setting the base font family

Value
an object of class ggplot

Examples

library(udpipe)
library(igraph)
library(ggraph)
library(ggplot2)
data(brussels_reviews_anno, package = 'udpipe')
x <- subset(brussels_reviews_anno, xpos %in% "JJ" & language %in% "fr")
x <- cooccurrence(x, group = "doc_id", term = "lemma")

textplot_cooccurrence(x, top_n = 25, subtitle = "showing only top 25")
textplot_cooccurrence(x, top_n = 25, title = "Adjectives",
                        vertex_color = "orange", edge_color = "black",
                        fontface = "bold")

textplot_correlation_glasso

Plot sparse term correlations as a graph structure

Description
Plot sparse term correlations as a graph structure. Uses the glasso procedure (glasso::glassopath) to reduce the correlation matrix to retain only the relevant correlations and next visualises these sparse correlations.

Usage
textplot_correlation_glasso(x, ...)

## Default S3 method:
textplot_correlation_glasso(
  x,
  n = 1000,
  exclude_zero = TRUE,
  label.cex = 1,
  node.width = 0.5,
Arguments

- \textit{x}: a correlation matrix
- ... further arguments passed on to \texttt{qgraph::qgraph}, except layout which is set to 'spring', labels (taken from the colnames of \texttt{x}), and borders which is set to FALSE.
- \textit{n}: sample size used in computing the sparse correlation matrix. Defaults to 1000.
- \textit{exclude.zero}: logical indicating to exclude zero-correlations from the graph
- \textit{label.cex}: passed on to \texttt{qgraph::qgraph}
- \textit{node.width}: passed on to \texttt{qgraph::qgraph}

Value

an object of class \texttt{ggplot}

Examples

```r
library(udpipe)
library(qgraph)
library(glasso)
data(brussels_reviews_anno, package = 'udpipe')
x <- subset(brussels_reviews_anno, xpos %in% 'NN' & language %in% 'fr' & !is.na(lemma))
x <- document_term_frequencies(x, document = "doc_id", term = "lemma")
dtm <- document_term_matrix(x)
dtm <- dtm_remove_lowfreq(dtm, maxterms = 60)

m <- dtm_cor(dtm)
textplot_correlation_glasso(m, exclude_zero = TRUE)
textplot_correlation_glasso(m, exclude_zero = FALSE)
```

Description

Plots the highest occurring correlations among terms. This is done by plotting the terms into nodes and the correlations between the terms as lines between the nodes. Lines of the edges are proportional to the correlation height. This uses the plot function for graphNEL objects (using the Rgraphviz package)
textplot_correlation_lines

Usage

  textplot_correlation_lines(x, ...)

  ## Default S3 method:
  textplot_correlation_lines(
    x,
    terms = colnames(x),
    threshold = 0.05,
    top_n,
    attrs = textplot_correlation_lines_attrs(),
    terms_highlight,
    label = FALSE,
    cex.label = 1,
    col.highlight = "red",
    lwd = 1,
    ...
  )

Arguments

  x                     a document-term matrix of class dgCMatrix
  ...                   other arguments passed on to plot
  terms                 a character vector with terms present in the columns of x indicating terms to focus on
  threshold             a threshold to show only correlations between the terms with absolute values above this threshold. Defaults to 0.05.
  top_n                 an integer indicating to show only the top top_n correlations. This can be set to plot only the top correlations. E.g. set it to 20 to show only the top 20 correlations with the highest absolute value.
  attrs                 a list of attributes with graph visualisation elements passed on to the plot function of an object of class graphNEL. Defaults to textplot_correlation_lines_attrs.
  terms_highlight       a vector of character terms to highlight or a vector of numeric values in the 0-1 range indicating how much (in percentage) to increase the node font size. See the examples.
  label                 logical indicating to draw the label with the correlation size between the nodes
  cex.label             cex of the label of the correlation size
  col.highlight         color to use for highlighted terms specified in terms_highlight. Defaults to red.
  lwd                   numeric value - graphical parameter used to increase the edge thickness which indicates the correlation strength. Defaults to 1.

Value

  invisibly the plot
Examples

```r
## Construct document/frequency/matrix
library(graph)
library(Rgraphviz)
library(udpipe)
data(brussels_reviews_anno, package = 'udpipe')
exclude <- c(32337682L, 27210436L, 26820445L, 37658826L, 3366134L, 48756422L,
            23454554L, 30461127L, 32850277L, 3056303L, 21508142L,
            28651065L, 29011387L, 37316020L, 22135291L,
            40169379L, 38627667L, 29470172L, 24071827L, 40478869L, 36825304L,
            21597085L, 21427658L, 7890178L, 32332472L, 39874379L, 32581310L,
            43865675L, 31586937L, 32454912L, 34061703L, 31403168L, 35979324L,
            29002317L, 33546304L, 47677695L)
dtm <- brussels_reviews_anno
dtm <- subset(dtm, !doc_id %in% exclude)
dtm <- subset(dtm, xpos %in% c("NN") & language == "nl" & !is.na(lemma))
dtm <- document_term_frequencies(dtm, document = "doc_id", term = "lemma")
dtm <- document_term_matrix(dtm)
dtm <- dtm_remove_lowfreq(dtm, minfreq = 5)
dtm <- dtm_remove_tfidf(dtm, top = 500)
## Plot top 20 correlations, having at least a correlation of 0.01
textplot_correlation_lines(dtm, top_n = 25, threshold = 0.01)
## Plot top 20 correlations
textplot_correlation_lines(dtm, top_n = 25, label = TRUE, lwd = 5)
## Plot top 20 correlations and highlight some terms
textplot_correlation_lines(dtm, top_n = 25, label = TRUE, lwd = 5,
                          terms_highlight = c("prijs", "privacy"),
                          main = "Top correlations in topic xyz")
## Plot top 20 correlations and highlight + increase some terms
textplot_correlation_lines(dtm, top_n = 25, label = TRUE, lwd=5,
                          terms_highlight = c(prijs = 0.8, privacy = 0.1),
                          col.highlight = "red")
## Plot correlations between specific terms
w <- dtm_colsums(dtm)
w <- head(sort(w, decreasing = TRUE), 100)
textplot_correlation_lines(dtm, terms = names(w), top_n = 20, label = TRUE)

attrs <- textplot_correlation_lines_attrs()
attrs$node$shape <- "rectangle"
attrs$edge$color <- "steelblue"
textplot_correlation_lines(dtm, top_n = 20, label = TRUE,
                           attrs = attrs)
```
textplot_correlation_lines_attr

Document/Term Correlation Plot graphical attributes

Description
Document/Term Correlation Plot graphical attributes

Usage
textplot_correlation_lines_attr(fontsize = 25)

Arguments
fontsize size of the font. Defaults to 25

Value
a list with graph visualisation elements used by textplot_correlation_lines

Examples

textplot_correlation_lines_attr()

---

textplot_dependencyparser

Plot output of a dependency parser

Description
Plot output of a dependency parser. This plot takes one sentence and shows for the sentence, the words, the parts of speech tag and the dependency relationship between the words.

Usage
textplot_dependencyparser(x, ...)

## Default S3 method:
textplot_dependencyparser(
x,
title = "Dependency Parser",
subtitle = "tokenisation, parts of speech tagging & dependency relations",
vertex_color = "darkgreen",
edge_color = "red",

---
textplot_dependencyparser

```r
  size = 3,
  base_family = "",
...
)

Arguments

  x     a data.frame as returned by a call to `udpipe` containing 1 sentence
  ...   not used yet
  title character string with the title to use in the plot
  subtitle character string with the title to use in the plot
  vertex_color character with the color of the label of each node. Defaults to darkgreen.
  edge_color character with the color of the edges between the nodes. Defaults to red.
  size   size of the labels in the plot. Defaults to 3.
  base_family character passed on to theme_void setting the base font family

Value

  an object of class ggplot

See Also

  `udpipe`

Examples

```r
library(udpipe)
library(ggraph)
library(ggplot2)
library(igraph)

x <- udpipe("The economy is weak but the outlook is bright", "english")
textplot_dependencyparser(x)

x <- udpipe("His speech about marshmallows in New York is utter bullshit", "english")
textplot_dependencyparser(x, size = 4)

x <- udpipe("UDPipe provides tokenization, tagging, lemmatization and dependency parsing of raw text", "english")
textplot_dependencyparser(x, size = 4)

data("example_udpipe", package = "textplot")
textplot_dependencyparser(example_udpipe, size = 4)
textplot_embedding_2d  Plot word embeddings in 2D

Description

This plot displays words in 2 dimensions, optionally grouped by cluster. This allows to visualise embeddings which are reduced by dimensionality reduction techniques like UMAP, t-SNE, PCA or similar techniques. It allows to highlight the words by groups and is a good way to visualise a small sets of word or topic embeddings.

Usage

textplot_embedding_2d(x, ...)

## Default S3 method:
textplot_embedding_2d(
  x,
  title = "Embedding plot in 2D",
  subtitle = list(),
  encircle = FALSE,
  points = FALSE,
  alpha = 0.4,
  ...
)

Arguments

x                       a data.frame with columns 'x', 'y', 'term' and optionally 'group' (color by group), 'weight' (size of the text / point shown), 'type' (pch used for the type of point)
...
not used yet

title                   character string with the title to use in the plot
subtitle                character string with the subtitle to use in the plot
encircle                logical indicating to encircle all the points belonging to a group using geom_encircle
points                  logical indicating to add points. Defaults to FALSE.
alpha                   transparency level passed on to geom_encircle in case encircle is set to TRUE

Value

an object of class ggplot
Examples

library(ggplot2)
library(ggrepel)
library(ggalt)

## Generate some fake embeddings
## probably you want to use word2vec::word2vec(...) + uwot::umap(...)
embeddings <- matrix(runif(26 * 2), nrow = 26, ncol = 2, dimnames = list(letters))
x <- data.frame(term = rownames(embeddings), x = embeddings[, 1], y = embeddings[, 2])

## 2D plot
textplot_embedding_2d(x)

## 2D plot with groups
x$group <- sample(c("clustera", "clusterb", "clusterc"), size = 26, replace = TRUE)
textplot_embedding_2d(x)

## 2D plot with groups and weights for each word
x$weight <- runif(nrow(x))
textplot_embedding_2d(x)

## 2D plot with groups and weights for each word and different types of points
x$type <- sample(c("word", "center"), size = 26, replace = TRUE)
x$type <- factor(x$type, levels = c("word", "center"))
textplot_embedding_2d(x, points = TRUE)
textplot_embedding_2d(x, title = "Embedding plot in 2D", subtitle = "example")

## Encircle the words belonging to each group
textplot_embedding_2d(x, title = "Embedding plot in 2D", subtitle = "example",
                     encircle = TRUE, alpha = 0.2)
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