Package ‘stminsights’

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Type Package

Title A 'Shiny' Application for Inspecting Structural Topic Models

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URL https://github.com/cschwem2er/stminsights

BugReports https://github.com/cschwem2er/stminsights/issues

Description
This app enables interactive validation, interpretation and visualization of structural topic models from the 'stm' package by Roberts and others (2014) <doi:10.1111/ajps.12103>. It also includes helper functions for model diagnostics and extracting data from effect estimates.

Imports
stm (>= 1.3.5), tidygraph (>= 1.1.0), ggraph (>= 2.0.0), igraph (>= 1.2.0), ggrepel (>= 0.8.0), shiny (>= 1.5.0), shinyBS (>= 0.6.0), shinydashboard (>= 0.7.0), shinyjs (>= 1.0.0), ggplot2 (>= 3.3.0), purrr (>= 0.3.0), stringr (>= 1.4.0), dplyr (>= 1.0.0), tibble (>= 2.1.0), readr (>= 1.3.0), huge (>= 1.3.0), stats, scales

Suggests quanteda (>= 2.0.0), knitr, rmarkdown

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`get_diag` computes STM model diagnostics

**Description**

`get_diag()` is a helper function to compute average and median semanticCoherence and exclusivity for a number of STM models. The function does not work for models with content covariates.

**Usage**

`get_diag(models, outobj)`

**Arguments**

- `models` A list of STM models.
- `outobj` The out object containing documents for all STM models.

**Value**

Returns model diagnostics in a data frame.

**Examples**

```r
library(stm)
library(dplyr)
library(ggplot2)
library(quanteda)

# prepare data
data <- corpus(gadarian, text_field = 'open.ended.response')
docvars(data)$text <- as.character(data)
data <- dfm(data, stem = TRUE, remove = stopwords('english'),
          remove_punct = TRUE)
out <- convert(data, to = 'stm')

# fit models
gadarian_3 <- stm(documents = out$documents,
                  vocab = out$vocab,
                  data = out$meta,
                  prevalence = ~ treatment + s(pid_rep),
                  content = TRUE)

# get diagnostics
diagnostics <- get_diag(gadarian_3, out)
```

```csharp
```
get_effects

K = 3,
max.em.its = 1, # reduce computation time for example
verbose = FALSE)

gadarian_5 <- stm(documents = out$documents,
  vocab = out$vocab,
  data = out$meta,
  prevalence = ~ treatment + s(pid_rep),
  K = 5,
  max.em.its = 1, # reduce computation time for example
  verbose = FALSE)

# get diagnostics
diag <- get_diag(models = list(
  model_3 = gadarian_3,
  model_5 = gadarian_5),
  outobj = out)

## Not run:
# plot diagnostics
diag %>%
ggplot(aes(x = coherence, y = exclusivity, color = statistic)) +
  geom_text(aes(label = name), nudge_x = 5) + geom_point() +
  labs(x = 'Semantic Coherence', y = 'Exclusivity') + theme_light()

## End(Not run)

get_effects

extract stm effect estimates

description

get_effects() is a helper function to store effect estimates from stm in a data frame.

usage

get_effects(
  estimates,
  variable,
  type,
  ci = 0.95,
  moderator = NULL,
  modval = NULL,
  cov_val1 = NULL,
  cov_val2 = NULL
)
get_effects

Arguments

estimates The object containing estimates calculated with estimateEffect.
variable The variable for which estimates should be extracted.
type The estimate type. Must be either 'pointestimate', 'continuous', or 'difference'.
ci The confidence interval for uncertainty estimates. Defaults to 0.95.
moderator The moderator variable in case you want to include an interaction effect.
modval The value of the moderator variable for an interaction effect. See examples for combining data for multiple values.
cov_val1 The first value of a covariate for type 'difference'.
cov_val2 The second value of a covariate for type 'difference'. The topic proportion of 'cov_val2' will be subtracted from the proportion of 'cov_val1'.

Value

Returns effect estimates in a tidy data frame.

Examples

library(stm)
library(dplyr)
library(ggplot2)

# store effects
prep <- estimateEffect(1:3 ~ treatment + pid_rep, gadarianFit, gadarian)
effects <- get_effects(estimates = prep,
variable = 'treatment',
type = 'pointestimate')

# plot effects
effects %>% filter(topic == 3) %>%
ggplot(aes(x = value, y = proportion)) +
  geom_errorbar(aes(ymin = lower, ymax = upper), width = 0.1, size = 1) +
  geom_point(size = 3) +
  coord_flip() + theme_light() + labs(x = 'Treatment', y = 'Topic Proportion')

# combine estimates for interaction effects
prep_int <- estimateEffect(1:3 ~ treatment * s(pid_rep),
gadarianFit, gadarian)
effects_int <- get_effects(estimates = prep_int,
variable = 'pid_rep',
type = 'continuous',
moderator = 'treatment',
modval = 1) %>%
bind_rows(
get_effects(estimates = prep_int,
    variable = 'pid_rep',
    type = 'continuous',
    moderator = 'treatment',
    modval = 0)
)

# plot interaction effects
effects_int %>% filter(topic == 2) %>%
    mutate(moderator = as.factor(moderator)) %>%
    ggplot(aes(x = value, y = proportion, color = moderator,
        group = moderator, fill = moderator)) +
    geom_line() +
    geom_ribbon(aes(ymin = lower, ymax = upper), alpha = 0.2) +
    theme_light() +
    labs(x = 'PID Rep.', y = 'Topic Proportion',
        color = 'Treatment', group = 'Treatment', fill = 'Treatment')

get_network(extract topic correlation network

Description

get_network() is a helper function to extract topic correlation networks as tidygraph objects and add labels and topic proportions.

Arguments

model The stm model for computing the correlation network.
method The method for determining edges. Can be either 'simple' or 'huge'.
cutoff The correlation cutoff criterion for method = 'cutoff'. Defaults to 0.05.
labels An optional vector of topic labels. Must include a label for each topic of the model.
cutiso Remove isolated notes without any edges from the network. Defaults to FALSE.

Value

Returns tidygraph network of topic correlations.

Examples

library(stm)
library(ggraph)
library(quanteda)

# prepare data
run_stminsights

launch the stminsights shiny app

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Description

run_stminsights launches the app to analyze Structural Topic models. It requires a .RData file with stm objects as illustrated in the example below.
Usage

run_stminsights(use_browser = TRUE)

Arguments

use_browser Choose whether you want to launch the shiny app in your browser. Defaults to TRUE.

Examples

## Not run:

library(stm)
library(quanteda)

# prepare data
data <- corpus(gadarian, text_field = 'open.ended.response')
docvars(data)$text <- as.character(data)
data <- dfm(data, stem = TRUE, remove = stopwords('english'), remove_punct = TRUE) %>% dfm_trim(min_termfreq = 2)
out <- convert(data, to = 'stm')

# fit models and effect estimates
gadarian_3 <- stm(documents = out$documents,
  vocab = out$vocab,
  data = out$meta,
  prevalence = ~ treatment + s(pid_rep),
  K = 3,
  max.em.its = 1, # reduce computation time for example
  verbose = FALSE)

prep_3 <- estimateEffect(1:3 ~ treatment + s(pid_rep), gadarian_3,
                         meta = out$meta)

gadarian_5 <- stm(documents = out$documents,
  vocab = out$vocab,
  data = out$meta,
  prevalence = ~ treatment + s(pid_rep),
  K = 5,
  max.em.its = 1, # reduce computation time for example
  verbose = FALSE)

prep_5 <- estimateEffect(1:5 ~ treatment + s(pid_rep), gadarian_5,
                         meta = out$meta)

# save objects in .RData file
save.image(paste0(tempdir(), '/stm_gadarian.RData'))

# launch the app
if(interactive()){
    run_stminsights()
} # End(Not run)
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