

Package ‘transforEmotion’

May 15, 2025

Title Sentiment Analysis for Text, Image and Video using Transformer Models

Version 0.1.6

Date 2025-05-15

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Description Implements sentiment analysis using huggingface <<https://huggingface.co>> transformer zero-shot classification model pipelines for text and image data. The default text pipeline is Cross-Encoder's DistilRoBERTa <<https://huggingface.co/cross-encoder/nli-distilroberta-base>> and default image/video pipeline is Open AI's CLIP <<https://huggingface.co/openai/clip-vit-base-patch32>>. All other zero-shot classification model pipelines can be implemented using their model name from <https://huggingface.co/models?pipeline_tag=zero-shot-classification>.

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Encoding UTF-8

Imports dplyr, googledrive, LSAfun, Matrix, methods, pbapply, progress, remotes, reticulate

Suggests knitr, markdown, rmarkdown, rstudioapi, testthat (>= 3.0.0)

VignetteBuilder knitr

RoxygenNote 7.3.2

Config/testthat/edition 3

NeedsCompilation no

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Depends R (>= 3.5.0)

Repository CRAN

Date/Publication 2025-05-15 10:10:01 UTC

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transforEmotion-package

transforEmotion-package

Description

Implements sentiment and emotion analysis using **huggingface** transformer zero-shot classification model pipelines on text and image data. The default text pipeline is **Cross-Encoder's Distil-RoBERTa** and default image/video pipeline is **Open AI's CLIP**. All other zero-shot classification model pipelines can be implemented using their model name from https://huggingface.co/models?pipeline_tag=zero-shot-classification.

Author(s)

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References

Yin, W., Hay, J., & Roth, D. (2019). Benchmarking zero-shot text classification: Datasets, evaluation and entailment approach. arXiv preprint arXiv:1909.00161.

calculate_moving_average

Calculate the moving average for a time series

Description

This function calculates the moving average for a time series.

Usage

```
calculate_moving_average(data, window_size)
```

Arguments

`data` Matrix or Data frame. The time series data
`window_size` Numeric integer. The size of the moving average window.

Value

Matrix or Data frame containing the moving average values.

check_nvidia_gpu *Install Necessary Python Modules*

Description

Installs required Python modules for the {transforEmotion} package, with automatic GPU detection and optional GPU-enabled module installation.

Usage

```
check_nvidia_gpu()
```

Details

This function performs the following steps:

- Checks for NVIDIA GPU availability
- If GPU is detected, prompts user to choose between CPU or GPU installation
- Installs core modules including transformers, torch, tensorflow, and other dependencies
- For GPU installations, sets up additional GPU-specific modules via `setup_gpu_modules()`

The function automatically manages dependencies and versions, ensuring compatibility between CPU and GPU variants of packages like torch, tensorflow, and torchvision. It uses [conda_install](#) for package management in the 'transforEmotion' conda environment.

Note

Ensure that miniconda is installed and properly configured before running this function. For GPU support, NVIDIA drivers must be properly installed on your system.

Author(s)

Alexander P. Christensen <alexpaulchristensen@gmail.com>

conda_check	<i>Check if the "transforEmotion" conda environment exists</i>
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Description

This function checks if the "transforEmotion" conda environment exists by running the command "conda env list" and searching for the environment name in the output.

Usage

```
conda_check()
```

Value

A logical value indicating whether the "transforEmotion" conda environment exists.

delete_transformer	<i>Delete a Transformer Model</i>
--------------------	-----------------------------------

Description

Large language models can be quite large and, when stored locally, can take up a lot of space on your computer. The direct paths to where the models are on your computer is not necessarily intuitive.

This function quickly identifies the models on your computer and informs you which ones can be deleted from it to open up storage space

Usage

```
delete_transformer(model_name, delete = FALSE)
```

Arguments

model_name	Character vector. If no model is provided, then a list of models that are locally stored on the computer are printed
delete	Boolean (length = 1). Should model skip delete question? Defaults to FALSE. Set to TRUE for less interactive deletion

Value

Returns list of models or confirmed deletion

Author(s)

Alexander P. Christensen <alexpaulchristensen@gmail.com>

Examples

```
if(interactive()){
  delete_transformer()
}
```

dlo_dynamics

Dynamics function of the DLO model

Description

This function calculates the dynamics of a system using the DLO (Damped Linear Oscillator) model based on Equation 1 (Ollero et al., 2023). The DLO model is a second-order differential equation that describes the behavior of a damped harmonic oscillator. The function takes in the current state of the system, the derivative of the state, the damping coefficient, the time step, and the values of the eta and zeta parameters. It returns the updated derivative of the state.

Usage

```
dlo_dynamics(x, dxdt, q, dt, eta, zeta)
```

Arguments

x	Numeric. The current state of the system (value of the latent score).
dxdt	Numeric. The derivative of the state (rate of change of the latent score).
q	Numeric. The damping coefficient.
dt	Numeric. The time step.
eta	Numeric. The eta parameter of the DLO model.
zeta	Numeric. The zeta parameter of the DLO model.

Value

A numeric vector containing the updated derivative of the state.

References

Ollero, M. J. F., Estrada, E., Hunter, M. D., & Cancer, P. F. (2023). Characterizing affect dynamics with a damped linear oscillator model: Theoretical considerations and recommendations for individual-level applications. *Psychological Methods*. doi:10.1037/met0000615

emotions

Emotions Data

Description

A matrix containing words ($n = 175,592$) and the emotion category most frequently associated with each word. This dataset is a modified version of the 'DepecheMood++' lexicon developed by Araque, Gatti, Staiano, and Guerini (2018). For proper scoring, text should not be stemmed prior to using this lexicon. This version of the lexicon does not rely on part of speech tagging.

Usage

```
data(emotions)
```

Format

A data frame with 175,592 rows and 9 columns.

word An entry in the lexicon, in English

AFRAID, AMUSED, ANGRY, ANNOYED, DONT_CARE, HAPPY, INSPIRED, SAD The emotional category. All emotions contain either a 0 or 1. If the category is most likely to be associated with the word, it receives a 1, otherwise, 0. Words are only associated with one category.

References

Araque, O., Gatti, L., Staiano, J., and Guerini, M. (2018). DepecheMood++: A bilingual emotion lexicon built through simple yet powerful techniques. *ArXiv*

Examples

```
data("emotions")
```

emoxicon_scores

Emoxicon Scores

Description

A bag-of-words approach for computing emotions in text data using the lexicon compiled by Araque, Gatti, Staiano, and Guerini (2018).

Usage

```
emoxicon_scores(text, lexicon, exclude)
```

Arguments

text	Matrix or data frame. A data frame containing texts to be scored (one text per row)
lexicon	The lexicon used to score the words. The default is the emotions dataset, a modification of the lexicon developed by Araque, Gatti, Staiano, and Guerini (2018). To use the raw lexicon from Araque et. al (2018) containing the original probability weights, use the weights dataset. If another custom lexicon is used, the first column of the lexicon should contain the terms and the subsequent columns contain the scoring categories.
exclude	A vector listing terms that should be excluded from the lexicon. Words specified in exclude will not influence document scoring. Users should consider excluding 'red herring' words that are more closely related to the topics of the documents, rather than the documents' emotional content. For example, the words "clinton" and "trump" are present in the lexicon and are both associated with the emotion 'AMUSED'. Excluding these words when analyzing political opinions may produce more accurate results.

Author(s)

Tara Valladares <tls8vx at virginia.edu> and Hudson F. Golino <hfg9s at virginia.edu>

References

Araque, O., Gatti, L., Staiano, J., and Guerini, M. (2018). DepecheMood++: A bilingual emotion lexicon built through simple yet powerful techniques. *ArXiv*

See Also

[emotions](#), where we describe how we modified the original DepecheMood++ lexicon.

Examples

```
# Obtain "emotions" data
data("emotions")

# Obtain "tinytrolls" data
data("tinytrolls")

## Not run:
# Obtain emoxicon scores for first 10 tweets
emotions_tinytrolls <- emoxicon_scores(text = tinytrolls$content, lexicon = emotions)

## End(Not run)
```

 emphasize

Generate and emphasize sudden jumps in emotion scores

Description

This function generates and emphasizes the effect of strong emotions expressions during the period where the derivative of the latent variable is high. The observable value of the strongest emotion from the positive or negative group will spike in the next k time steps. The probability of this happening is p at each time step in which the derivative of the latent variable is greater than 0.2. The jump is proportionate to the derivative of the latent variable and the sum of the observable values of the other emotions.

Usage

```
emphasize(data, num_observables, num_steps, k = 10, p = 0.5)
```

Arguments

data	Data frame. The data frame containing the latent and observable variables created by the <code>simulate_video</code> function.
num_observables	Numeric integer. The number of observable variables per latent factor.
num_steps	Numeric integer. The number of time steps used in the simulation.
k	Numeric integer. The number of time steps to emphasize the effect of strong emotions on future emotions (default is 10). Alternatively: the length of a strong emotional episode.
p	Numeric. The probability of the strongest emotion being emphasized in the next k time steps (default is 0.5).

Value

A data frame containing the updated observable variables.

 generate_observables

Generate observable emotion scores data from latent variables

Description

Function to generate observable data from 2 latent variables (negative and positive affect). The function takes in the latent variable scores, the number of time steps, the number of observable variables per latent factor, and the measurement error variance. It returns a matrix of observable data. The factor loadings are not the same for all observable variables. They have uniform random noise added to them (between -0.15 and 0.15). The loadings are scaled so that the sum of the loadings for each latent factor is 2, to introduce a ceiling effect and to differentiate the dynamics of specific emotions. This is further emphasized by adding small noise to the measurement error variance for each observed variable (between -0.01 and 0.01).

Usage

```
generate_observables(X, num_steps, num_obs, error, loadings = 0.8)
```

Arguments

X	Matrix or Data frame. The (num_steps X 2) matrix of latent variable scores.
num_steps	Numeric integer. Number of time steps.
num_obs	Numeric integer. The number of observable variables per latent factor.
error	Numeric. Measurement error variance.
loadings	Numeric (default = 0.8). The default initial loading of the latent variable on the observable variable.

Value

A (num_steps X num_obs) Matrix or Data frame containing the observable variables.

generate_q

Generate a matrix of Dynamic Error values for the DLO simulation

Description

This function generates a matrix of Dynamic Error values (q) for the DLO simulation.

Usage

```
generate_q(num_steps, sigma_q)
```

Arguments

num_steps	Numeric integer. The number of time steps used in the simulation.
sigma_q	Numeric. Standard deviation of the Dynamic Error/

Value

A (num_steps X 3) matrix of Dynamic Error values for neutral, negative and positive emotion latent score.

 image_scores

 Calculate image scores using a Hugging Face CLIP model

Description

This function takes an image file and a vector of classes as input and calculates the scores for each class using a specified Hugging Face CLIP model. Primary use of the function is to calculate FER scores - Facial Expression Detection of emotions based on detected facial expression in images. In case there are more than one face in the image, the function will return the scores of the face selected using the face_selection parameter. If there is no face in the image, the function will return NA for all classes. Function uses reticulate to call the Python functions in the image.py file. If you run this package/function for the first time it will take some time for the package to setup a functioning Python virtual environment in the background. This includes installing Python libraries for facial recognition and emotion detection in text, images and video. Please be patient.

Usage

```
image_scores(
  image,
  classes,
  face_selection = "largest",
  model = "oai-base",
  local_model_path = NULL
)
```

Arguments

- | | |
|----------------|---|
| image | The path to the image file or URL of the image. |
| classes | A character vector of classes to classify the image into. |
| face_selection | The method to select the face in the image. Can be "largest" or "left" or "right". Default is "largest" and will select the largest face in the image. "left" and "right" will select the face on the far left or the far right side of the image. Face_selection method is irrelevant if there is only one face in the image. |
| model | A string specifying the CLIP model to use. Options are: <ul style="list-style-type: none"> • "oai-base": "openai/clip-vit-base-patch32" (default) • "oai-large": "openai/clip-vit-large-patch14" • "eva-8B": "BAAI/EVA-CLIP-8B-448" (quantized version for reduced memory usage) • "jina-v2": "jinaai/jina-clip-v2" • Any valid HuggingFace model ID |

Note: Using custom HuggingFace model IDs beyond the recommended models is done at your own risk. Large models may cause memory issues or crashes, especially on systems with limited resources. The package has been optimized and tested with the recommended models listed above.

`local_model_path`

Optional. Path to a local directory containing a pre-downloaded HuggingFace model. If provided, the model will be loaded from this directory instead of being downloaded from HuggingFace. This is useful for offline usage or for using custom fine-tuned models.

On Linux/Mac, look in `~/.cache/huggingface/hub/` folder for downloaded models. Navigate to the snapshots folder for the relevant model and point to the directory which contains the config.json file. For example: `"/home/username/.cache/huggingface/hub/models--cross-encoder-nli-distilroberta-base/snapshots/b5b020e8117e1ddc6a0c7ed0fd22c0e679edf0fa/"`

On Windows, the base path is `C:\Users\USERNAME\.cache\huggingface\transformers\`

Warning: Using very large models from local paths may cause memory issues or crashes depending on your system's resources.

Details

Data Privacy: All processing is done locally with the downloaded model, and your images are never sent to any remote server or third-party.

Value

A data frame containing the scores for each class.

Author(s)

Aleksandar Tomasevic <atomashevic@gmail.com>

MASS_mvrnorm

Multivariate Normal (Gaussian) Distribution

Description

This function generates a random sample from the multivariate normal distribution with mean μ and covariance matrix Σ .

Usage

`MASS_mvrnorm(n = 1, mu, Sigma, tol = 1e-06, empirical = FALSE, EISPACK = FALSE)`

Arguments

- `n` Numeric integer. The number of observations to generate.
- `mu` Numeric vector. The mean vector of the multivariate normal distribution.
- `Sigma` Numeric matrix. The covariance matrix of the multivariate normal distribution.
- `tol` Numeric. Tolerance for checking the positive definiteness of the covariance matrix.
- `empirical` Logical. Whether to return the empirical covariance matrix.
- `EISPACK` Logical. Whether to use the EISPACK routine instead of the LINPACK routine.

Value

A (n X p) matrix of random observations from the multivariate normal distribution. Updated: 26.10.2023.

neo_ipip_extraversion *NEO-PI-R IPIP Extraversion Item Descriptions*

Description

A list (length = 6) of the NEO-PI-R IPIP item descriptions (<https://ipip.ori.org/newNEOFacetsKey.htm>). Each vector within the 6 list elements contains the item descriptions for the respective Extraversion facets – friendliness, gregariousness, assertiveness, activity_level, excitement_seeking, and cheerfulness

Usage

```
data(neo_ipip_extraversion)
```

Format

A list (length = 6)

Examples

```
data("neo_ipip_extraversion")
```

nlp_scores *Natural Language Processing Scores*

Description

Natural Language Processing using word embeddings to compute semantic similarities (cosine; see [costring](#)) of text and specified classes

Usage

```
nlp_scores(
  text,
  classes,
  semantic_space = c("baroni", "cbow", "cbow_ukwac", "en100", "glove", "tasa"),
  preprocess = TRUE,
  remove_stop = TRUE,
  keep_in_env = TRUE,
  envir = 1
)
```

Arguments

text	Character vector or list. Text in a vector or list data format
classes	Character vector. Classes to score the text
semantic_space	Character vector. The semantic space used to compute the distances between words (more than one allowed). Here's a list of the semantic spaces: "baroni" Combination of British National Corpus, ukWaC corpus, and a 2009 Wikipedia dump. Space created using continuous bag of words algorithm using a context window size of 11 words (5 left and right) and 400 dimensions. Best word2vec model according to Baroni, Dinu, & Kruszewski (2014) "cbow" Combination of British National Corpus, ukWaC corpus, and a 2009 Wikipedia dump. Space created using continuous bag of words algorithm with a context window size of 5 (2 left and right) and 300 dimensions "cbow_ukwac" ukWaC corpus with the continuous bag of words algorithm with a context window size of 5 (2 left and right) and 400 dimensions "en100" Combination of British National Corpus, ukWaC corpus, and a 2009 Wikipedia dump. 100,000 most frequent words. Uses moving window model with a size of 5 (2 to the left and right). Positive pointwise mutual information and singular value decomposition was used to reduce the space to 300 dimensions "glove" Wikipedia 2014 dump and Gigaword 5 with 400,000 words (300 dimensions). Uses co-occurrence of words in text documents (uses cosine similarity) "tasa" Latent Semantic Analysis space from TASA corpus all (300 dimensions). Uses co-occurrence of words in text documents (uses cosine similarity)
preprocess	Boolean. Should basic preprocessing be applied? Includes making lowercase, keeping only alphanumeric characters, removing escape characters, removing repeated characters, and removing white space. Defaults to TRUE
remove_stop	Boolean. Should stop_words be removed? Defaults to TRUE
keep_in_env	Boolean. Whether the classifier should be kept in your global environment. Defaults to TRUE. By keeping the classifier in your environment, you can skip re-loading the classifier every time you run this function. TRUE is recommended
envir	Numeric. Environment for the classifier to be saved for repeated use. Defaults to the global environment

Value

Returns semantic distances for the text classes

Author(s)

Alexander P. Christensen <alexpaulchristensen@gmail.com>

References

Baroni, M., Dinu, G., & Kruszewski, G. (2014). Don't count, predict! a systematic comparison of context-counting vs. context-predicting semantic vectors. In *Proceedings of the 52nd annual meeting of the association for computational linguistics* (pp. 238-247).

Landauer, T.K., & Dumais, S.T. (1997). A solution to Plato's problem: The Latent Semantic Analysis theory of acquisition, induction and representation of knowledge. *Psychological Review*, *104*, 211-240.

Pennington, J., Socher, R., & Manning, C. D. (2014). GloVe: Global vectors for word representation. In *Proceedings of the 2014 conference on empirical methods in natural language processing* (pp. 1532-1543).

Examples

```
# Load data
data(neo_ipip_extraversion)

# Example text
text <- neo_ipip_extraversion$friendliness[1:5]

## Not run:
# GloVe
nlp_scores(
  text = text,
  classes = c(
    "friendly", "gregarious", "assertive",
    "active", "excitement", "cheerful"
  )
)

# Baroni
nlp_scores(
  text = text,
  classes = c(
    "friendly", "gregarious", "assertive",
    "active", "excitement", "cheerful"
  ),
  semantic_space = "baroni"
)

# CBOW
nlp_scores(
  text = text,
  classes = c(
    "friendly", "gregarious", "assertive",
    "active", "excitement", "cheerful"
  ),
  semantic_space = "cbow"
)

# CBOW + ukWaC
nlp_scores(
```

```
text = text,
classes = c(
  "friendly", "gregarious", "assertive",
  "active", "excitement", "cheerful"
),
semantic_space = "cbow_ukwac"
)

# en100
nlp_scores(
  text = text,
  classes = c(
    "friendly", "gregarious", "assertive",
    "active", "excitement", "cheerful"
  ),
  semantic_space = "en100"
)

# tasa
nlp_scores(
  text = text,
  classes = c(
    "friendly", "gregarious", "assertive",
    "active", "excitement", "cheerful"
  ),
  semantic_space = "tasa"
)

## End(Not run)
```

plot_sim_emotions *Plot the latent or the observable emotion scores.*

Description

Function to plot the latent or the observable emotion scores.

Usage

```
plot_sim_emotions(df, mode = "latent", title = " ")
```

Arguments

df	Data frame. The data frame containing the latent and observable variables created by the simulate_video function.
mode	Character. The mode of the plot. Can be either 'latent', 'positive' or 'negative'.
title	Character. The title of the plot. Default is an empty title, ' '.

Value

A plot of the latent or the observable emotion scores.

punctuate

Punctuation Removal for Text

Description

Keeps the punctuations you want and removes the punctuations you don't

Usage

```
punctuate(
  text,
  allowPunctuations = c("-", "?", "'", "\"", ";", ",", ".", "!")
)
```

Arguments

`text` Character vector or list. Text in a vector or list data format

`allowPunctuations` Character vector. Punctuations that should be allowed in the text. Defaults to common punctuations in English text

Details

Coarsely removes punctuations from text. Keeps general punctuations that are used in most English language text. Apostrophes are much trickier. For example, not allowing "'" will remove apostrophes from contractions like "can't" becoming "cant"

Value

Returns text with only the allowed punctuations

Author(s)

Alexander P. Christensen <alexpaulchristensen@gmail.com>

Examples

```
# Load data
data(neo_ipip_extraversion)

# Example text
text <- neo_ipip_extraversion$friendliness

# Keep only periods
punctuate(text, allowPunctuations = c("."))
```

 rag *Retrieval-augmented Generation (RAG)*

Description

Performs retrieval-augmented generation {llama-index}
 Currently limited to the TinyLLAMA model

Usage

```
rag(
  text = NULL,
  path = NULL,
  transformer = c("LLAMA-2", "Mistral-7B", "OpenChat-3.5", "Orca-2", "Phi-2",
    "TinyLLAMA"),
  prompt = "You are an expert at extracting themes across many texts",
  query,
  response_mode = c("accumulate", "compact", "no_text", "refine", "simple_summarize",
    "tree_summarize"),
  similarity_top_k = 5,
  device = c("auto", "cpu", "cuda"),
  keep_in_env = TRUE,
  envir = 1,
  progress = TRUE
)
```

Arguments

text	Character vector or list. Text in a vector or list data format. path will override input into text Defaults to NULL
path	Character. Path to .pdfs stored locally on your computer. Defaults to NULL
transformer	Character. Large language model to use for RAG. Available models include: "LLAMA-2" The largest model available (13B parameters) but also the most challenging to get up and running for Mac and Windows. Linux operating systems run smooth. The challenge comes with installing the {llama-cpp-python} module. Currently, we do not provide support for Mac and Windows users "Mistral-7B" Mistral's 7B parameter model that serves as a high quality but more computationally expensive (more time consuming) "Orca-2" More documentation soon... "Phi-2" More documentation soon... "TinyLLAMA" Default. A smaller, 1B parameter version of LLAMA-2 that offers fast inference with reasonable quality
prompt	Character (length = 1). Prompt to feed into TinyLLAMA. Defaults to "You are an expert at extracting emotional themes across many texts"

query	Character. The query you'd like to know from the documents. Defaults to prompt if not provided
response_mode	Character (length = 1). Different responses generated from the model. See documentation here Defaults to "tree_summarize"
similarity_top_k	Numeric (length = 1). Retrieves most representative texts given the query. Larger values will provide a more comprehensive response but at the cost of computational efficiency; small values will provide a more focused response at the cost of comprehensiveness. Defaults to 5. Values will vary based on number of texts but some suggested values might be: 40-60 Comprehensive search across all texts 20-40 Exploratory with good trade-off between comprehensive and speed 5-15 Focused search that should give generally good results These values depend on the number and quality of texts. Adjust as necessary
device	Character. Whether to use CPU or GPU for inference. Defaults to "auto" which will use GPU over CPU (if CUDA-capable GPU is setup). Set to "cpu" to perform over CPU
keep_in_env	Boolean (length = 1). Whether the classifier should be kept in your global environment. Defaults to TRUE. By keeping the classifier in your environment, you can skip re-loading the classifier every time you run this function. TRUE is recommended
envir	Numeric (length = 1). Environment for the classifier to be saved for repeated use. Defaults to the global environment
progress	Boolean (length = 1). Whether progress should be displayed. Defaults to TRUE

Value

Returns response from TinyLLAMA

Data Privacy

All processing is done locally with the downloaded model, and your text is never sent to any remote server or third-party.

Author(s)

Alexander P. Christensen <alexpaulchristensen@gmail.com>

Examples

```
# Load data
data(neo_ipip_extraversion)

# Example text
text <- neo_ipip_extraversion$friendliness[1:5]
```

```
## Not run:
rag(
  text = text,
  query = "What themes are prevalent across the text?",
  response_mode = "tree_summarize",
  similarity_top_k = 5
)
## End(Not run)
```

sentence_similarity *Sentiment Analysis Scores*

Description

Uses sentiment analysis pipelines from [huggingface](#) to compute probabilities that the text corresponds to the specified classes

Usage

```
sentence_similarity(
  text,
  comparison_text,
  transformer = c("all_minilm_l6"),
  device = c("auto", "cpu", "cuda"),
  preprocess = FALSE,
  keep_in_env = TRUE,
  envir = 1
)
```

Arguments

text	Character vector or list. Text in a vector or list data format
comparison_text	Character vector or list. Text in a vector or list data format
transformer	Character. Specific sentence similarity transformer to be used. Defaults to "all_minilm_l6" (see huggingface) Also allows any sentence similarity models with a pipeline from huggingface to be used by using the specified name (e.g., "typeform/distilbert-base-uncased-mnli"; see Examples)
device	Character. Whether to use CPU or GPU for inference. Defaults to "auto" which will use GPU over CPU (if CUDA-capable GPU is setup). Set to "cpu" to perform over CPU
preprocess	Boolean. Should basic preprocessing be applied? Includes making lowercase, keeping only alphanumeric characters, removing escape characters, removing repeated characters, and removing white space. Defaults to FALSE. Transformers generally are OK without preprocessing and handle many of these functions internally, so setting to TRUE will not change performance much

keep_in_env	Boolean. Whether the classifier should be kept in your global environment. Defaults to TRUE. By keeping the classifier in your environment, you can skip re-loading the classifier every time you run this function. TRUE is recommended
envir	Numeric. Environment for the classifier to be saved for repeated use. Defaults to the global environment

Value

Returns a $n \times m$ similarity matrix where n is length of text and m is the length of comparison_text

Author(s)

Alexander P. Christensen <alexpaulchristensen@gmail.com>

Examples

```
# Load data
data(neo_ipip_extraversion)

# Example text
text <- neo_ipip_extraversion$friendliness[1:5]

## Not run:
# Example with defaults
sentence_similarity(
  text = text, comparison_text = text
)

# Example with model from 'sentence-transformers'
sentence_similarity(
  text = text, comparison_text = text,
  transformer = "sentence-transformers/all-mpnet-base-v2"
)

## End(Not run)
```

setup_gpu_modules *Install GPU Python Modules*

Description

Installs GPU-specific Python modules for the {transforEmotion} conda environment.

Usage

```
setup_gpu_modules()
```

Details

This function installs additional GPU-specific modules including:

- AutoAWQ for weight quantization
- Auto-GPTQ for GPU quantization
- Optimum for transformer optimization
- llama-cpp-python (Linux only) for CPU/GPU inference

The function is typically called by `setup_modules()` when GPU installation is selected, but can also be run independently to update GPU-specific modules.

Note

This function requires NVIDIA GPU and drivers to be properly installed.

Author(s)

Alexander P. Christensen <alexpaulchristensen@gmail.com>

`setup_miniconda`*Install Miniconda and activate the transforEmotion environment*

Description

Installs miniconda and activates the transforEmotion environment

Usage

```
setup_miniconda()
```

Details

Installs miniconda using [install_miniconda](#) and activates the transforEmotion environment using [use_condaenv](#). If the transforEmotion environment does not exist, it will be created using [conda_create](#).

Author(s)

Alexander P. Christensen <alexpaulchristensen@gmail.com> Aleksandar Tomasevic <atomashevich@gmail.com>

 simulate_video

Simulate latent and observed emotion scores for a single "video"

Description

This function simulates emotions in a video using the DLO model implemented as continuous time state space model. The function takes in several parameters, including the time step, number of steps, number of observables, and various model parameters. It returns a data frame containing the simulated emotions and their derivatives, as well as smoothed versions of the observables. The initial state of the video is always the same. Neutral score is 0.5 and both positive and negative emotion score is 0.25. To simulate more realistic time series, there is an option of including a sudden jump in the emotion scores. This is done by emphasizing the effect of the dominant emotion during the period where the derivative of the latent variable is high. The observable value of the strongest emotion from the positive or negative group will spike in the next k time step (`emph.dur`). The probability of this happening is p at each time step in which the derivative of the latent variable is greater than 0.2. The jump is proportionate to the derivative of the latent variable and the sum of the observable values of the other emotions.

Usage

```
simulate_video(
  dt,
  num_steps,
  num_observables,
  eta_n,
  zeta_n,
  eta,
  zeta,
  sigma_q,
  sd_observable,
  loadings,
  window_size,
  emph = FALSE,
  emph.dur = 10,
  emph.prob = 0.5
)
```

Arguments

<code>dt</code>	Numeric real. The time step for the simulation (in minutes).
<code>num_steps</code>	Numeric real. Total length of the video (in minutes).
<code>num_observables</code>	Numeric integer. The number of observables to generate per factor. Total number of observables generated is $2 \times \text{num_observables}$.
<code>eta_n</code>	Numeric. The eta parameter for the neutral state.
<code>zeta_n</code>	Numeric. The zeta parameter for the neutral state.

eta	Numeric. The eta parameter for the positive and negative emotions.
zeta	Numeric. The zeta parameter for the positive and negative emotions.
sigma_q	Numeric. The standard deviation of Dynamic Error of the q(t) function.
sd_observable	Numeric. The standard deviation of the measurement error.
loadings	Numeric (default = 0.8). The default initial loading of the latent variable on the observable variable.
window_size	Numeric integer. The window size for smoothing the observables.
emph	Logical. Whether to emphasize the effect of dominant emotion (default is FALSE).
emph.dur	Numeric integer. The duration of the emphasis (default is 10).
emph.prob	Numeric. The probability of the dominant emotion being emphasized (default is 0.5).

Value

A data frame (num_steps X (6 + num_observables)) containing the latent scores for neutral score, positive emotions, negative emotions and their derivatives, as well as smoothed versions of the observables.

Examples

```
simulate_video(dt = 0.01, num_steps = 50, num_observables = 4,
              eta_n = 0.5, zeta_n = 0.5,
              eta = 0.5, zeta = 0.5,
              sigma_q = 0.1, sd_observable = 0.1,
              loadings = 0.8, window_size = 10)
```

stop_words

Stop Words from the tm Package

Description

174 English stop words in the *tm* package

Usage

```
data(stop_words)
```

Format

A vector (length = 174)

Examples

```
data("stop_words")
```

`tinytrolls`*Russian Trolls Data - Small Version*

Description

A matrix containing a smaller subset of tweets from the `trolls` dataset, useful for test purposes. There are approximately 20,000 tweets from 50 authors. This dataset includes only authored tweets by each account; retweets, reposts, and repeated tweets have been removed. The original data was provided by FiveThirtyEight and Clemson University researchers Darren Linvill and Patrick Warren. For more information, visit <https://github.com/fivethirtyeight/russian-troll-tweets>

Usage

```
data(tinytrolls)
```

Format

A data frame with 22,143 rows and 6 columns.

content A tweet.

author The name of the handle that authored the tweet.

publish_date The date the tweet was published on.

followers How many followers the handle had at the time of posting.

updates How many interactions (including likes, tweets, retweets) the post garnered.

account_type Left or Right

Examples

```
data(tinytrolls)
```

`transformer_scores`*Sentiment Analysis Scores*

Description

Uses sentiment analysis pipelines from [huggingface](#) to compute probabilities that the text corresponds to the specified classes

Usage

```

transformer_scores(
  text,
  classes,
  multiple_classes = FALSE,
  transformer = c("cross-encoder-roberta", "cross-encoder-distilroberta",
    "facebook-bart"),
  device = c("auto", "cpu", "cuda"),
  preprocess = FALSE,
  keep_in_env = TRUE,
  envir = 1,
  local_model_path = NULL
)

```

Arguments

text	Character vector or list. Text in a vector or list data format
classes	Character vector. Classes to score the text
multiple_classes	Boolean. Whether the text can belong to multiple true classes. Defaults to FALSE. Set to TRUE to get scores with multiple classes
transformer	<p>Character. Specific zero-shot sentiment analysis transformer to be used. Default options:</p> <p>"cross-encoder-roberta" Uses Cross-Encoder's Natural Language Interface RoBERTa Base zero-shot classification model trained on the Stanford Natural Language Inference (SNLI) corpus and MultiNLI datasets</p> <p>"cross-encoder-distilroberta" Uses Cross-Encoder's Natural Language Interface DistilRoBERTa Base zero-shot classification model trained on the Stanford Natural Language Inference (SNLI) corpus and MultiNLI datasets. The DistilRoBERTa is intended to be a smaller, more lightweight version of "cross-encoder-roberta", that sacrifices some accuracy for much faster speed (see https://www.sbert.net/docs/cross_encoder/pretrained_models.html#nli)</p> <p>"facebook-bart" Uses Facebook's BART Large zero-shot classification model trained on the Multi-Genre Natural Language Inference (MultiNLI) dataset</p> <p>Defaults to "cross-encoder-distilroberta"</p> <p>Also allows any zero-shot classification models with a pipeline from hugging-face to be used by using the specified name (e.g., "typeform/distilbert-base-uncased-mnli"; see Examples)</p> <p>Note: Using custom HuggingFace model IDs beyond the recommended models is done at your own risk. Large models may cause memory issues or crashes, especially on systems with limited resources. The package has been optimized and tested with the recommended models listed above.</p>
device	Character. Whether to use CPU or GPU for inference. Defaults to "auto" which will use GPU over CPU (if CUDA-capable GPU is setup). Set to "cpu" to perform over CPU

preprocess	Boolean. Should basic preprocessing be applied? Includes making lowercase, keeping only alphanumeric characters, removing escape characters, removing repeated characters, and removing white space. Defaults to FALSE. Transformers generally are OK without preprocessing and handle many of these functions internally, so setting to TRUE will not change performance much
keep_in_env	Boolean. Whether the classifier should be kept in your global environment. Defaults to TRUE. By keeping the classifier in your environment, you can skip re-loading the classifier every time you run this function. TRUE is recommended
envir	Numeric. Environment for the classifier to be saved for repeated use. Defaults to the global environment
local_model_path	Optional. Path to a local directory containing a pre-downloaded HuggingFace model. If provided, the model will be loaded from this directory instead of being downloaded from HuggingFace. This is useful for offline usage or for using custom fine-tuned models. On Linux/Mac, look in ~/.cache/huggingface/hub/ folder for downloaded models. Navigate to the snapshots folder for the relevant model and point to the directory which contains the config.json file. For example: "/home/username/.cache/huggingface/hub/models--cross-encoder-nli-distilroberta-base/snapshots/b5b020e8117e1ddc6a0c7ed0fd22c0e679edf0fa/" On Windows, the base path is C:\Users\USERNAME\.cache\huggingface\transformers\ Warning: Using very large models from local paths may cause memory issues or crashes depending on your system's resources.

Value

Returns probabilities for the text classes

Data Privacy

All processing is done locally with the downloaded model, and your text is never sent to any remote server or third-party.

Author(s)

Alexander P. Christensen <alexpaulchristensen@gmail.com>

References**# BART**

Lewis, M., Liu, Y., Goyal, N., Ghazvininejad, M., Mohamed, A., Levy, O., ... & Zettlemoyer, L. (2019). Bart: Denoising sequence-to-sequence pre-training for natural language generation, translation, and comprehension. *arXiv preprint arXiv:1910.13461*.

RoBERTa

Liu, Y., Ott, M., Goyal, N., Du, J., Joshi, M., Chen, D., ... & Stoyanov, V. (2019). Roberta: A robustly optimized bert pretraining approach. *arXiv preprint arXiv:1907.11692*.

Zero-shot classification

Yin, W., Hay, J., & Roth, D. (2019). Benchmarking zero-shot text classification: Datasets, evaluation and entailment approach. *arXiv preprint arXiv:1909.00161*.

MultiNLI dataset

Williams, A., Nangia, N., & Bowman, S. R. (2017). A broad-coverage challenge corpus for sentence understanding through inference. *arXiv preprint arXiv:1704.05426*.

Examples

```
# Load data
data(neo_ipip_extraversion)

# Example text
text <- neo_ipip_extraversion$friendliness[1:5]

## Not run:
# Cross-Encoder DistilRoBERTa
transformer_scores(
  text = text,
  classes = c(
    "friendly", "gregarious", "assertive",
    "active", "excitement", "cheerful"
  )
)

# Facebook BART Large
transformer_scores(
  text = text,
  classes = c(
    "friendly", "gregarious", "assertive",
    "active", "excitement", "cheerful"
  ),
  transformer = "facebook-bart"
)

# Directly from huggingface: typeform/distilbert-base-uncased-mnli
transformer_scores(
  text = text,
  classes = c(
    "friendly", "gregarious", "assertive",
    "active", "excitement", "cheerful"
  ),
  transformer = "typeform/distilbert-base-uncased-mnli"
)

## End(Not run)
```

Description

This function retrieves facial expression recognition (FER) scores from a specific number of frames extracted from a YouTube video using a specified Hugging Face CLIP model. It utilizes Python libraries for facial recognition and emotion detection in text, images, and video.

Usage

```
video_scores(
    video,
    classes,
    nframes = 100,
    face_selection = "largest",
    start = 0,
    end = -1,
    uniform = FALSE,
    ffreq = 15,
    save_video = FALSE,
    save_frames = FALSE,
    save_dir = "temp/",
    video_name = "temp",
    model = "oai-base",
    local_model_path = NULL
)
```

Arguments

video	The URL of the YouTube video to analyze.
classes	A character vector specifying the classes to analyze.
nframes	The number of frames to analyze in the video. Default is 100.
face_selection	The method for selecting faces in the video. Options are "largest", "left", or "right". Default is "largest".
start	The start time of the video range to analyze. Default is 0.
end	The end time of the video range to analyze. Default is -1 and this means that video won't be cut. If end is a positive number greater than start, the video will be cut from start to end.
uniform	Logical indicating whether to uniformly sample frames from the video. Default is FALSE.
ffreq	The frame frequency for sampling frames from the video. Default is 15.
save_video	Logical indicating whether to save the analyzed video. Default is FALSE.
save_frames	Logical indicating whether to save the analyzed frames. Default is FALSE.
save_dir	The directory to save the analyzed frames. Default is "temp/".
video_name	The name of the analyzed video. Default is "temp".
model	A string specifying the CLIP model to use. Options are: <ul style="list-style-type: none"> "oai-base": "openai/clip-vit-base-patch32" (default)

- "oai-large": "openai/clip-vit-large-patch14"
- "eva-8B": "BAAI/EVA-CLIP-8B-448" (quantized version for reduced memory usage)
- "jina-v2": "jinaai/jina-clip-v2"
- Any valid HuggingFace model ID

Note: Using custom HuggingFace model IDs beyond the recommended models is done at your own risk. Large models may cause memory issues or crashes, especially on systems with limited resources. The package has been optimized and tested with the recommended models listed above. Video processing is particularly memory-intensive, so use caution with large custom models.

local_model_path

Optional. Path to a local directory containing a pre-downloaded HuggingFace model. If provided, the model will be loaded from this directory instead of being downloaded from HuggingFace. This is useful for offline usage or for using custom fine-tuned models.

On Linux/Mac, look in `~/.cache/huggingface/hub/` folder for downloaded models. Navigate to the snapshots folder for the relevant model and point to the directory which contains the config.json file. For example: `"/home/username/.cache/huggingface/hub/models--cross-encoder-nli-distilroberta-base/snapshots/b5b020e8117e1ddc6a0c7ed0fd22c0e679edf0fa/"`

On Windows, the base path is `C:\Users\USERNAME\.cache\huggingface\transformers\`

Warning: Using very large models from local paths may cause memory issues or crashes depending on your system's resources, especially when processing videos with many frames.

Value

A result object containing the analyzed video scores.

Data Privacy

All processing is done locally with the downloaded model, and your video frames are never sent to any remote server or third-party.

Author(s)

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