

News Sentiment Analysis

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News sentiment analysis



Assess sentiment analysis of news articles - their parts and the whole text, as well as aspects of sentiment towards different mentioned issues



Exploration of current SOTA approaches



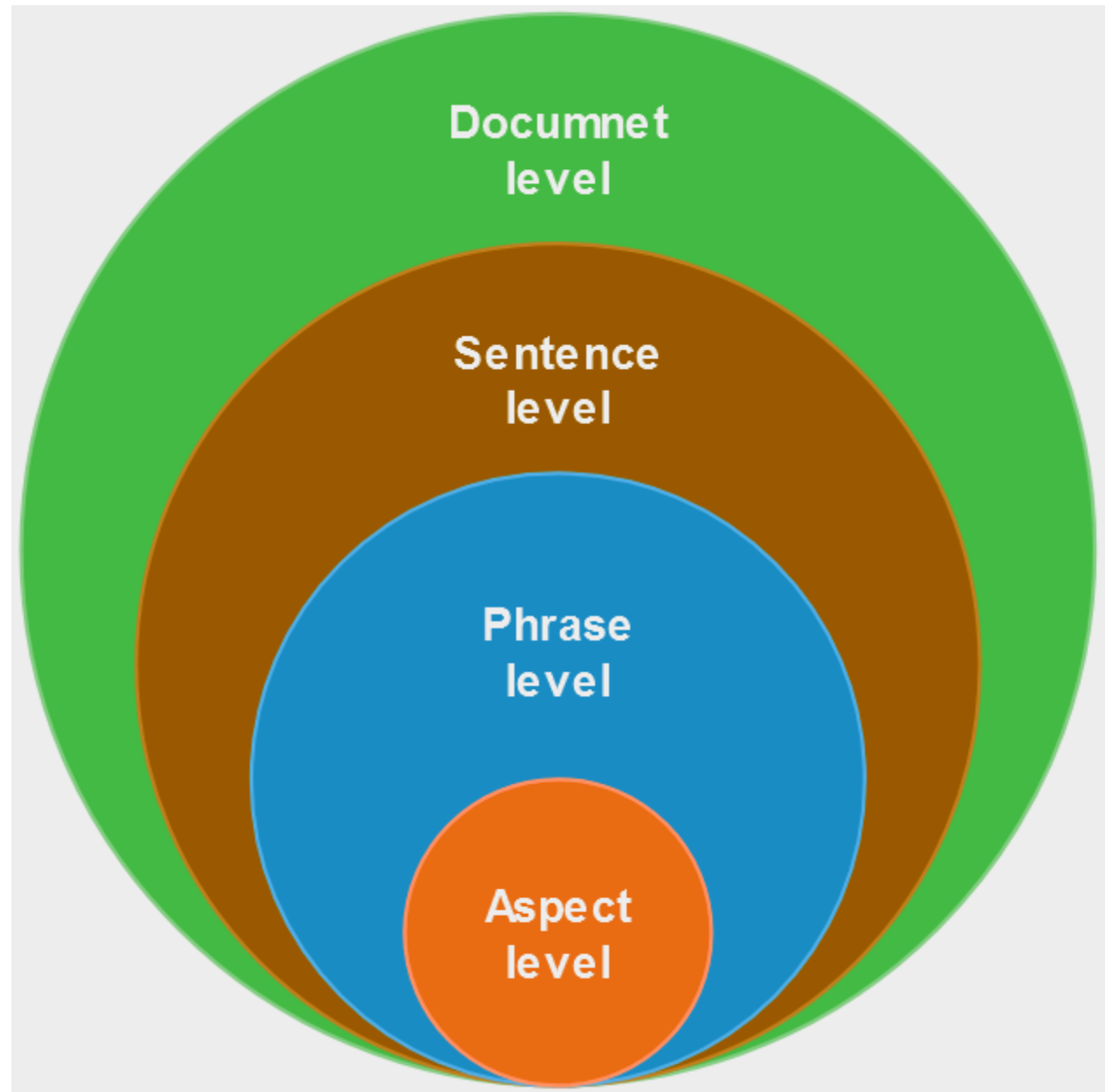
Make vizualizations using predicted sentiment



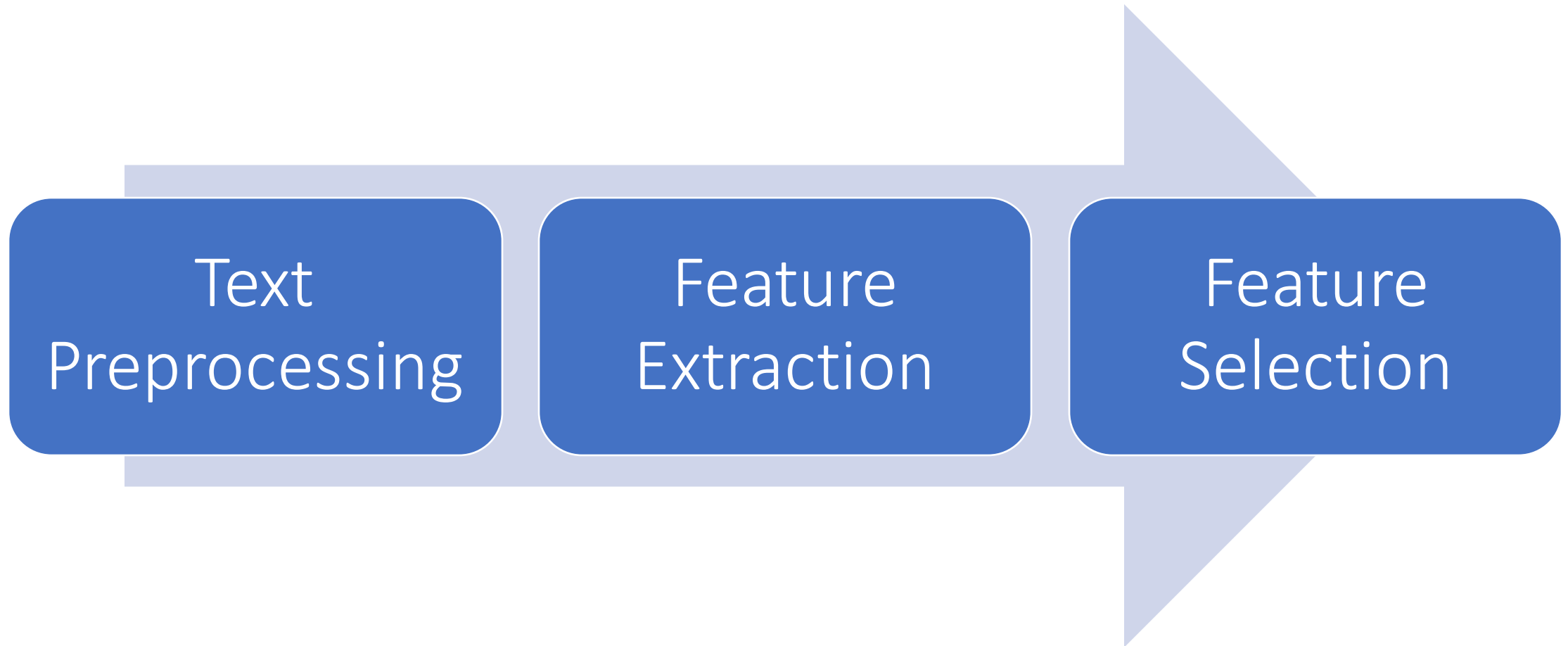
Perform XAI on top of our predictions

Sentiment analysis

Level of sentiment analysis



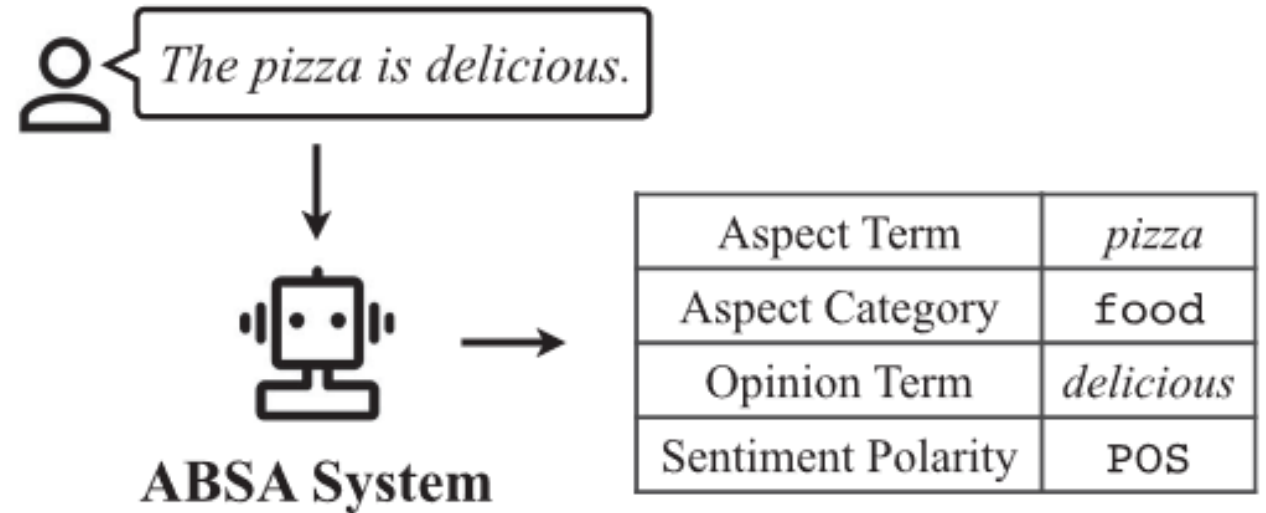
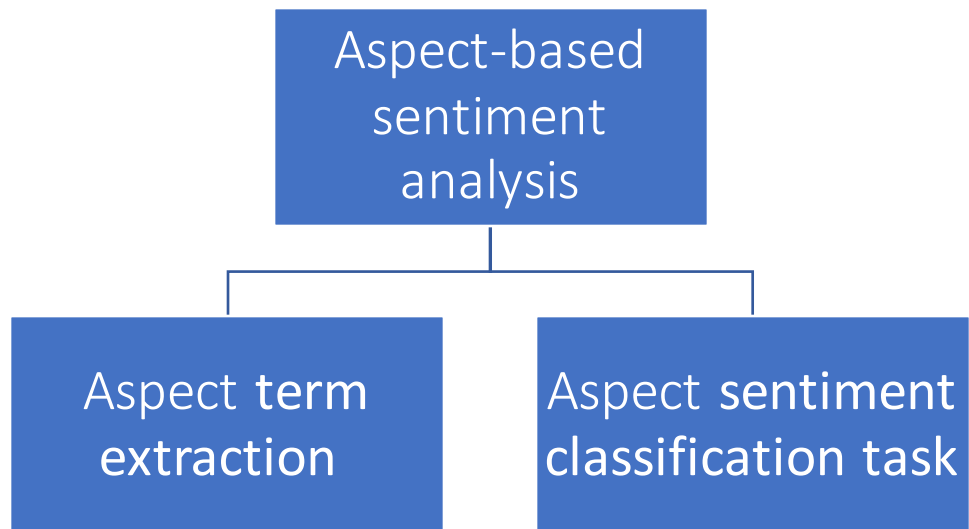
Data preprocessing



Challenges in sentiment analysis

- Sarcasm detection
- Negation handling
- Spam detection
- Anaphora and coreference resolution
- Word sense disambiguation
- Low-resource languages
- Sentiment analysis of code-mixed data

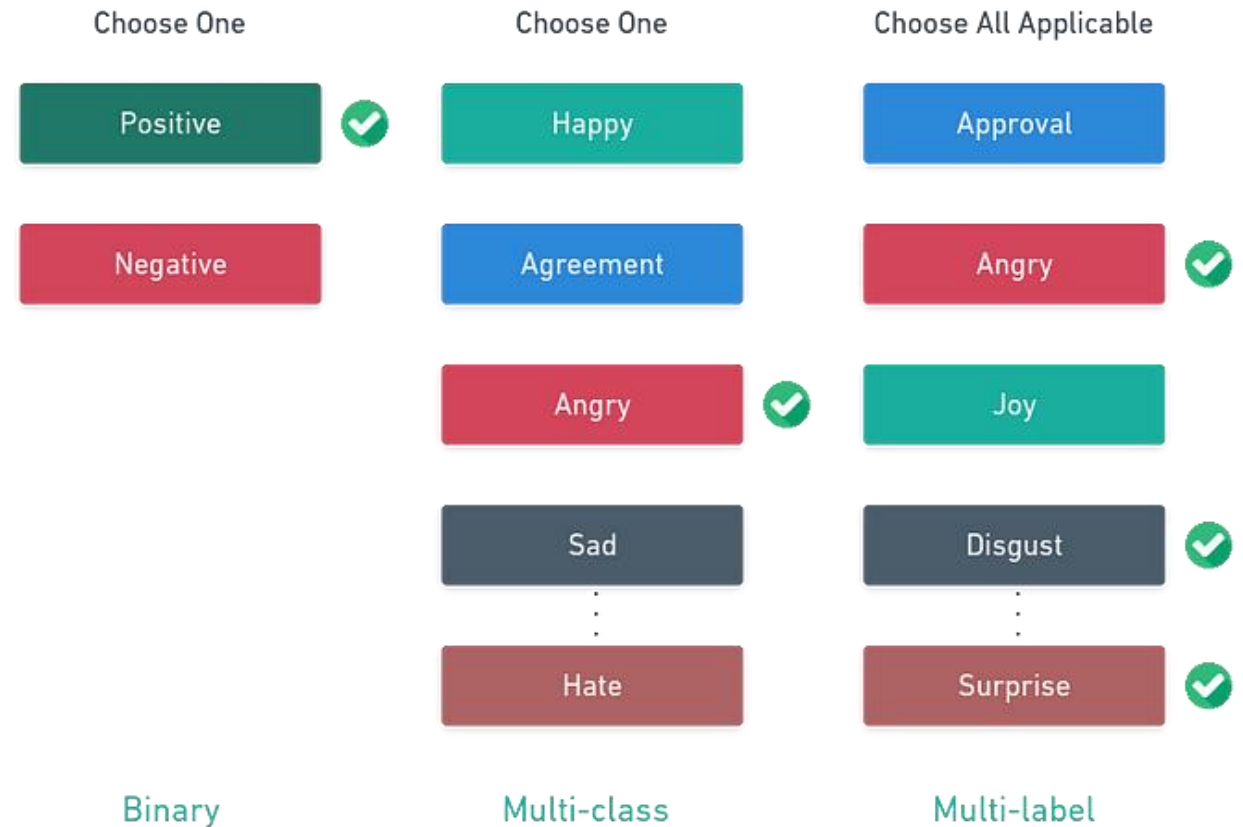
Aspect-based sentiment analysis



Zhang, W., Li, X., Deng, Y., Bing, L. and Lam, W. (2022). A Survey on Aspect-Based Sentiment Analysis: Tasks, Methods, and Challenges. *arXiv (Cornell University)*.

Extensions of sentiment analysis

- Fine-grained scale of sentiment
- Multilabel classification : go emotions dataset



Slovenian language in NLP – available datasets

Annotated news corpora and a lexicon for sentiment analysis in Slovene (Bučar, J., Žnidaršič, M. & Povh, J.)

- 250 000 documents
- 10 000 manually annotated

Slovene corpus for aspect-based sentiment analysis - SentiCoref 1.0 (Žitnik, S.)

- 837 documents
- 31 000 named entities
- 5 level sentiment annotation for each entity

Slovenian language in NLP

- No sentiment analysis task in the benchmark
- 1 model available at huggingface.com referring to Slovenian and Croatian

Leaderboards

Natural language inference (SI-NLI) >

A natural language inference benchmark for Slovene language.



04 October 2023



4

1.0

Slovene SuperGLUE >

This leaderboard is a Slovene (translated) version of an existing English version of SuperGLUE benchmark.



15 February 2022



1

1.0

Machine Translation (SLO -> ENG) >

This machine translation leaderboard is measuring a success of automatic machine translation from Slovene to English language.



02 August 2023



13

1.0

Machine Translation (ENG -> SLO) >

This machine translation leaderboard is measuring a success of automatic machine translation from English to Slovene language.



02 August 2023



9

1.0

Speech recognition >

This leaderboard is prepared for the evaluation of automated speech recognition in Slovene.



15 June 2023



3

1.0

Named entity recognition >

A named entity recognition benchmark for Slovene language.



21 September 2023



1

1.0

Universal Dependency Parsing >

Measuring performance of parsing raw text to Universal Dependencies, along with other related subtasks.



31 August 2023



4

1.0

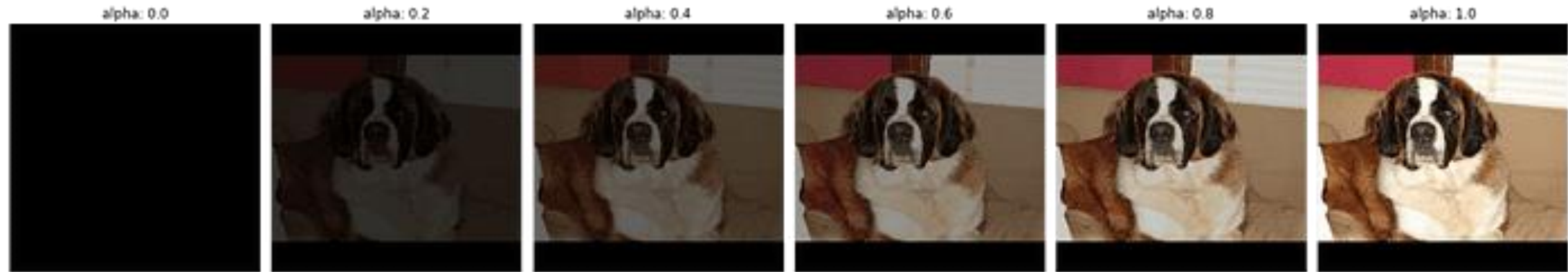
eXplainable Artificial Intelligence

Integrated Gradients

$$\textit{IntegratedGrads}_i(x) ::= (x_i - x'_i) \times \int_{\alpha=0}^1 \frac{\partial F(x' + \alpha \times (x - x'))}{\partial x_i} d\alpha$$

- <https://medium.com/@kemalpiro/xai-methods-integrated-gradients-6ee1fe4120d8>

Integrated Gradients



$$\text{IntegratedGrads}_i(x) ::= (x_i - x'_i) \times \int_{\alpha=0}^1 \frac{\partial F(x' + \alpha \times (x - x'))}{\partial x_i} d\alpha$$

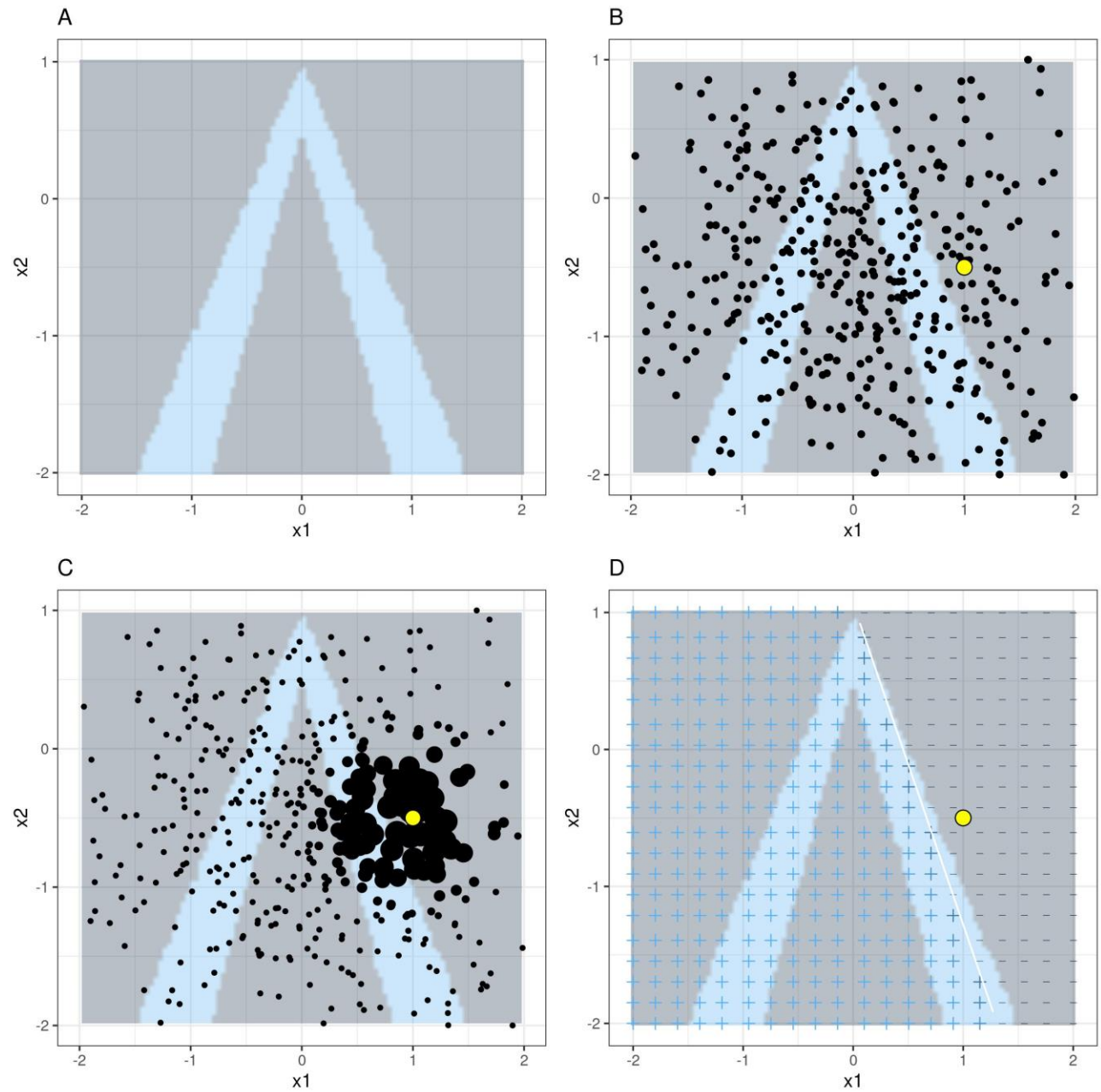
- <https://medium.com/@kemalpiro/xai-methods-integrated-gradients-6ee1fe4120d8>

Application in NLP

- Baseline = [#pad]
(embedding dependent)
- Attributions calculated with respect to embedding tensor
- Attributions summed across all embedding dimensions to get word/token level attribution

Legend: ■ Negative □ Neutral ■ Positive				
True Label	Predicted Label	Attribution Label	Attribution Score	Word Importance
pos	pos (0.96)	pos	1.29	it was a fantastic performance ! #pad
pos	pos (0.87)	pos	1.56	best film ever #pad #pad #pad #pad
pos	pos (0.92)	pos	1.14	such a great show ! #pad #pad
neg	neg (0.29)	pos	-1.11	it was a horrible movie #pad #pad
neg	neg (0.22)	pos	-1.03	i 've never watched something as bad
neg	neg (0.07)	pos	-0.84	that is a terrible movie . #pad

LIME



LIME in NLP

- Generation of perturbed instances using masks
- Similarity computed in embedding space

Output:

us men have right touch in relay duel against australia thens , aug . 17 - so michael phelps is not going to match the seven gold medals won by mark spitz . and it is too early to tell if he will match aleksandr dityatin , the soviet gymnast who won eight total medals in 1980 .

Concept-based interpretability : TCAV

- Concepts
 - Predefined, high-level features
 - In image processing: "stripes"
 - In NLP : "positive sentiment"
 - Represented as dataset
- Concept Activation Vectors (CAVs)
 - CAVs are obtained by perturbing input data along the concept's direction and observing the model's responses.

```
. . so well . . .  
. . so good . . .  
. . . love it . pad  
. . . like it . pad  
. . even greater . . .  
. antic . . . . .  
. . . fantastical . . .  
. grotesque . . . . .  
fantastic . . . . . pad  
grand . . . . . pad
```



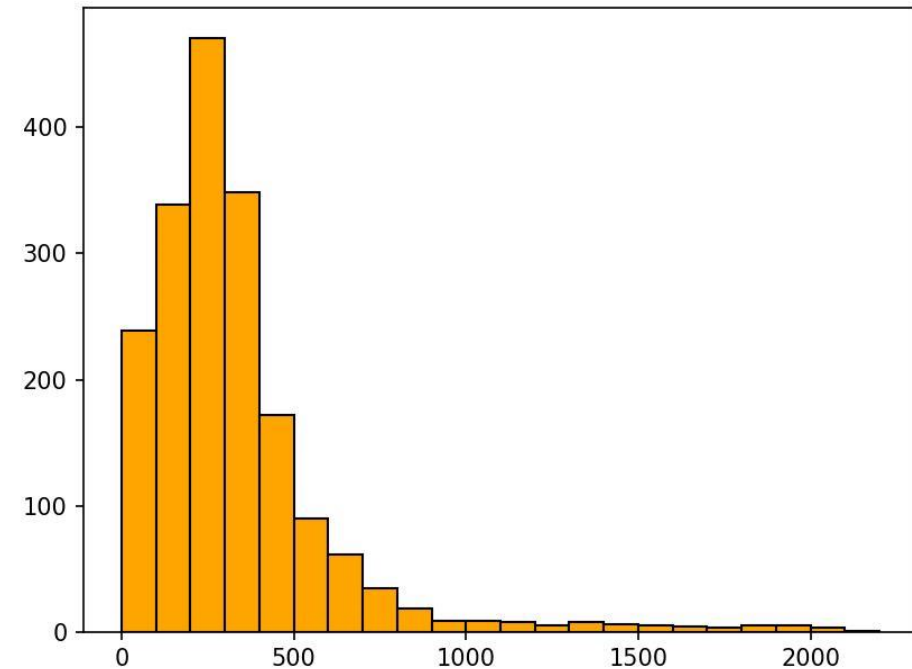
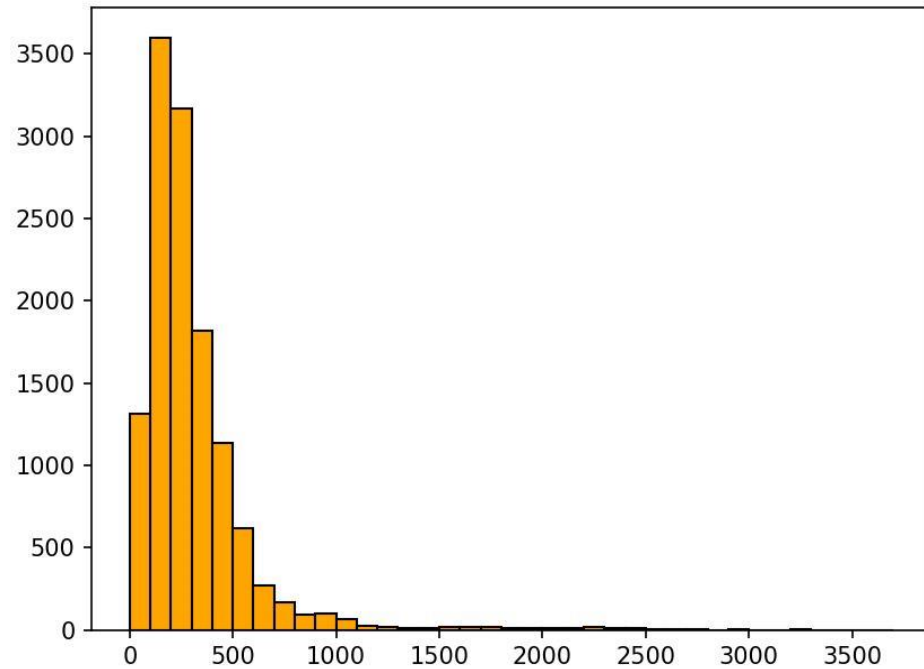
Captum library

- Integrated Gradients, LIME and TCAV are implemented
- Well-maintained and well-documented

STA database and its API

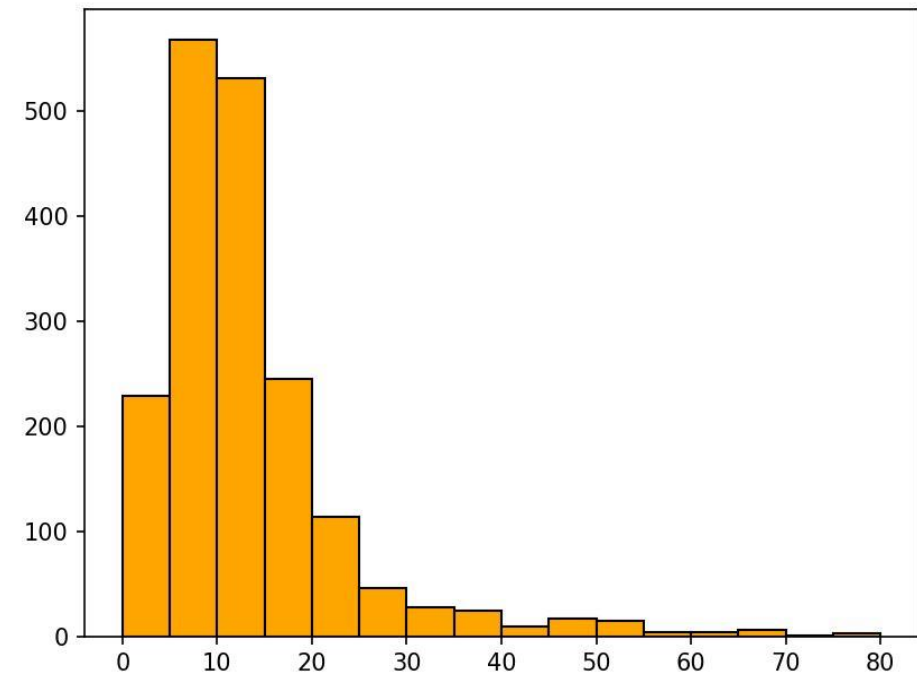
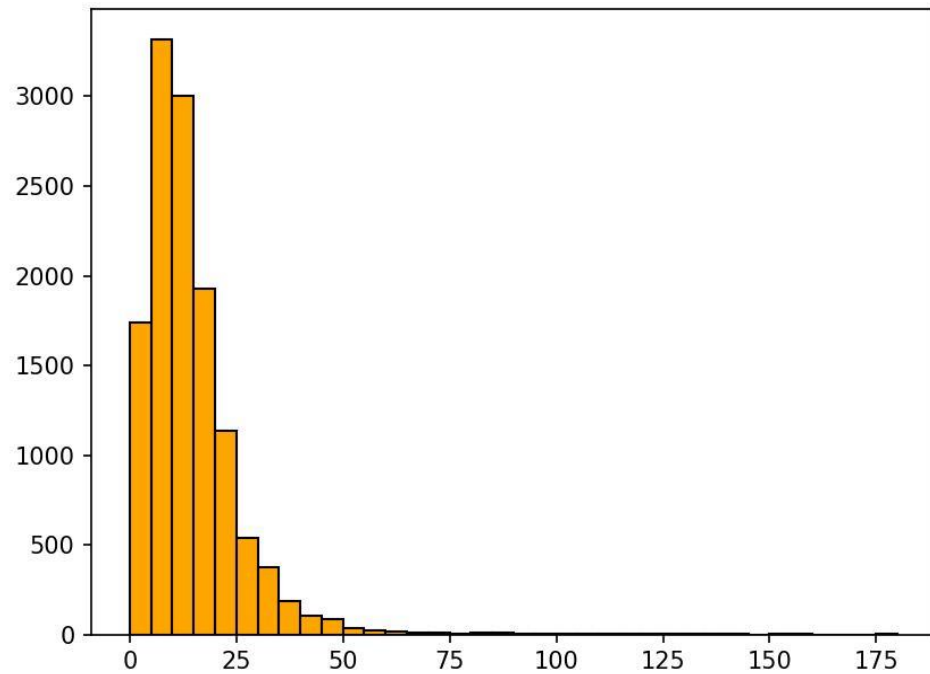
- News text;
- Authors (their initials) of the news;
- Headline;
- List of categories;
- List of keywords;
- Places;
- Timestamp of the creation of the news.

Preliminary exploratory data analysis (EDA)



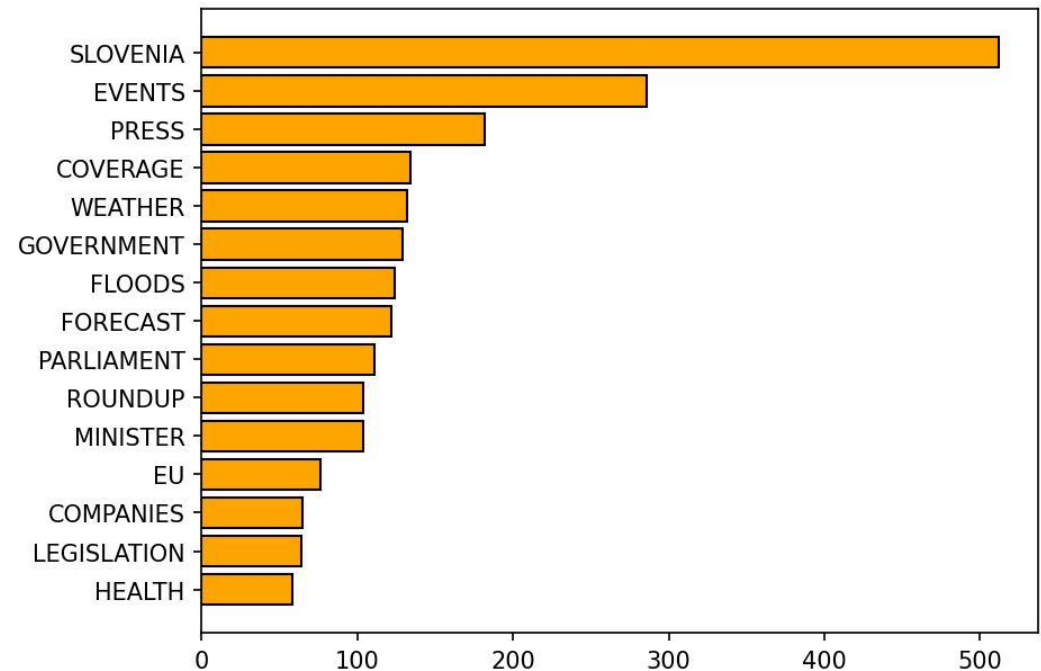
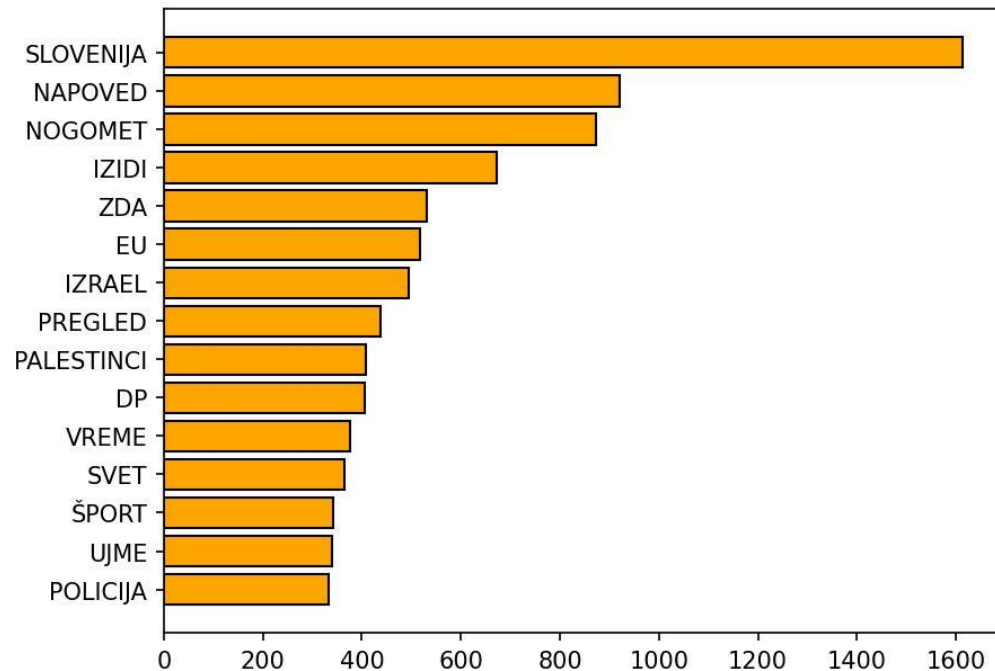
- Number of used words in news for Slovenian (on the left) and English (on the right).

Preliminary exploratory data analysis (EDA)



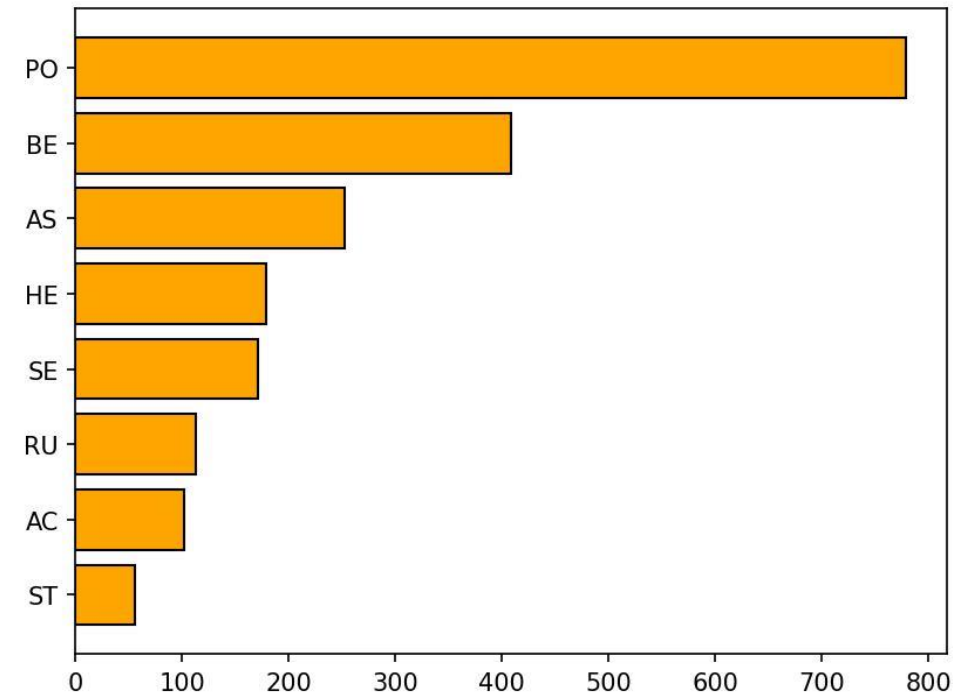
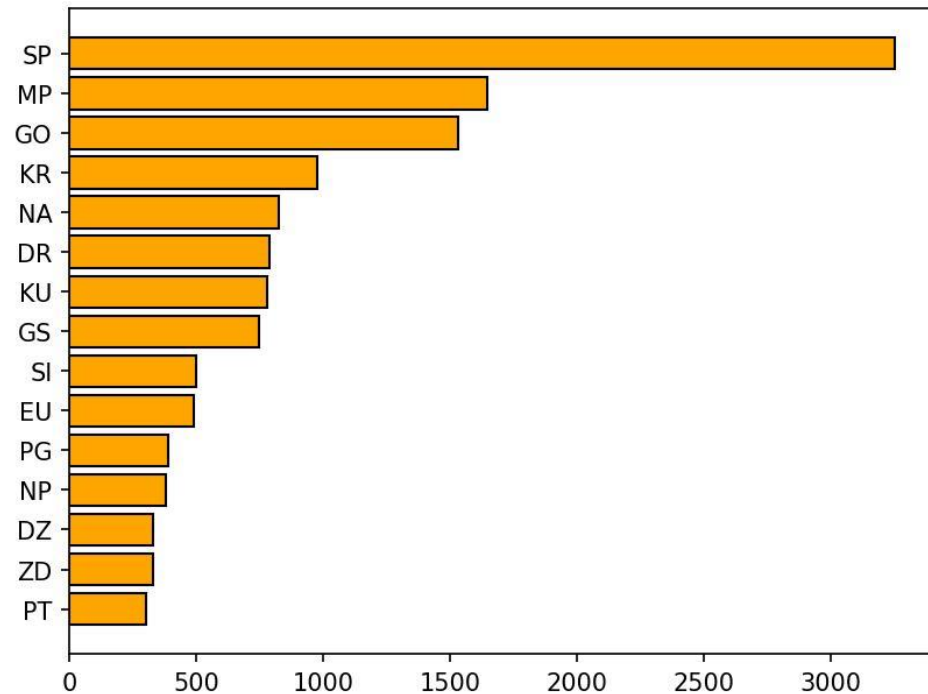
- Number of sentences in news for Slovenian (on the left) and English (on the right).

Preliminary exploratory data analysis (EDA)



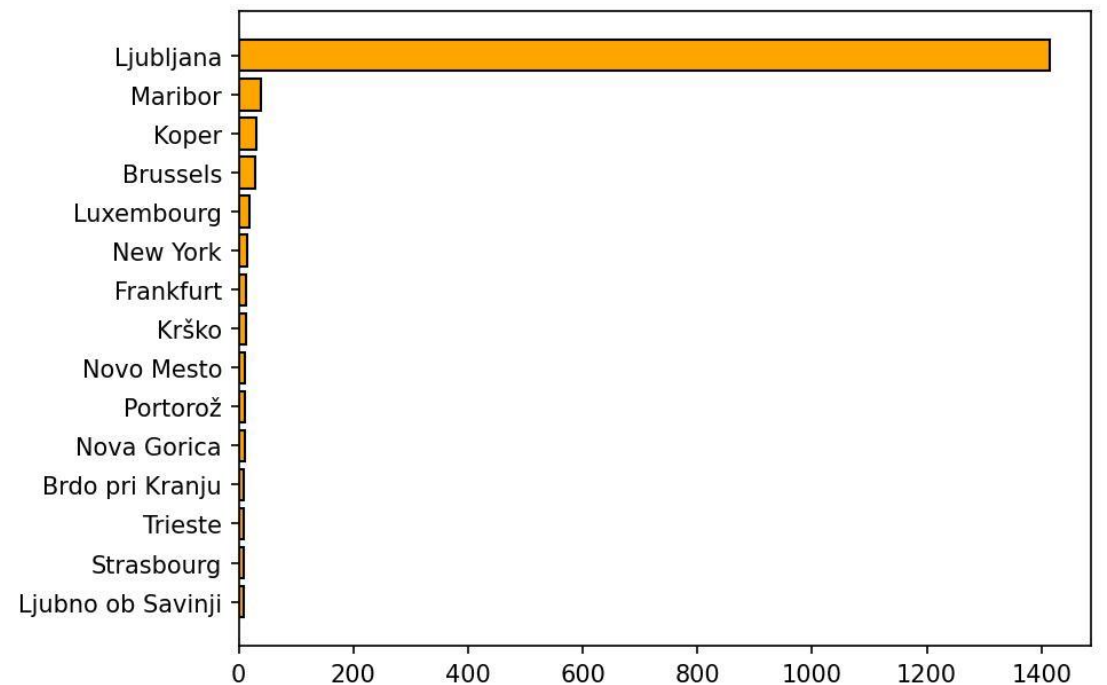
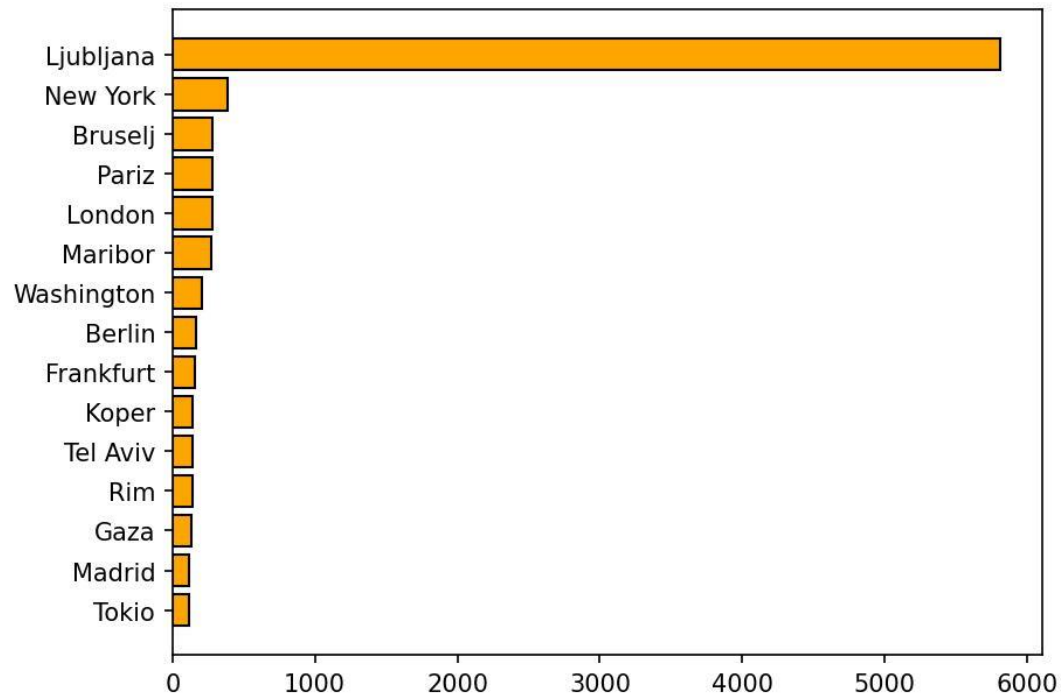
- Most common keywords in Slovenian (on the left) and English (on the right) news.

Preliminary exploratory data analysis (EDA)



- Most common categories in Slovenian (on the left) and English (on the right) news.

Preliminary exploratory data analysis (EDA)



- Cities connected with news for Slovenian (on the left) and English (on the right).



Solution concept














- No annotated data – we plan to annotate English data manually at least for the test set. For the first project, we only focus on the English news.
- We'll test existing pre-trained models and see how good they perform. In case on poor performance, we'll annotate also train data and fine-tune the models, or we could use existing annotated domain-specific data, in this case data with news.




Solution concept





- We'll prepare visualizations using outputs of our final model.
- We'll also perform XAI to explain performance of the model.

Starting models

● siebert/**sentiment-roberta-large-english**   like 84

 Text Classification  Transformers  PyTorch  TensorFlow  JAX  English  roberta  sentiment  twitter  reviews  siebert  Inference Endpoints  arxiv:1907.11692

 Model card  Files and versions  Community 5



  Train  Deploy  Use in Transformers

 Edit model card




SiEBERT - English-Language Sentiment Classification



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 yangheng/**deberta-v3-base-absa-v1.1**   like 23

 Text Classification  Transformers  PyTorch  Safetensors  laptop14  restaurant14  restaurant16  ACL-Twitter  MAMS  Television  TShirt  Yelp  English  deberta-v2
 aspect-based-sentiment-analysis  PyABSA  Inference Endpoints  arxiv:2208.01368  arxiv:2110.08604  License: mit

 Model card  Files and versions  Community 4

  Train  Deploy  Use in Transformers

 Edit model card

Powered by PyABSA: An open source tool for aspect-based sentiment analysis

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Questions?