

Text Classification with *fastText* for Factchecking

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Factchecking: Asylum mentions in national constitutions

Berlin. Im Rennen um den **CDU-Vorsitz** hat Bewerber **Friedrich Merz eine Debatte über das deutsche Asylrecht gefordert.** Auf der **CDU-Regionalkonferenz** am Mittwoch im thüringischen Seebach bei Eisenach sagte **Merz:** „Deutschland ist das einzige Land auf der Welt, das ein Individualrecht auf Asyl in seiner Verfassung stehen hat. (...) Ich bin schon seit langer Zeit der Meinung, dass wir bereit sein müssten, über dieses Asylgrundrecht offen zu reden, ob es in dieser Form fortbestehen kann, wenn wir ernsthaft eine europäische Einwanderungs- und Flüchtlingspolitik wollen.“

Worauf bezieht sich Merz mit seinen Aussagen? Stimmen seine Behauptungen? Wie ist die rechtliche Situation für Asylsuchende? Das

Source: <https://www.handelsblatt.com/politik/deutschland/faktencheck-stimmen-die-aussagen-von-friedrich-merz-zum-deutschen-asylrecht/>

Ist Deutschland das einzige Land mit Individualrecht auf Asyl?

„Die Aussage von Friedrich Merz stiftet in der Öffentlichkeit Verwirrung“, sagt Asylrechtsexperte Constantin Hruschka vom Münchener Max-Planck-Institut für Sozialrecht und Sozialpolitik.



DEBATTE ÜBER ASYLRECHT

AfD-Politiker: „Friedrich Merz überholt uns nun sogar auf der rechten Seite“

Das „Individualrecht auf Asyl“ besage, dass Asylsuchende theoretisch zur Durchsetzung ihrer Rechte bis vor das **Bundesverfassungsgericht** ziehen könnten. Diese Möglichkeit unterliege aber strengen Zulässigkeitsvoraussetzungen und gelte etwa auch in Frankreich, Italien oder Portugal. „Auch hier hat das Asylrecht Verfassungsrang“, betont Hruschka.

Auch der Bielefelder Europarechtler Franz Mayer weist die Äußerung von Merz zurück „Das stimmt so nicht. Die verfassungsrechtliche Garantie eines subjektiven Rechts auf Asyl ist keine deutsche Besonderheit.“

- Can you ask the machine instead?

- Extradition procedure
- Regional group(s)

Protection of stateless persons

- International human rights treaties

- International law
- International human rights treaties
- Treaty ratification

2. No German may be extradited to a foreign country. The law may provide otherwise for extraditions to a member state of the European Union or to an international court, provided that the rule of law is observed.

Article 16a: [Right of asylum]

1. Persons persecuted on political grounds shall have the right of asylum.
2. Paragraph (1) of this Article may not be invoked by a person who enters the federal territory from a member state of the European Communities or from another third state in which application of the Convention Relating to the Status of Refugees and of the Convention for the Protection of Human Rights and Fundamental Freedoms is assured. The states outside the European Communities to which the criteria of the first sentence of this paragraph apply shall be specified by a law requiring the consent of the Bundesrat. In the cases specified in the first sentence of this paragraph, measures to terminate an applicant's stay may be implemented without regard to any legal challenge that may have been instituted against them.
3. By a law requiring the consent of the Bundesrat, states may be specified in which, on the basis of their laws, enforcement practices and general political conditions, it can be safely concluded that neither political persecution nor inhuman or degrading punishment or treatment exists. It shall be presumed that a foreigner from such a state is not persecuted, unless he presents evidence justifying the conclusion that, contrary to this presumption, he is persecuted on political grounds.
4. In the cases specified by paragraph (3) of this Article and in other cases that are plainly unfounded or considered to be plainly unfounded, the implementation of measures to terminate an applicant's stay may be suspended by a court only if serious doubts exist as to their legality; the scope of review may be limited, and tardy objections may be disregarded. Details shall be determined by a law.
5. Paragraphs (1) to (4) of this Article shall not preclude the conclusion of international agreements of member states of the European Communities with each other or with those third states which, with due regard for the obligations arising from the Convention Relating to the Status of Refugees and the Convention for the Protection of Human Rights and Fundamental Freedoms, whose enforcement must be assured in the contracting states, adopt rules conferring jurisdiction to decide on applications for asylum, including the reciprocal recognition of asylum decisions.

• Protection of stateless persons

• International human rights treaties

Article 16a: [Right of asylum]

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Search for the same concept annotated in other constitutions...

Albania 1998 (rev. 2016)

Compare

Collapse ^

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PART TWO > CHAPTER II > ARTICLE 40

Share article   

Foreigners have the right of refuge in the Republic of Albania according to law.

[Report error](#)

Algeria 1989 (reinst. 1996, rev. 2016)

Compare

Collapse ^

Download PDF | View HTML

TITLE I > CHAPTER V > ARTICLE 83

Share article   

In no case may a political refugee who is lawfully claiming the right of asylum be handed over or extradited.

[Report error](#)

Angola 2010

Compare

Collapse ^

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TITLE II > CHAPTER II > SECTION II > ARTICLE 70

Share article   

2. The extradition of foreign citizens for political motives, for charges punishable by the death penalty or in cases where it is justifiably recognised that extradition may lead to the torture, inhumane or cruel treatment of the individual concerned or will result in irreversible damage to their physical integrity under the law of the state applying for extradition, shall not be permitted.

Should we want to programmatically find asylum mentions in national constitutions:

- What are the technical implications?
 - E.g. annotate a few constitutions manually, and train a classifier to annotate new constitutions
- What are some of the enabler methods and resources to provide a solution?
 - A. Document collection (corpus)
 - B. Label set to annotate with
 - C. Off-the-shelf machine learning code
- E.g. *fastText* (but it could also be *scikit-learn* and others)
 - How to get started with *fastText*, once you have annotated some documents?
 - Spoiler alert...

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```
1 classifier = fasttext.supervised(trainingfile, modelfile)
```


Enabler method: Text classification

- Broader discipline: Language technology (Natural language processing)
- **Train supervised machine learning classifiers on the manually labeled (parts of) texts**
 - Categorize (Classify) text passages in national constitutions in terms of discrete categories
 - Categories (Classes, Labels): domain-specific concepts from legal-political/sociological domain
 - The concepts describe the normative content of a text snippet (a sentence)

• Protection of stateless persons

• International human rights treaties

Article 16a: [Right of asylum]

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- Challenge 1: Need training data
 - CCP API to reconstruct the labeled constitutions, 206 Constitution texts in English, Manually **labeled**
 - PROTECTION_OF_STATELESS_PERSONS: "Does the constitution contain provisions for the protection of stateless individuals, refugees from other states, or the right for asylum?"
 - Corpus reconstructed based on CCP project API
 - + manual re-labeling + cross-checking
 - Preprocessing: text without annotations are removed
 - Lowercasing, lemmatization, stopword removal

| | |
|--------------------------------|-------------------|
| Unique legislative labels | 53 broad concepts |
| Max labels per text snippet | 12 |
| Mean labels per text snippet | 1.74 |
| Unique label combinations | 2,117 |
| Most frequent label occurrence | 11,288 |
| Labeled text snippets | 99,379 |
| Mean length of text snippets | 13.6 |

Multiple topicality → Multi-label classification task

Enabler tool: *fastText*

- Joulin et al. (2016): *Bag of Tricks for Efficient Text Classification*. arXiv Preprint.
- Uses an *unsupervised* neural network to obtain semantic vector representations – popularly: "embeddings"
 - Adjustable hyperparameters, a.o. training epochs, learning rate, vector dimensionality...
- Next to learning word representations, it can directly utilize the vector representations for *supervised* Text Classification – without using neural learning for that
 - "fastText is often on par with deep learning classifiers in terms of accuracy, and many orders of magnitude faster for training and evaluation"

Enabler tool: *fastText*

- Linear classifier with hierarchical softmax function to compute label probabilities for a text snippet
- Builds a tree of label probabilities
 - rather than building and combining binary classifiers for each of the classes. Important when class distribution is unbalanced.
- Hidden layer represents text snippets (e.g. sentences) as a bag of word embeddings
 - Sentences represented by averaging over word vectors
 - Parametrisable: e.g. n-gram token representation to account for local word order

Enabler tool: *fastText*

First, the classifier computes a document vector y . This vector y is a linear bag of words of the document. It is computed by averaging all document word vectors x_i :

$$y = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

Here, N is the number of words w_i in the document. A document word w_i is a word occurrence. Each word vector is taken in the averaging the same number of times as the word occurred in the document.

The document vector y is supplied to the input of the hidden layer, where it is multiplied by the matrix B of the hidden linear layer to get a classification vector z :

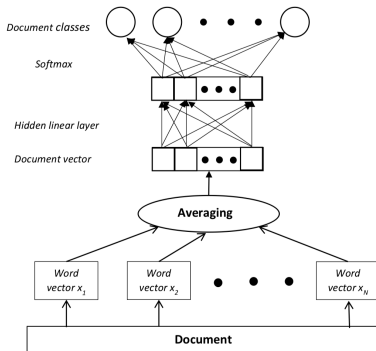


Figure 1. LBoW classifier with hidden linear layer

Source: Zolotov, Vladimir, and David Kung. "Analysis and optimization of fasttext linear text classifier." arXiv preprint arXiv:1702.05531 (2017).

- Training data *for text classification* is in plain text labeled with the classes
 - `__label__Asylum` persons persecuted on political grounds shall have the right of asylum
 - `__label__Explicit_Mentions_International_Law` according universal international legal norms republic azerbaijan grants political asylum foreign citizens persons without citizenship
- A. Jupyter notebook
- B. Get source code, build
`github.com/facebookresearch/fastText`

```
1 import fasttext
2 trainingfile = '/home/jovyan/pl/data/constitutions/fastt_broad.train'
3 testfile = '/home/jovyan/pl/data/constitutions/fastt_broad.valid'
4 modelfile = 'myFTmodel'
```

Train a supervised classifier, using default parameters

```
1 classifier = fasttext.supervised(trainingfile, modelfile)
```

The generated myFTmodel.bin "is a binary file containing the parameters of the model along with the dictionary and all hyper parameters. The binary file can be used later to compute word vectors or to restart the optimization."

Evaluate the trained fastText model

```
1 result = classifier.test(testfile)
2 print('P@1:', result.precision)
3 print('R@1:', result.recall)
4 print('Number of examples:', result.nexamples)
```

```
P@1: 0.5419784302595593
R@1: 0.3005064232783039
Number of examples: 19379
```

Inspection of classifier output on manually provided examples

I.e., which labels are assigned automatically to new texts by the model we learned.

```
1 texts = ['All refugees should be granted asylum.', 'Refugees should be granted asylum according to International Tr
2 labels = classifier.predict(texts, k=2)
3 # Assign probability
4 labels = classifier.predict_proba(texts, k=3)
5 for i, l in enumerate(labels):
6     print(texts[i], '\n', l, '\n')
```

```
All refugees should be granted asylum.
[('Citizenship', 0.326172), ('Legal_Procedural_Rights', 0.277344), ('Executive_Independence_and_Power', 0.0566406)]
```

```
Refugees should be granted asylum according to International Treaties.
```



Setup for Classification and Evaluation

- 1-, 2-, and 3-gram representation (unigram, bigram, trigram)
- Training epochs (30), Learning rate (0.1), Embedding vector dimensionality (100)
- 10-fold cross-validation (train on 90%, test on 10%)
- Baseline evaluation strategy: Always assign the label most frequent in corpus

Pilot Classification Results

- Classification performance in terms of label assignment Precision and Recall
- Ⓒ rank 1: Most probable label assigned to a text segment
- Ⓒ rank 2: Two most probable labels assigned to a text segment

| Topics Features | Broad P@1 | R@1 |
|-----------------|-----------|-------|
| Freq. baseline | 11.36 | 11.36 |
| Unigram | 60.47 | 37.44 |
| Bigram | 70.85 | 40.71 |
| Trigram | 71.34 | 40.99 |

| Broad P@2 | R@2 |
|-----------|-------|
| 5.84 | 4.02 |
| 48.27 | 55.50 |
| 52.21 | 60.02 |
| 52.49 | 60.29 |

- Local word order provided crucial information

Semantically Broad vs Narrow class labels

- **Labels (aka classes)** can be defined both in terms of broad and narrow concepts
- Taxonomic structure is directly relevant to our text classification experiments
 - Broad concept labels: 53 broad realms in constitutional design such as EQUALITY, GENDER, AND MINORITY RIGHTS
 - Narrow concept labels: 322 specific topics, e.g. PROTECTION OF STATELESS PERSONS that can pertain to *one or more* of the broad labels
 - NB. Larger amount of narrow labels did not entail a larger amount of labels assigned: mapping between narrow concepts and broad concepts comprises bipartite graph

Enabler resource: Ontology of legal concepts

- Topics
 - Amendment
 - 'Culture and Identity'
 - Elections
 - Executive
 - Federalism
 - 'International Law'
 - Judiciary
 - Legislature
 - 'Principles and Symbols'
 - 'Regulation and Oversight'
 - 'Rights and Duties'
 - 'Citizen Duties'
 - 'Civil and Political Rights'
 - 'Economic Rights'
 - Enforcement
 - 'Equality, Gender, and Minority Rights'
 - 'Citizenship of indigenous groups'
 - 'Equality for persons with disabilities'
 - 'Equality regardless of age'
 - 'Equality regardless of creed or belief'
 - 'Equality regardless of financial status'
 - 'Equality regardless of gender'
 - 'Equality regardless of language'
 - 'Equality regardless of nationality'
 - 'Equality regardless of origin'
 - 'Equality regardless of parentage'
 - 'Equality regardless of political party'
 - 'Equality regardless of race'
 - 'Equality regardless of religion'
 - 'Equality regardless of sexual orientation'
 - 'Equality regardless of skin color'
 - 'Equality regardless of social status'
 - 'Equality regardless of tribe or clan'
 - 'General guarantee of equality'
 - 'Indigenous right not to pay taxes'
 - 'Indigenous right to illegal activities'
 - 'Indigenous right to political parties'
 - 'Indigenous right to representation'
 - 'Indigenous right to self governance'
 - 'Indigenous right to vote'
 - 'Mentions of social class'
 - 'Protection of stateless persons'
 - 'Provision for matrimonial equality'

- Topics
 - Amendment
 - 'Culture and Identity'
 - Elections
 - Executive
 - Federalism
 - 'International Law'
 - 'Explicit References to Int. Law'
 - 'Foreign Policy'
 - Treaties
 - 'International human rights treaties'
 - 'Legal status of treaties'
 - 'Treaty ratification'
 - Judiciary
 - Legislature
 - 'Principles and Symbols'
 - 'Regulation and Oversight'
 - 'Rights and Duties'

Pilot Classification Results

| Topics Features | Broad | | Narrow | | Broad | | Narrow | |
|--------------------|-------|-------|--------|-------|-------|-------|--------|-------|
| | P@1 | R@1 | P@1 | R@1 | P@2 | R@2 | P@2 | R@2 |
| Freq. baseline | 11.36 | 11.36 | 7.4 | 7.4 | 5.84 | 4.02 | 5.52 | 4.07 |
| Unigram | 60.47 | 37.44 | 60.27 | 37.27 | 48.27 | 55.50 | 42.82 | 52.97 |
| Bigram | 70.85 | 40.71 | 65.05 | 40.22 | 52.21 | 60.02 | 45.65 | 56.48 |
| Trigram | 71.34 | 40.99 | 64.42 | 39.84 | 52.49 | 60.29 | 45.20 | 55.91 |

- Broad concepts learned more efficiently than narrow concepts

- Read more theoretical and technical details:
 - P. Lendvai (2018): *Legislative Concept Classification in National Constitutions*. In: Book of Abstracts of the European Association for Digital Humanities Conference (EADH-2018), December 7-9, Galway, Ireland.
 - P. Lendvai, K. Zaczynska (2019): *Automatic Labeling of Legal Concepts in Constitution Documents: Corpus Creation, Classification Experiments*. Internal report, Göttingen University, Germany.
 - K. Zaczynska (2018). *Multi-Label Klassifikation rechtlicher Konzepte von Verfassungstexten*. [Multi-label Classification of Legal Concepts in Constitution Texts]. Master's Thesis, University of Gießen, Germany.

More resources

- Jupyter notebooks for the same corpus, broad labels only, implemented by the Campuslabor DCA:
- *Not using fastText but scikit-learn*: i.e. different classification approach

- 00DatasetCCP_Ch2_withoutPreproc.csv
- 01_DataExtraction_and_DataManipulation.ipynb
- 01_Preprocessing.ipynb
- 02_Exploratory_Data_Analysis.ipynb
- 02DatasetCCP_BM_Ch2_Preproc.csv
- 03_ParameterOptimization_GridSearch.ipynb
- 04_FeatureSelectionChi2_GridSearch.ipynb
- 05_Classification_ovr.ipynb
- 06_Classification_ovr_withParamOptimization.ipynb
- 07_Classification_ovr_withParamOptimization_withFeatureSelection.ipynb
- 08_Classification_cc_withParamOptimization_withFeatureSelection.ipynb
- 09_Classification_lp_withParamOptimization_withFeatureSelection.ipynb
- 10_Classification_ovr_ROS_withPara...timization_withFeatureSelection.ipynb

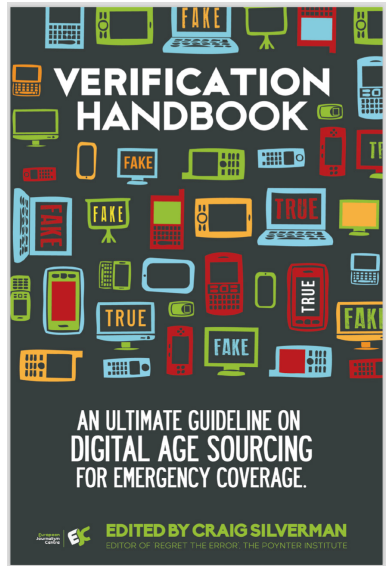
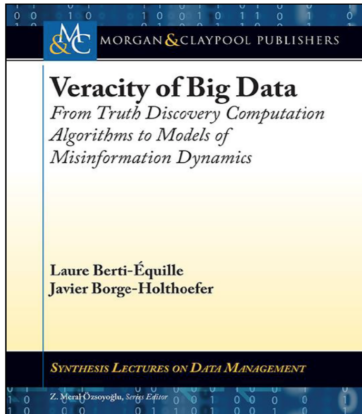
<https://fasttext.cc>

<https://research.fb.com/fasttext/>

<https://fasttext.cc/docs/en/faqs.html#content>

<https://www.constituteproject.org>

More about factchecking and technology



- P Lendvai, UD Reichel, T Declerck (2016). Factuality drift assessment by lexical markers in resolved rumors. ACM Press
- UD Reichel, P Lendvai (2016). Veracity Computing from Lexical Cues and Perceived Certainty Trends. COLING Workshop on Noisy User-Generated Text.
- P Lendvai, UD Reichel (2016). Contradiction Detection for Rumorous Claims. COLING Workshop on Extra-propositional Aspects of Meaning.