Das FLAIR Framework zur automatischen Analyse von Texten (NLP)

Prof. Dr. Alan Akbik

Lehrstuhl "Maschinelles Lernen"

Institut für Informatik

Humboldt-Universität zu Berlin

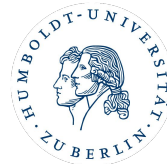# Very Quick Introduction

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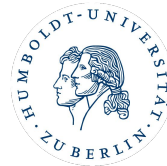
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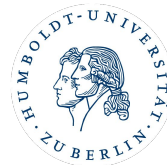
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this talk!

Overview

Motivation: From Research to Production

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NLP Tasks & Demos

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NLP Tasks & Demos

  ○ Text Classification (+usage)

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NLP Tasks & Demos

    ○   Text Classification (+usage)

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Foto: Heike Zappe

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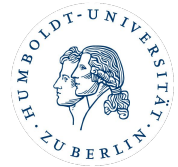
  ○ Sequence Labeling (+research)

  ○ Text-Image

Summary and Outlook

Foto: Heike Zappe

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- ○ Text Classification (+usage)

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NLP in Industrial Research

Started in 2018 with research at Zalando on *Named Entity Recognition (NER)*

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Back in 2000 , People Magazine `PUBLISHER` highlighted Prince Williams' `PERSON` style who at the time was a little more fashion-conscious , even making fashion statements at times .

Now-a-days the prince mainly wears navy `COLOR` suits `ITEM` (sometimes double-breasted `DESIGN`) , light blue `COLOR` button-ups `ITEM` with classic `LOOK` pointed `DESIGN` collars `PART` , and burgundy `COLOR` ties `ITEM` .
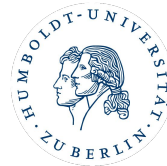
But who knows what the future holds ...

Duchess Kate `PERSON` did wear an Alexander McQueen `BRAND` dress `ITEM` to the wedding `OCCASION` in the fall of 2017 `SEASON` .
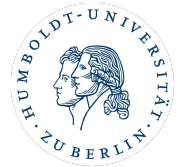
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(1) Unhappy with **reproducibility** of papers

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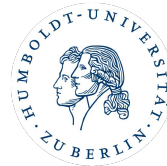(1) Unhappy with **reproducibility** of papers

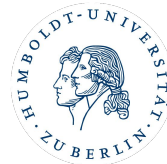- ○ Some papers only report results (no code)

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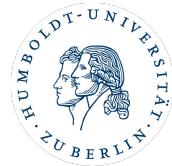
(2) New **state-of-the-art** approach to NER

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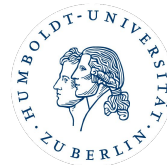- How to convince research community of our approach?

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Idea:

Open source it!

A *very simple* framework for
state-of-the-art NLP

The Flair Framework

flair

A *very simple* framework for
state-of-the-art NLP
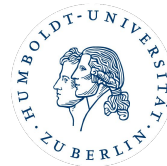
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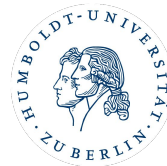*state-of-the-art* NLP

NLP
research

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GitHub PyTorch

v0.1

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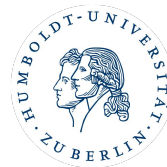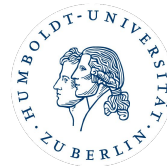
~~v0.1~~ → **v0.2**

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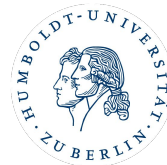*open source!*

v0.1 → v0.2 → **v0.3**

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GitHub ☢ PyTorch

v0.1 -> v0.2 -> v0.3 ..... → **v0.6.1**

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>110 contributors

>500 open source dependant projects

>9.5k stars and >1.4k forks

>300 languages

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NLP Tasks & Demos

- ○ Text Classification (+usage)

- ○ Sequence Labeling (+research)

- ○ Text-Image

Summary and Outlook
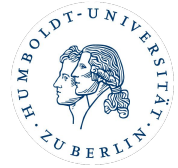
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NLP Task: Text Classification
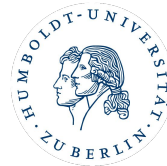
Task: Predict label(s) for a given text

NLP Task: Text Classification

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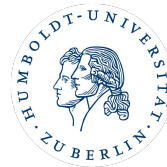
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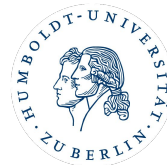Task: Predict label(s) for a given text

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implemented in

flair

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Hate Speech Detection

Du bist doch ein "§ $"§§"§ !!!!!! ⟶ *INSULT*

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Applications:
- Spam Filtering
- Chatbots (intents)
- **Political sciences**
  - Hate speech
  - Fake news
  - Political bias

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Setup Flair

```
pip install flair
```

In a local *python 3.6+* environment or online environments like CoLab

NLP Task: Text Classification

```python
from flair.models import TextClassifier
from flair.data import Sentence


tagger = TextClassifier.load('sentiment')


sentence = Sentence('The talk was interesting.')


tagger.predict(sentence)


print(sentence.labels)
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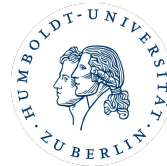
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Load classifier
(downloads pre-trained
model on first call)

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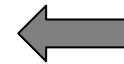
Your text
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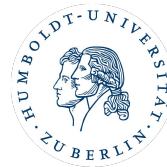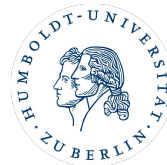
Pre-Trained Models in Flair

Model ID	Task
sentiment	Sentiment Analysis
ner	4-class Named Entity Recognition
ontonotes-ner	12-class Named Entity Recognition
pos	Part-of-Speech Tagging
de-pos	Part-of-Speech Tagging (German)
frame	Semantic Frame Detection
chunk	Syntactic Chunking
multi-pos	Multilingual Part-of-Speech Tagging

Full list HERE

NLP Task: Sequence Labeling

Named Entity Recognition

Belgium **LOC** 's prime minister , Charles Michel **PER** , has disclosed that he held discussions on the possibility in Davos **LOC** with the BBC **ORG** 's director general , Tony Hall **PER** .
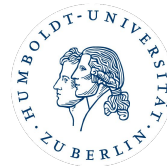
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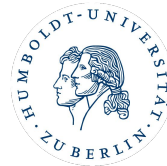flair

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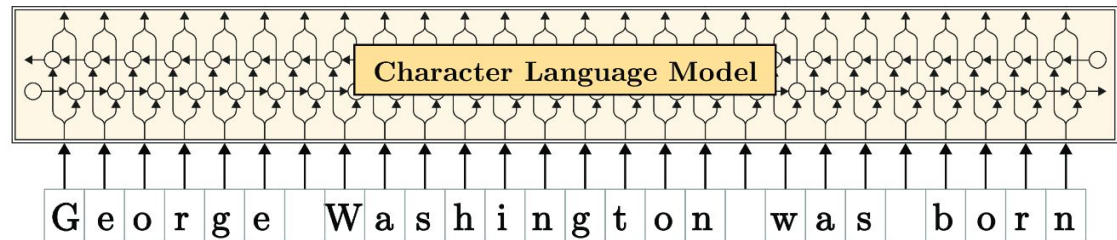Applications:

- Biomedical domain
- Law / FinTech
- Social sciences

implemented in

flair

Flair Embeddings

Contextual String Embeddings for Sequence Labeling. A. Akbik, D. Blythe and R. Vollgraf. **COLING 2018.**

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Model of
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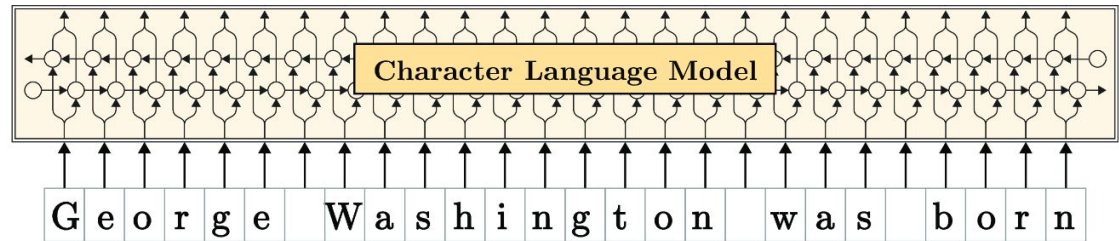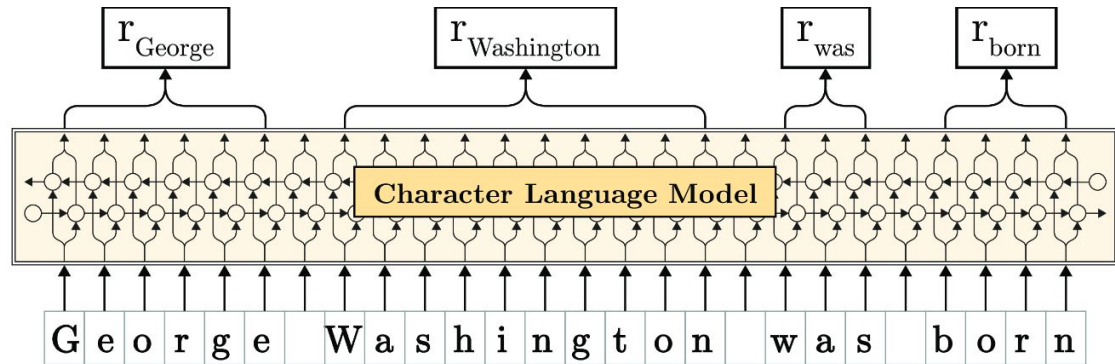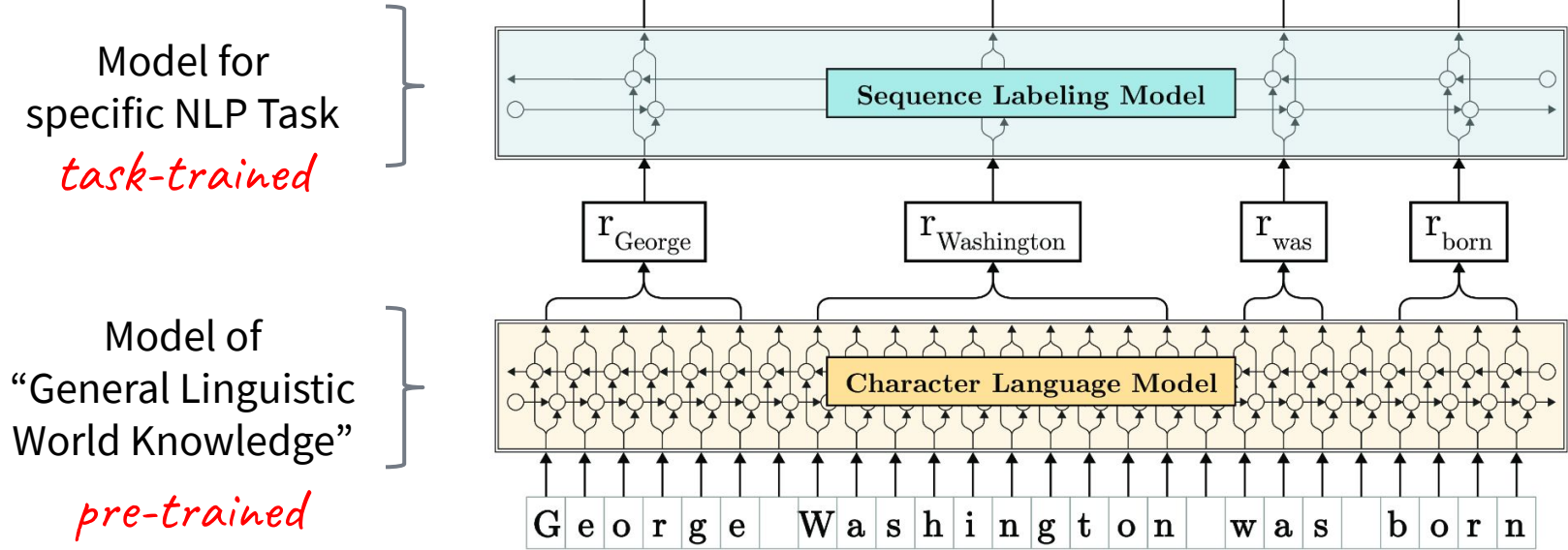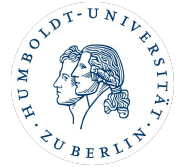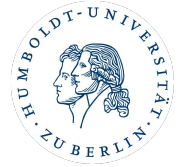
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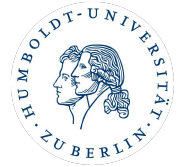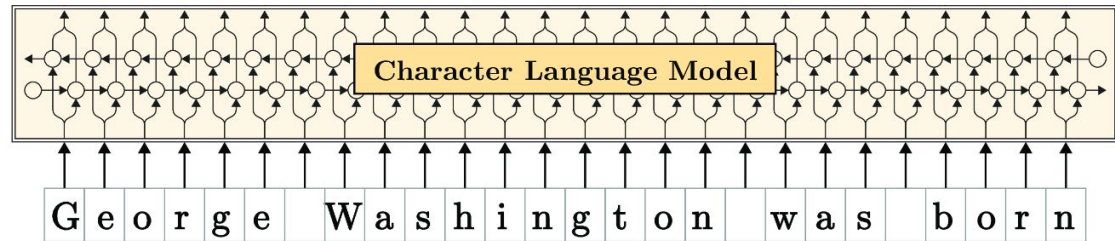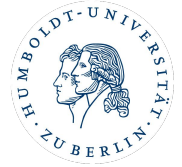

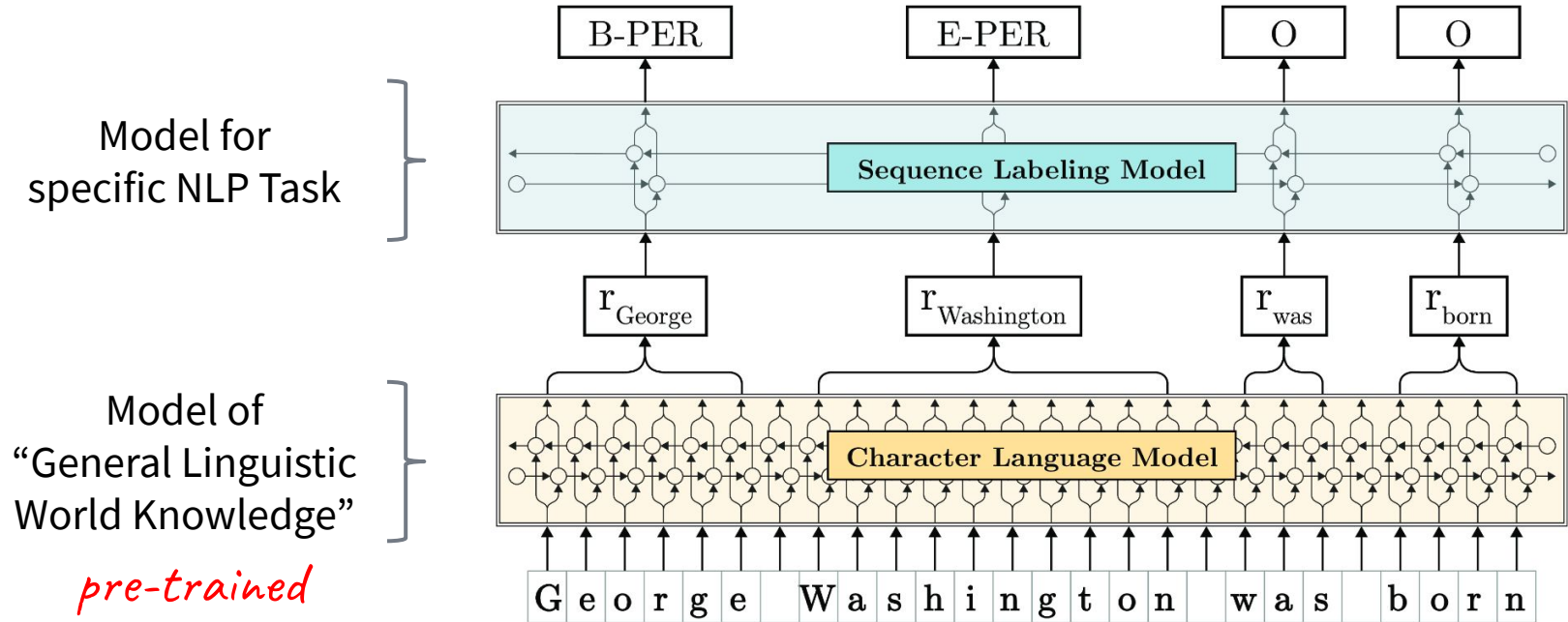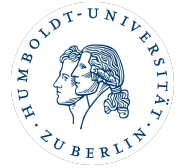
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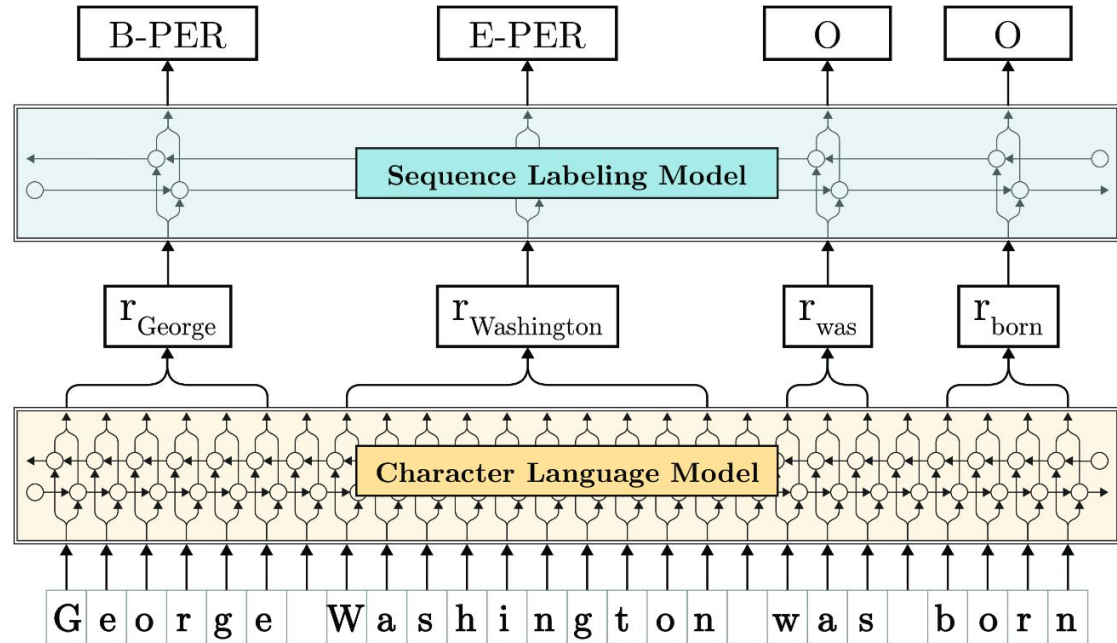
Flair Embeddings: Pre-Training

Idea: Make a prediction problem out of plain text

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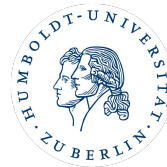
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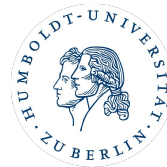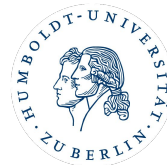
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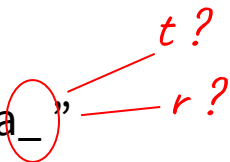
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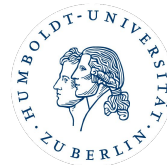
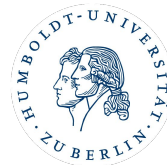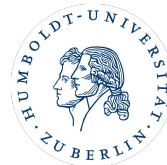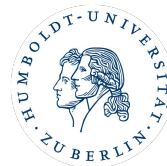**Train** to predict next character

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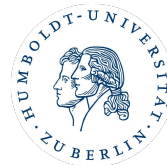+ learns subword features

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Flair Embeddings: Evaluation

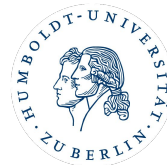| Approach	NER-English F1-score	NER-German F1-score	Chunking F1-score	POS Accuracy
proposed				
PROPOSED	91.97±0.04	85.78 ± 0.18	96.68±0.03	97.73±0.02
PROPOSED$_{+\text{WORD}}$	93.07±0.10	88.20 ± 0.21	96.70±0.04	97.82±0.02
PROPOSED$_{+\text{CHAR}}$	91.92±0.03	85.88 ± 0.20	**96.72**±0.05	97.8±0.01
PROPOSED$_{+\text{WORD+CHAR}}$	**93.09**±0.12	**88.32** ± 0.20	96.71±0.07	97.76±0.01
PROPOSED$_{+\text{ALL}}$	92.72±0.09	n/a	96.65±0.05	**97.85**±0.01
baselines				
HUANG	88.54±0.08	82.32 ± 0.35	95.4±0.08	96.94±0.02
LAMPLE	89.3±0.23	83.78 ± 0.39	95.34±0.06	97.02±0.03
PETERS	92.34±0.09	n/a	96.69±0.05	97.81± 0.02
best published				
	92.22±0.10 (Peters et al., 2018)	78.76 (Lample et al., 2016)	96.37±0.05 (Peters et al., 2017)	97.64 (Choi, 2016)
	91.93±0.19 (Peters et al., 2017)	77.20 (Seyler et al., 2017)	95.96±0.08 (Liu et al., 2017)	97.55 (Ma and Hovy, 2016)
	91.71±0.10 (Liu et al., 2017)	76.22 (Gillick et al., 2015)	95.77 (Hashimoto et al., 2016)	97.53±0.03 (Liu et al., 2017)
	91.21 (Ma and Hovy, 2016)	75.72 (Qi et al., 2009)	95.56 Søgaard et al. (2016)	97.30 (Lample et al., 2016)

Contextual String Embeddings for Sequence Labeling. A. Akbik, D. Blythe and R. Vollgraf. **COLING 2018.**

Flair Embeddings: Evaluation

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One Model, Many Languages

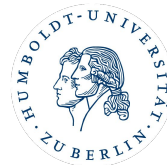Most models are language specific (English NER, German NER etc.)

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It is possible to train a **single model** using training data from multiple languages [Akbik et al., 2019]

- especially if we use multilingual language models

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Multilingual Sequence Labeling With One Model. Alan Akbik, Tanja Bergmann and Roland Vollgraf. *Northern Lights Deep Learning Workshop, NLDL 2019*. [pdf]

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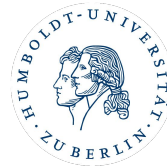- language identification is implicit

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NLP Task: Named Entity Recognition - Domains

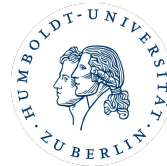# NLP Task: Named Entity Recognition - Domains

Biomedical Domain

HunFlair [Weber et al., 2020]

suggested as a promising approach in patients [SPECIES] with COVID-19 [DISEASE] who are admitted to hospitals . In addition to antivir therapy , potential ACE2- [GENE] and AT1-R [GENE] - inhibiting strategi and other supportive care , we suggest other potential JAK [GENE] inhibitors (JAKinibs) and novel anti - inflammatory combination therapie that affect the JAK [GENE] - STAT [GENE] pathway in patients [SPECIES] with COVID-19 [DISEASE] . Since the combination of MTX [CHEMICAL] and baricitinib [CHEMICAL] leads to outstanding clinical outcomes , the additio

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Legal Tech Domain

vom 6. August 2020. Alle Beschwerdeführer befinden sich derzeit gemeinsam im Urlaub auf der Insel Mallorca `LANDSCHAFT` , die vom Robert-Koch-Institut `ORG` als Risikogebiet eingestuft wird. Sie wollen 29. August 2020 wieder nach Deutschland `LAND` einreisen, ohne sich gemäß § 1 Abs. 1 bis Abs. 3 der Verordnung zur Testpflicht `VERORDNUNG` Einreisenden aus Risikogebieten auf das SARS-CoV-2-Virus testen zu lass Die Verordnung sei wegen eines Verstoßes der ihr zugrunde liegenden gesetzlichen Ermächtigungsgrundlage, des § 36 Abs. 7 IfSG `GESETZ` ,

Other NLP Tasks (Beta)

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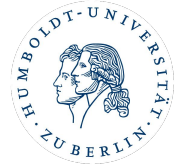
Text Regression

I really liked this movie because [...] → **80% JOY**
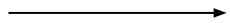
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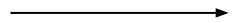Dataset: WASSA-2018 Shared Task on Implicit Emotions:

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dog catching a frisbee in the park ←→

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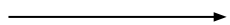
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↔

Dataset: Feidegger [Lefakis et al., 2018]

- Fashion images and German-language descriptions

FEIDEGGER: A Multi-modal Corpus of Fashion Images and Descriptions in German. Leonidas Lefakis, Alan Akbik and Roland Vollgraf. *11th Language Resources and Evaluation Conference, LREC 2018.* [pdf]

Overview

Motivation: From Research to Production

NLP Tasks & Demos

- ○ Text Classification (+usage)

- ○ Sequence Labeling (+research)

- ○ Text-Image

Summary and Outlook
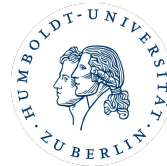
Foto: Heike Zappe

Summary

Application

- NLP models in action (sentiment analysis, named entity recognition)
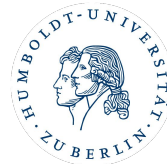- Introduced Flair Framework for NLP

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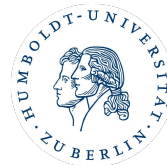- Introduced Flair Framework for NLP

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- "FLERT" Sequence Labeling
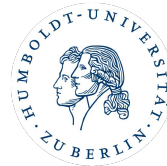
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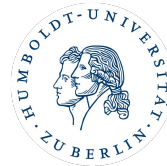- "FLERT" Sequence Labeling

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Flair 0.7

Thank You!

Questions?

Foto: Heike Zappe