

Sebastian, Basti, Wastl?!

Recognizing Named Entities in Bavarian Dialectal Data

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LREC-COLING 2024



Named Entity Recognition (NER) is a fundamental task.

Problem: Lack of high-quality annotations on non-standard language varieties.

WikiAnn (Pan et al., 2017) silver annotations on 282 languages/dialects, including Bavarian, but on unnatural texts.

bar · 300 rows

🔍 Search this dataset

tokens
sequence

```
[ "", "", "Mongolei", "", "" ]
```

```
[ "Dieter", "Hildebrandt", "(", "seit", "2005", ")" ]
```

```
[ "", "", "Heiliges", "Remisches", "Reich", "", "" ]
```

```
[ "Weiterleitung", "Josua", "(", "Buach", ")" ]
```

```
[ "***", "", "", "Ortenberg", "", "" ]
```

```
[ "", "", "Kina", "", "" ]
```

```
[ "Israel", "Kamakawiwo'ole", "-", "Wejdbekannta", "Sānga" ]
```

```
[ "Clark", "County", ",", "Indiana" ]
```

```
[ "**", "Rudolph", "Moshammer", ",", "1940-2005" ]
```

```
[ "***", "", "", "Holland", "", "" ]
```

```
[ "WEITERLEITUNG", "Gila", "County", ",", "Arizona" ]
```

```
[ "X", "Japan", "(", "1997", "aufgelöst", ",", "2007", "/", "08", "wiedavaeinigt", ")" ]
```

```
[ "**", "", "", "Toskana", "", "" ]
```

```
[ "Weiterleitung", "Johannes", "XXIII", "." ]
```

Named Entity Recognition Dialects Bavarian German

- The first dialectal NER dataset for German, BARNER;
- 161K tokens annotated on Bavarian Wikipedia articles (*bar-wiki*) and tweets (*bar-tweet*);
- Comparing lexical distribution, syntactic construction, and entity information with 3 German NER datasets on *wiki*, *tweet* and *news*;
- Incorporating German datasets to improve BARNER parsing;
- Multi-task learning with Bavarian-German Dialect Identification.

BARNER

First manually annotated NER dataset
on a German dialect – Bavarian

Annotations and guidelines available:
<https://github.com/mainlp/BarNER>

CoNLL06 style (Tjong Kim Sang and De Meulder, 2003)

- PERSON, LOCATION, ORGANIZATION, MISCELLANEOUS;

GermEval 2014/NoSta-D style (Benikova et al., 2014)

- -deriv/-part for nominal derivation and compounding;
- *Italienroas*_{LOCpart} 'tour of Italy';
- *eiropäischn*_{LOCderiv} 'European';

Others


- LANGUAGE, RELIGION, EVENT, work-of-art (WOA);
- Only flat and named entities, excluding common nouns, pronouns, overlapping, or nested NEs.

Tagset normalized to CoNLL06 for analyses and experiments.

Wikipedia articles

- Carefully written and consistently updated;
- <https://bar.wikipedia.org/wiki/Wikipedia:Hoamseitn>.

Twitter (X) tweets

- noisier, less formal, and more dynamic;
- Snowballed from a list of 17 Bavarian ‘seed users’ (<http://indigenoustweets.com/bar/>) to their friends;
- Manually classified into *bar/de/other/NA* and only kept *bar*-items;
- Hashtags ([#*minga*]_{LOC}) and emojis ([_{LOC}) are annotated.

BARNER – Inter-Annotator Agreement (IAA)

- Three graduate students took five months to annotate BARNER;
- 53% of BARNER are **double annotated** for disagreement studies;
- 85+ typed span F1s;
- Entity span detection is harder for tweets but entity typing is easier.

- Both *bar-wiki* and *bar-tweet* reach 75K+ tokens;
- *bar-tweet* has much fewer entities due to informality and length.

Corpus	#Toks	#Sents	#Ents	Ents/Tok (in %)
<i>bar-wiki</i>	75.7k	3.6k	4.2k	5.5
<i>bar-tweet</i>	86.1k	7.5k	2.5k	2.9

Named Entities Diverge

Bavarian vs. German

>

Wikipedia vs. Tweets vs. News

Comparisons – Five German & Bavarian Datasets

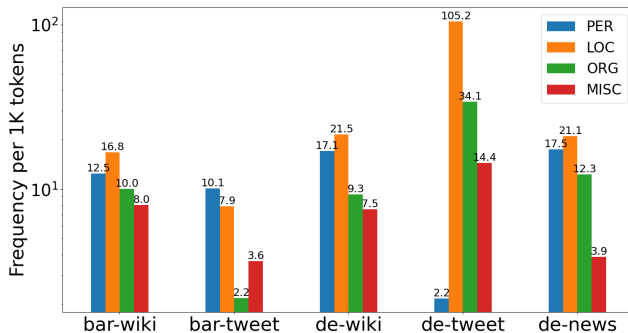
	Bavarian	German
<i>wiki</i>	<i>bar-wiki</i>	<i>de-wiki</i> the wiki portion of NoSta-D (Benikova et al., 2014)
<i>tweet</i>	<i>bar-tweet</i>	<i>de-tweet</i> MobIE transportation tweets (Hennig et al., 2021)
<i>news</i>	/	<i>de-news</i> CoNLL 2006 news (Tjong Kim Sang and De Meulder, 2003)

We use **Jaccard Similarity (JS)**:

- $\frac{\text{shared (i.e., intersection) tokens}}{\text{concatenated (i.e., union) tokens}}$ between datasets;
- Compare surface strings to preserve variations;
- German *wiki* × *news* highest 0.417 – formality and well-editedness;
- Similar between tweets and other same-dialect genres:
 - DE *tweet* × *news* 0.229;
 - DE *tweet* × *wiki* 0.195;
 - BAR *tweet* × *wiki* 0.181.

Comparisons – Entity Type Distributions

- Frequencies of NE types per 1K tokens (log-scaled);
- *bar-wiki* and *de-wiki*: similar type distributions;
- *de-tweet*: extreme LOC outlier (105.2) – many routes/streets/cities;
- *bar-tweet*: least entities, esp. ORG; PER > LOC – personal chats.



Person entities:

- Family names come before given names, e.g., *Dreßen* is the family name in *Dreßen Thomas*;
- Shortened given names with diminutive suffixes (e.g., *-l*), *Sebastian* becomes *Basti* or *Wastl*;
- Given names are typically preceded by definite articles, e.g., *d'Maria* and *da Michel*.

Possessive constructions:

the genitive determiner in German is replaced by combining preposition *vo* 'from' with a dative determiner:

- 'Association of National Olympic Committees' in English
- *Vaeinigung vo de Nationoin Olympischn Komitees* in Bavarian
- *Vereinigung der Nationalen Olympischen Komitees* in German

NER results on Bavarian

*Cross-domain, sequential, and joint
training with German*

*Multi-task learning with
dialect identification*

- MaChAmp (van der Goot et al., 2021) with masked CRF decoder;
- Datasets: five tag-normalized German and Bavarian datasets;
- German GBERT (Chan et al., 2020)
<https://huggingface.co/deepset/gbert-large>;
- Multilingual XLM (Conneau et al., 2020)
<https://huggingface.co/xlm-roberta-large>;
- 3-run average on Span F1.

Experiments – In-domain

- More difficult on *bar-wiki*, *bar-tweet*, and *de-tweet* – smaller datasets and non-mainstream variations (Bavarian and/or tweet);
- XLM-R for later experiments – higher F1s on BAR.

In-domain	<i>bar-wiki</i>	<i>bar-tweet</i>	<i>de-wiki</i>	<i>de-tweet</i>	<i>de-news</i>
Corpus Statistics					
#TrainToks	61.4K	71.8K	232.4K	47.0K	207.0K
#TrainEnts	2.7K	1.6K	12.9K	7.3K	10.0K

In-domain Results					
XLM-R	72.91	77.55	85.67	77.14	88.35
GBERT	72.17	73.30	86.68	79.75	90.23

Experiments – Out-of-domain (OOD)

- Models trained on the larger *de-wiki* and *de-news* perform badly on *bar-wiki*, *bar-tweet*, and *de-tweet*;
- Models trained on smaller but in-domain Bavarian data are better;
- However, cross-genre degradations between *de-wiki* and *de-news* are relatively small.

Experiments – Sequential

Motivation: *bar-wiki*/*tweet* suffer from smaller training size.

Sequential: train on another dataset → train+evaluate on target.

- Improved performances on all five datasets;
- *de-wiki* → *bar-wiki* – same genre but more data;
- *bar-wiki* → *bar-tweet* – same dialect but denser entities;
- *de-tweet* → *de-wiki* & *de-news* – topic-heavy entities;
- All other BAR/DE datasets → *de-news* – more diverse data.

Another\Target	<i>bar-wiki</i>	<i>bar-tweet</i>	<i>de-wiki</i>	<i>de-tweet</i>	<i>de-news</i>
<i>bar-wiki</i>	—	79.27	-	77.26	+
<i>bar-tweet</i>	-	—	-	-	+
<i>de-wiki</i>	73.67	+	—	-	+
<i>de-tweet</i>	-	-	86.08	—	88.89
<i>de-news</i>	-	+	-	-	—
In-domain	72.91	77.55	85.67	77.14	88.35

Joint: train on all five → dev/test on target.

Joint+seq: train on five → train on target → dev/test on target.

- Joint improves vastly on *bar-wiki* 8.82 ↑ & mildly on *bar-tweet* 0.62 ↑;
- Joint+seq improves *bar-wiki* by another 2.36 ↑.

	<i>bar-wiki</i>	<i>bar-tweet</i>	<i>de-wiki</i>	<i>de-tweet</i>	<i>de-news</i>
joint	81.73	78.17	85.89	-	-
joint+seq	84.09	+	-	-	88.67
In-domain	72.91	77.55	85.67	77.14	88.35

Dialect Identification (DID): Classifying *tweet* and *wiki* as BAR or DE.

MTL with 5 NER and 2 DID tasks: Vastly improve *bar-wiki* 11.26 \uparrow .

Overall best results:

- *bar-wiki* by multi-task and other four by sequential;
- Still, Bavarian and tweets are more difficult.

	<i>bar-wiki</i>	<i>bar-tweet</i>	<i>de-wiki</i>	<i>de-tweet</i>	<i>de-news</i>
In-domain	72.91	77.55	85.67	77.14	88.35
Best model	multi-task	seq-bar-wiki	seq-de-tweet	seq-bar-wiki	seq-de-tweet
Improvement	11.26 \uparrow	1.72 \uparrow	0.41 \uparrow	0.12 \uparrow	0.54 \uparrow
Final result	84.17	79.27	86.08	77.26	88.89

Conclusion

- BARNER – manually annotated named entity corpus for Bavarian;
- Lexical and entity-level distinctions between DE and BAR;
- SOTA results from sequential training and multi-task learning;
- Diversity – genres, topics, and dialects – helps BAR and DE.

Future Work

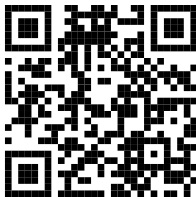
- Alignments between mainstream languages and dialects;
- More fine-grained sub-dialectal (sub-regional) variations;
- Translation- vs. transfer-based approaches in dialectal NLP;
- Call for more dialectal datasets.

Also at LREC-COLING 2024:

Bavarian Universal Dependencies (Blaschke et al., 2024)

Slot Intent Detection (Winkler et al., 2024)

Questions?
Comments?



Paper

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This project is supported by ERC Consolidator Grant DIALECT 101043235.

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