Universität Zürich UZH

Masterarbeit

zur Erlangung des akademischen Grades

Master of Arts

der Philosophischen Fakultät der Universität Zürich

(Titel)

Verfasserin/Verfasser: Jonathan Schaber

Matrikel-Nr: 11-771-359

Referentin/Referent: Dr. Simon Clematide

[Betreuerin/Betreuer: (Titel Vorname Name) [nur falls vom Ref. unterschiedlich]]

Institut für Computerlinguistik

Abgabedatum: (xx.xx.xxxx)

Abstract

This is the place to put the English version of the abstract.

Zusammenfassung

Und hier sollte die Zusammenfassung auf Deutsch erscheinen.

Acknowledgement

I want to thank X, Y and Z for their precious help. And many thanks to whoever for proofreading the present text.

Contents

List of Figures

List of Tables

List of Acronyms

ML   Machine Learning

NLP   Natural Language Processing

POS   Part-Of-Speech

SRL   Semantic Role Labelling OR Semantic Role Labeller

STTS   Stuttgart-Tübingen-TagSet

1 Introduction

1.1 Motivation

Some words on your motivation would be nice.

1.2 Research Questions

The research questions that shall be answered in this thesis, are:

1. What do I do?

2. How do I do it?

3. And why?

1.3 Thesis Structure

In this first chapter . . .
Chapter 2 introduces . . .
Chapter 3 . . .

2 Semantic Roles

2.1 Overview

"The main reason computational systems use semantic roles is to act as a shallow meaning representation that can let us make simple inferences that aren't possible from the pure surface string of words, or even from the parse tree." [Jurafsky and Martin, 2019, p. 375]

3 Data Sets

3.1 Why create an own corpus?

3.2 Corpora

3.2.1 deISEAR

As Troiano et al. [2019] write in their

3.2.2 MLQA_V1

Lewis et al. [2019] compiled

3.2.3 PAWS-X

Yang et al. [2019]

3.2.4 SCARE

Sänger et al. [2016]

3.2.5 XNLI

Conneau et al. [2018]

3.2.6 XQuAD

Artetxe et al. [2019]

4 Architecture

4.1 Overview

4.2 Semantic Role Labeller

State-of-the-art semantic role labellers (SRLs) are end-to-end models, implementing For my system, I implement the DAMESRL, a model presented by Do et al. [2018]. I use their pre-trained German Character-Attention model which, according to the authors, achieved an F1 score of 73.5 on the CoNLL'09 task [Hajič et al., 2009].

"A major advantage of dependency grammars is their ability to deal with languages that are morphologically rich and have a relatively free word order." [Jurafsky and Martin, 2019, p. 274] For extracting predicates, I rely on the dependency tree the ParZu parser Sennrich et al. [2013] generates for a given sentence. Since one sentence can have multiple predicate-argument structures, I need to device an algorithm to extract the relevant predicates in a sentence. This is not as straight forward as it seems on the first look. Consider the sentence

(4.1) Die Pakete werden einzeln weitergeleitet, was manchmal zu unterschiedlichen Pfaden und einer fehlerhaften Übertragung führt.

whose dependency parse tree is shown in Figure 1: This sentence has three verbs in it, `werden`, `weitergeleitet`, and `führt`, but only the last two of them are relevant predicates, i.e. predicates that carry "true" semantics.

I propose the following algorithm 1 deciding whether a verb in a sentence is or isn't a predicate using a heuristic, mostly relying on the STTS-tags [Schiller et al., 1999] of the parser's output:

The condition on line 9, that only tokens in the respective subclause are considered, is ensured by making sure that if a token u's POS is "V" and it points to its head t, that it is not itself the head of a subclause — i.e. its dependency relation is e.g. "relative clause". If that is the case the token u is considered to belong to
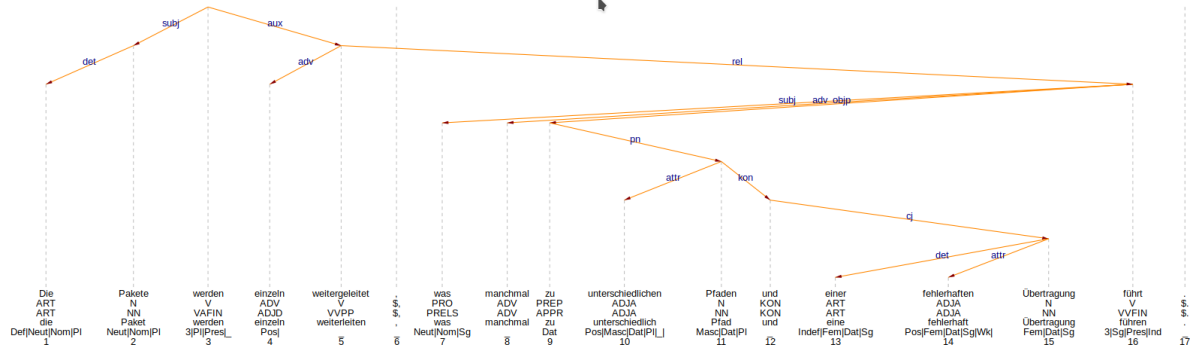
Figure 1: Example sentence with multiple predicates.

another subclause and therefore not preventing token t from getting labelled as a predicate. Consider again the example 4.2: Let's say we are in the for-loop at the token *weitergeleitet*. Because it is a verb but not a finite full-verb, we enter the else-clause on line 7. If we were now to loop through all token of sentence 4.2 we would find that token *führt* is a verb that points to our primary token. Without the above outlined constraint that only verbs in the same subclause pointing to our original verb are preventing it from being labelled a predicate, *weitergeleitet* would be labelled as non-predicate. This is obviously false. Taking into account the above considerations, we see that although *führt* points to *weitergeleitet*, its edge label is *rel* — which means that it's the head of a relative subclause — therefore it is not anymore in the same subclause and *weitergeleitet* gets labelled as predicate.

4.3 German BERT

Since its publishing two years ago, BERT [Devlin et al., 2018] has often been called a "turning-point" in ML in NLP.

Algorithm 1 Predicate finding algorithm

1: **for all** token $t \in$ sentence **do**
2:    **if** POS $t \neq$ 'V' **then**
3:      $t \leftarrow$ NOT_PRED
4:    **else**
5:      **if** STTS $t =$ 'VVFIN' **then**
6:        $t \leftarrow$ PRED
7:      **else**
8:        FLAG $\leftarrow True$
9:        **for all** token $u \neq t \in$ subclause **where** $t \in$ subclause **do**
10:          **if** POS $u =$ 'V' $\wedge$ u dependent on t **then**
11:            $t \leftarrow$ NOT_PRED
12:            FLAG $\leftarrow False$
13:            **break**
14:          **end if**
15:        **end for**
16:        **if** FLAG $= True$ **then**
17:          $t \leftarrow$ PRED
18:        **end if**
19:      **end if**
20:    **end if**
21: **end for**

5 Results

5.1 BLEU Scores

Table 1 shows how to use the predefined tab command to have it listed.

language pair	ABC	YYY
EN→DE	20.56	32.53
DE→EN	43.35	52.53

Table 1: BLEU scores of different MT systems

And we can reference the large table in the appendix as Table 2

5.2 Evaluation

We saw in section 5.1

We will see in subsection 5.2.1 some more evaluations.

5.2.1 More evaluation

5.3 Citations

Although BLEU scores should be taken with caution (see Callison-Burch et al. [2006]) or if you prefer to cite like this: [Callison-Burch et al., 2006] . . .

to cite: [Koehn, 2005, 30-31]
to cite within parentheses/brackets: [Koehn, 2005], [Koehn, 2005, 30-32]

to cite within the text: Koehn [2005], Koehn [2005, 37]

only the author(s): Callison-Burch et al.

only the year: 2006

5.4 Graphics

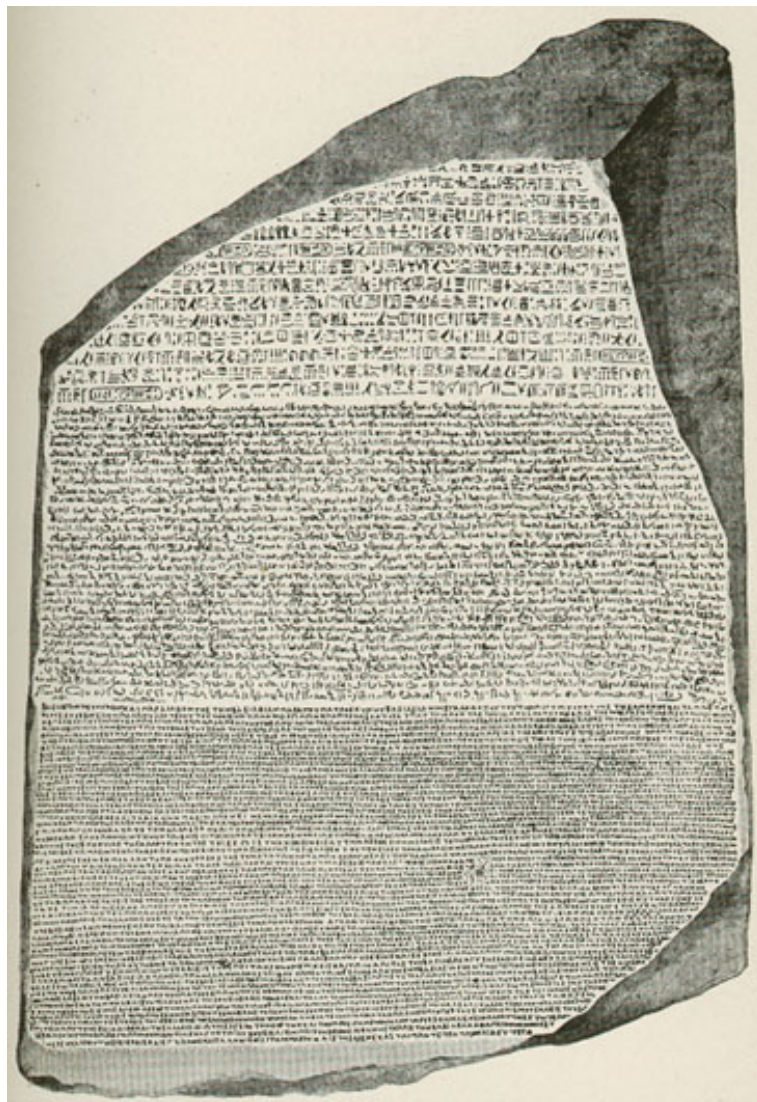To include a graphic that appears in the list of figures, use the predefined fig command:

Figure 2: The Rosetta Stone

And then reference it as Figure 2 is easy.

5.5 **Some Linguistics**

(With the package 'covington')

Gloss:

(5.1) *The   cat   sits   on   the   table.*
       die   Katze   sitzt auf   dem   Tisch
       'Die Katze sitzt auf dem Tisch.'

Gloss with morphology:

(5.2) *La   gata   duerm -e   en   la   cama.*
       Art.Fem.Sg Katze   schlaf -3.Sg in   Art.Fem.Sg Bett
       'Die Katze schläft im Bett.'

6 Conclusion

In this project we have done so much.[1]

We could show that . . .

Future research is needed.
The show must go on.

---

[1]Thanks to many people that helped me.

Glossary

Of course there are plenty of glossaries out there! One (not too serious) example is the online MT glossary of Kevin Knight [2] in which MT itself is defined as

> techniques for allowing construction workers and architects from all over the world to communicate better with each other so they can get back to work on that really tall tower.

accuracy A basic score for evaluating automatic **annotation tools** such as **parsers** or **part-of-speech taggers**. It is equal to the number of **tokens** correctly tagged, divided by the total number of tokens. [...]. (See **precision and recall**.)

clitic A morpheme that has the syntactic characteristics of a word, but is phonologically and lexically bound to another word, for example *n't* in the word *hasn't*. Possessive forms can also be clitics, e.g. The dog*'s* dinner. When **part-of-speech tagging** is carried out on a corpus, clitics are often separated from the word they are joined to.

---

[2] Machine Translation Glossary (Kevin Knight): `http://www.isi.edu/natural-language/people/dvl.html`

References

M. Artetxe, S. Ruder, and D. Yogatama. On the cross-lingual transferability of monolingual representations. *arXiv preprint arXiv:1910.11856*, 2019.

C. Callison-Burch, M. Osborne, and P. Koehn. Re-evaluating the Role of BLEU in Machine Translation Research. In *Proceedings of the European Association of Computational Linguistics (EACL)*, pages 249–256, 2006. URL http://www.aclweb.org/anthology/E/E06/E06-1032.pdf.

A. Conneau, G. Lample, R. Rinott, A. Williams, S. R. Bowman, H. Schwenk, and V. Stoyanov. Xnli: Evaluating cross-lingual sentence representations. *arXiv preprint arXiv:1809.05053*, 2018.

J. Devlin, M.-W. Chang, K. Lee, and K. Toutanova. Bert: Pre-training of deep bidirectional transformers for language understanding. *arXiv preprint arXiv:1810.04805*, 2018.

Q. N. T. Do, A. Leeuwenberg, G. Heyman, and M. F. Moens. A flexible and easy-to-use semantic role labeling framework for different languages. In *Proceedings of the 27th International Conference on Computational Linguistics: System Demonstrations*, pages 161–165, 2018.

J. Hajič, M. Ciaramita, R. Johansson, D. Kawahara, M. A. Martí, L. Màrquez, A. Meyers, J. Nivre, S. Padó, J. Štepánek, et al. The conll-2009 shared task: Syntactic and semantic dependencies in multiple languages. 2009.

D. Jurafsky and J. H. Martin. Speech and language processing (draft). october 2019. *URL https://web. stanford. edu/~ jurafsky/slp3*, 2019.

P. Koehn. Europarl: A Parallel Corpus for Statistical Machine Translation. In *Proceedings of the MT Summit 2005*, pages 79–86, 2005. URL http://www.iccs.inf.ed.ac.uk/~pkoehn/publications/europarl-mtsummit05.pdf.

P. Lewis, B. Oğuz, R. Rinott, S. Riedel, and H. Schwenk. Mlqa: Evaluating cross-lingual extractive question answering. *arXiv preprint arXiv:1910.07475*, 2019.

M. Sänger, U. Leser, S. Kemmerer, P. Adolphs, and R. Klinger. Scare—the sentiment corpus of app reviews with fine-grained annotations in german. In *Proceedings of the Tenth International Conference on Language Resources and Evaluation (LREC'16)*, pages 1114–1121, 2016.

A. Schiller, S. Teufel, C. Stöckert, and C. Thielen. Guidelines für das tagging deutscher textcorpora. *University of Stuttgart/University of Tübingen*, 1999.

R. Sennrich, M. Volk, and G. Schneider. Exploiting synergies between open resources for german dependency parsing, pos-tagging, and morphological analysis. In *Proceedings of the International Conference Recent Advances in Natural Language Processing RANLP 2013*, pages 601–609, 2013.

E. Troiano, S. Padó, and R. Klinger. Crowdsourcing and validating event-focused emotion corpora for german and english. *arXiv preprint arXiv:1905.13618*, 2019.

Y. Yang, Y. Zhang, C. Tar, and J. Baldridge. Paws-x: A cross-lingual adversarial dataset for paraphrase identification. *arXiv preprint arXiv:1908.11828*, 2019.

Lebenslauf

Persönliche Angaben

Ich Persönlich

Meinestrasse Nr

PLZ Wohnort

ichpersoenlich@uzh.ch

Schulbildung

| 2012-2014 | Bachelor-Studium Computerlinguistik und Sprachtechnologie an der Universität Zürich |
| seit 2014 | Master |

Berufliche und nebenberufliche Tätigkeiten

| 2012–2013 | Tutorate PCL I+II |

A Tables

Part of speech	POS type	POS	number of labels in my corpus
14	DET	**35**	280
14	DET	**35**	280
14	DET	**35**	280
14	DET	**35**	280
14	DET	**35**	280
14	DET	**35**	280
14	DET	**35**	280
14	DET	**35**	280
14	DET	**35**	280
14	DET	**35**	280
14	DET	**35**	280
14	DET	**35**	280
14	DET	**35**	280
14	DET	**35**	280
14	Total	**35**	280

Table 2: Some very large table in the appendix

B List of something

This appendix contains a list of things I used for my work.

- apples

  - `export2someformat`

- bananas

- oranges

  - `bleu4orange`

  - `rouge2orange`