CUNI x-ling: Parsing under-resourced languages in CoNLL 2018 UD Shared Task

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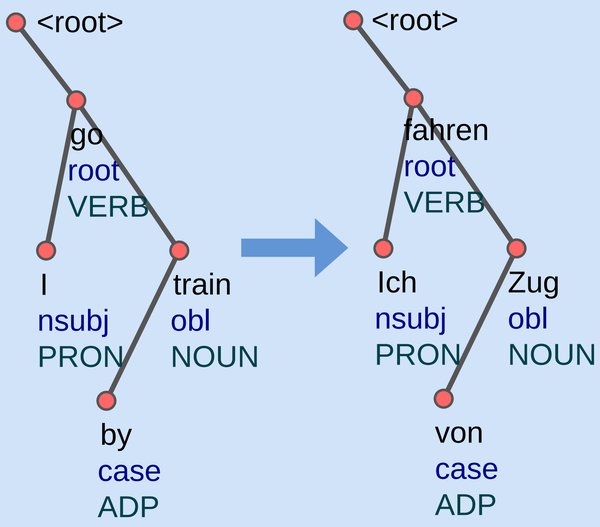
Treebank translation

- word-alignment (FastAlign) on OpenSubtitles2018 (Opus)

- each word is translated by the target word that was most frequently aligned to it



Pretrained embeddings

When the UDPipe parser is trained, we use pretrained word-embeddings by Bojanovski et al. (2016) on Wikiperdia texts

UniMorph morphology

Universal morpology annotation (Sylak-Glassman, 2016) uses different features form UD, mapping needed:

```
1     ->  Preson=1
SG    ->  Number=Sg
COND  ->  Mood=Cnd
ACC   ->  Cas=Acc
PRF   ->  Aspect=Perf
ADJ   ->  POS = ADJ
```

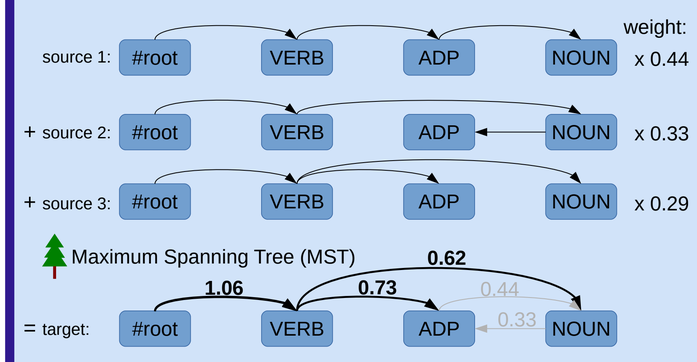
Post-correction:
If the word is found in UniMorph, chnage its tag, lemma and features

Combining multiple parsers

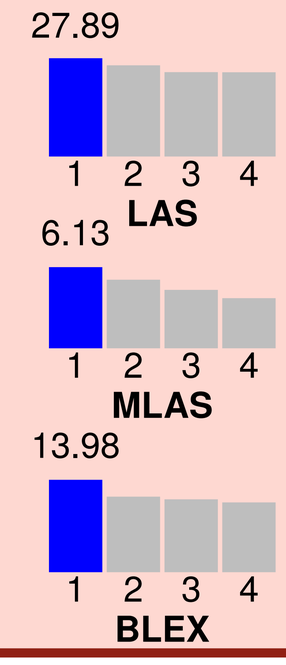
Several different parse trees are combined together.

Each tree may have different weight (expected performance on target treebank)

Maximum spanning tree is used to chose the best result.



Overall results on low-resource languages



Languages with no training data

Naija

1. apply English tokenizer
2. "translate" words to English
3. apply English tagger and parser
4. copy form to lemma, remove final -s

Naija -> English:

- if the Naija word is not in English lexicon:

- word changes:

```
sey   -> that      de   ->  is
na    -> is        don  ->  has
wey   -> which     am   ->  him
im    -> his       go   ->  will
wetin -> what      no   ->  not
dey   -> is        di   ->  the
deh   -> is        pikin ->  small
foh   -> in        sebi  ->  right
e     -> he        abi   ->  right
dem   -> they      nna   ->  man
dis   -> this      sabi  ->  know
```

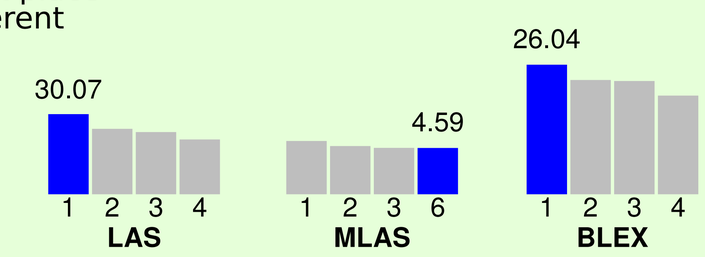
- character changes:

```
i  ->  y      k  ->  c
d  ->  th     ^  ->  h
t  ->  th     $  ->  t
a$ ->  er     o  ->  ou
```

Wiki:
A bai shu giv mai broda
[I bought shoes that I gave to my brother]

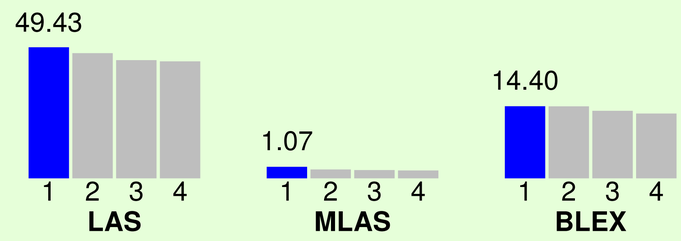
Bible:
Jisos Kraist wey dem born for David and Abraham famili, na em stori bi dis.

jw.org:
We come from different different place and we dey speek different different language.



Faroese

1. train devowelled Nynorsk tagger and parser
2. apply Nynorsk tokenizer
3. apply dewovelled Nynorsk tagger and parser
4. copy lowercased form to lemma
5. apply UniMorph morphology post-correction



Devowellization:

English:
Everyone has the right to life, liberty and the security of person.

Nynorsk:
Alle har rett til liv, fridom og personleg tryggleik.

Faroese:
Ein og hvør hevur rætt til lív, frælsi og persónliga trygd.

same words: 2

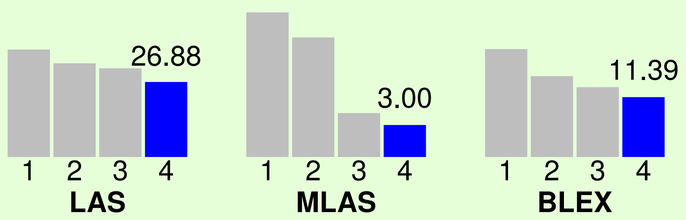
Devowelled Nynorsk:
ll hr rtt tl lv, frdm g prsnlg trgglk.

Devowelled Faroese:
n g hvr hvr rtt tl lv, frls g prsnlg trgd.

same words: 5

Breton

1. translate French treebank into Breton
2. train pseudo-Breton tagger and parser
3. apply French tokenizer
4. apply pseudo-Breton tagger and parser
5. apply UniMorph morphology post-correction



Thai

1. obtain Thai tokenizer

2. translate Indonesian, Chinese and Vietanmese treebanks into Thai

3. train pseudo-Thai parsers on the translated treebanks

4. combine taggers and parsers based on LAS on the development data

Indonesian	0.75
Chinese	0.55
Vietnamese	0.40

Tokenization:

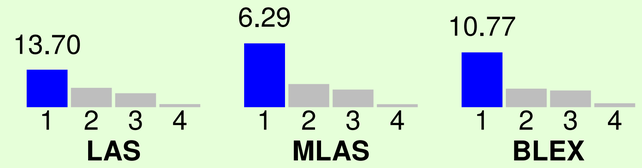
- generate synthetic Thai text by sampling Thai tokens

- list available within pretrained word-embeddings on Wikipedia

- token distribution:
  Prob(t) = 1 / sqrt(Ord(t))

- English, Japanese, and Chinese filtered out

- train UDPipe tokenizer on the synthetic Thai



Languages with small training data

1. train a UDPipe tokenizer, tagger, and parser

2. train delexicalized parsers for two other close languages

3. tokenize and tag the input

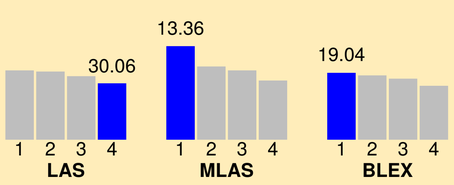
4. parse it with the target parser and the other two delexicalized parsers

5. do weighted combination of the parse trees using LAS

6. post-fix morphology using UniMorph, rewrite UPOS and lemmas

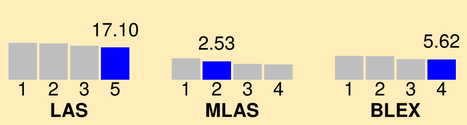
Armenian

Armenian	0.57
Latvian	0.56
Estonian	0.51



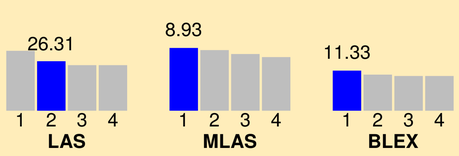
Buryat

Buryat	0.45
Hindi	0.41
Uyghur	0.38



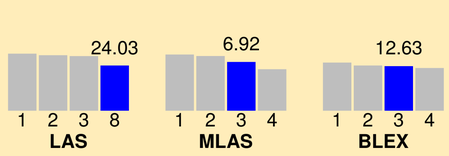
Kazakh

Kazakh	0.44
Turkish	0.33
Uyghur	0.29



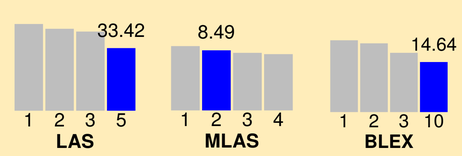
Kurmanji

Kurmanji	0.52
Latin	0.47
Greek	0.45



Up. Sorbian

Up. Sorbian	0.40
Polish	0.60
Czech	0.51



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