Language-Specific Adaptations of Multilingual Language Models for Universal Dependency Parsing

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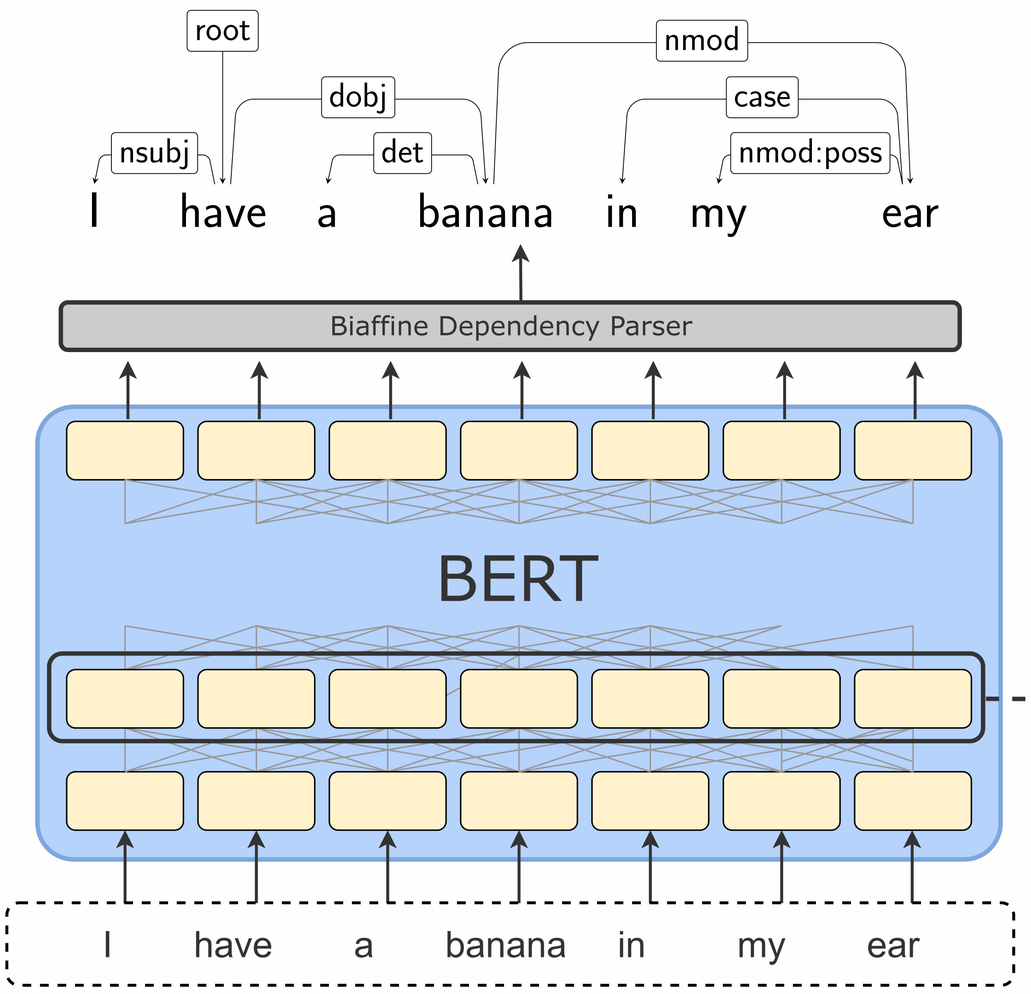
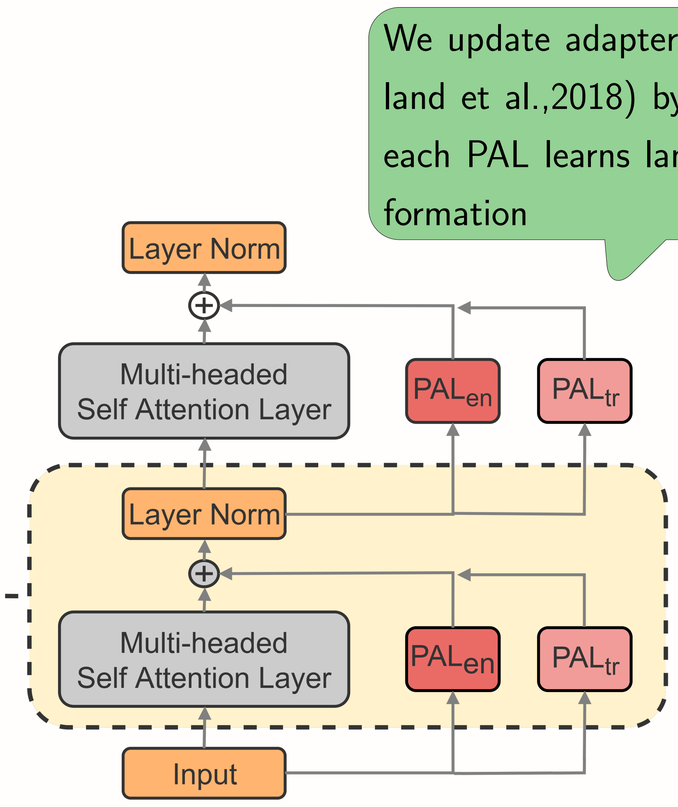


We extended Udify (Kondratyuk et al.,2019) that uses pretrained multilingual BERT as sentence encoder in biaffine parser



Overview

Task: Adapting mBERT-parser to N different languages

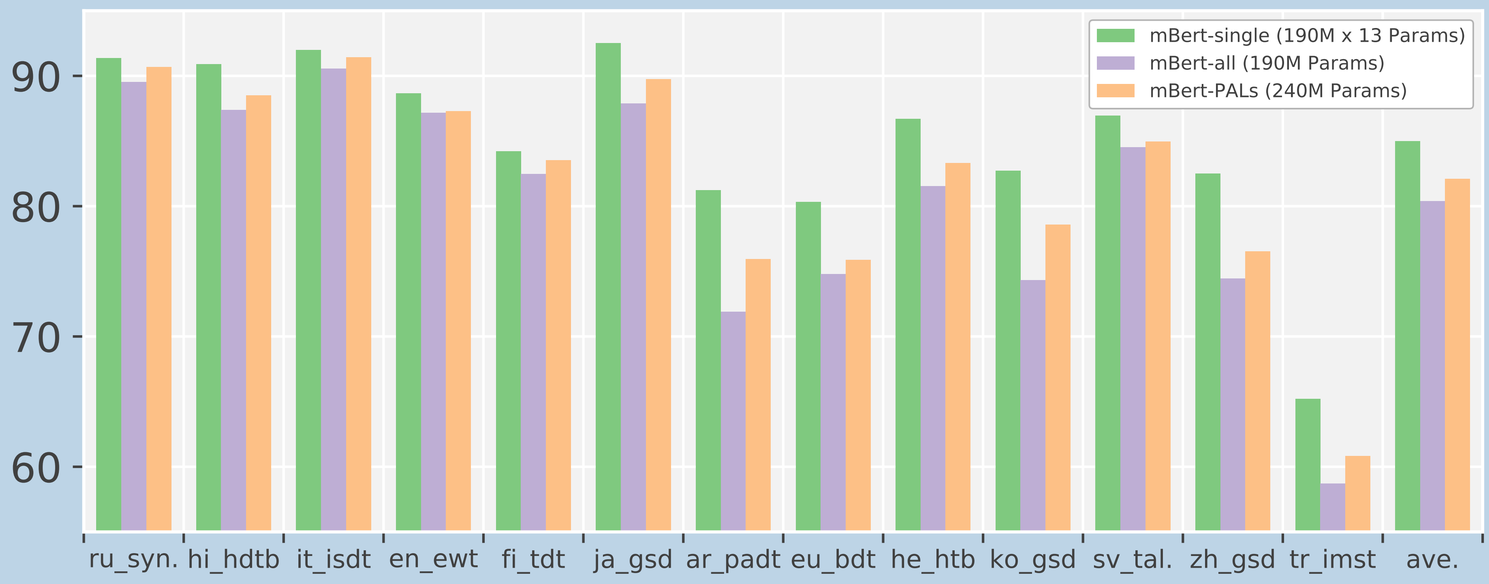
Problem: One parser trained on all languages < monolingual parsers trained on each language

Goal: Improve the multilingual parser by capturing language specific information in specific modules (PALs)

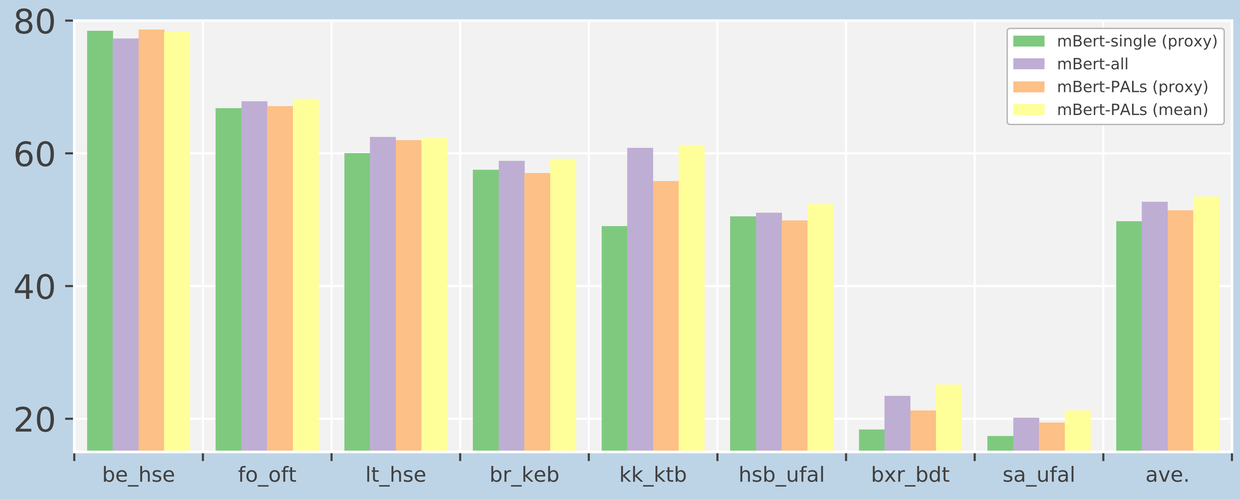
Languages with Training Data

Dataset	Family	Size(K)
ru_syn.	IE, Slavic	48.8
hi_hdtb	IE, Indic	13.3
it_isdt	IE, Romance	13.1
en_ewt	IE, Germanic	12.5
fi_tdt	Uralic, Finnic	12.5
ja_gsd	Japanese	7.1
ar_padt	Afro-Asiatic, Semitic	6.1
eu_bdt	Basque	5.4
he_htb	Afro-Asiatic, Semitic	5.2
ko_gsd	Korean	4.4
sv_tal.	IE, Germanic	4.3
zh_gds	Sino-Tibetan	4.0
tr_imst	Turkic, Southwestern	3.7

We train the parser either separately (`mBert-single`) or on all treebanks (`mBert-all`) with/out adapters (`mBert-PALs`).



Languages without Training Data (Zero-Shot)



We use `mBert-single`/`mBert-PALs` with a proxy language or we take the mean of each PALs' activations for all languages.

Language	Belarusian	Faroese	Lithuanian	Breton	Kazakh	U. Sorbian	Buryat	Sanskrit
Dataset	be_hse	fo_oft	lt_hse	br_keb	kk_ktb	hsb_ufal	bxr_bdt	sa_ufal
Proxy	ru_syn.	en_ewt	ru_syn.	en_ewt	tr_imst	ru_syn.	ru_syn.	hi_hdtb

Conclusion

- Language adapters (PALs) help the model to learn language-specific information that increase the parsing performance when model is trained on various languages all together.
- Training model with PALs on all languages still underperforms compared to the single language training.
- Without training data (zero-shot), using proxy languages (`mBert-single`/`mBert-PALs`) does not increase performance.
- Using adapters of all languages, `mBert-PALs(mean)`, increases parsing scores which indicates the future direction of our research.