DOMAIN GENERALIZATION IN VIETNAMESE DEPENDENCY PARSING

A NOVEL BENCHMARK AND DOMAIN GAP ANALYSIS

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THÀNH PHỐ HỒ CHÍ MINH

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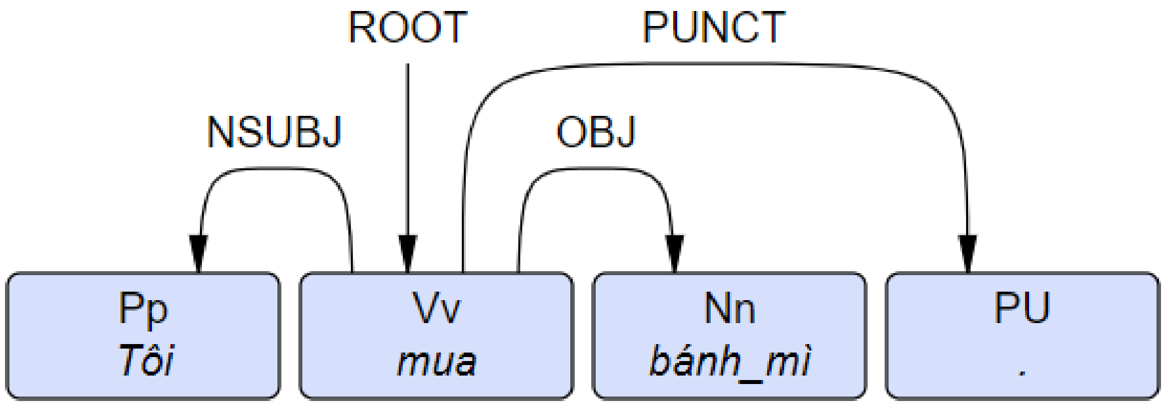
CÔNG NGHỆ THÔNG TIN

Introduction: Dependency Parsing

Dependency Parsing: build a directed tree by Grammatical relations

Tôi mua bánh mì.
(I buy some bread.)



Introduction: Domain Gap

Domain Gap: The difference between training and testing domain(s)

Training:

- *I love you so much.*
- *You are the light of my life.*
- *I'm crazy about you.*

Testing:

- *Em an com chua.*

Problem

- There is a limited number of research inside domain generalization on Vietnamese dependency parsing.
- One of the keys reason is the lack of a compatible treebank.

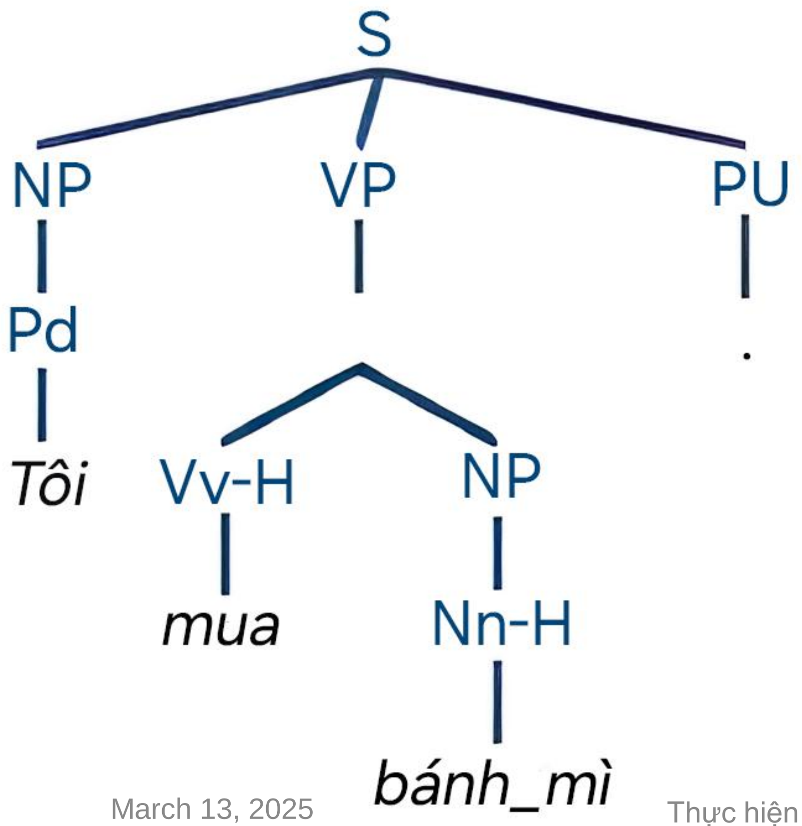
Our contribution

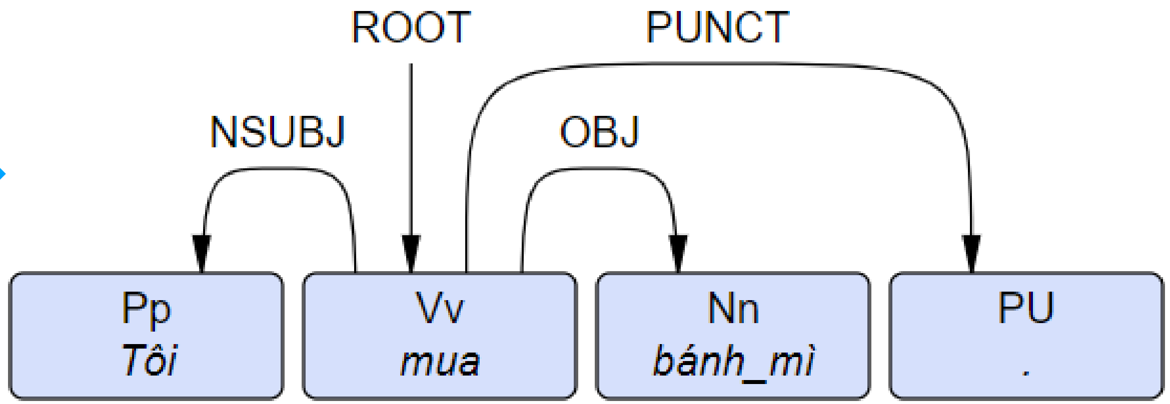
In this research, we release:

- DGDT, a Vietnamese dependency treebank that available in multiple domains, which can accommodate cross-domain setups.
- DGDTMark, a benchmark suite available in different cross-domain scenarios.

Dataset construction

- To keep balance between cost and data quality, we adopt a converter to transform an existing constituency treebank.





Dataset construction

- We follow the converter released by Truong et al. (1) and the constituency treebank of Nguyen et al. (2) as they fit our requirements.

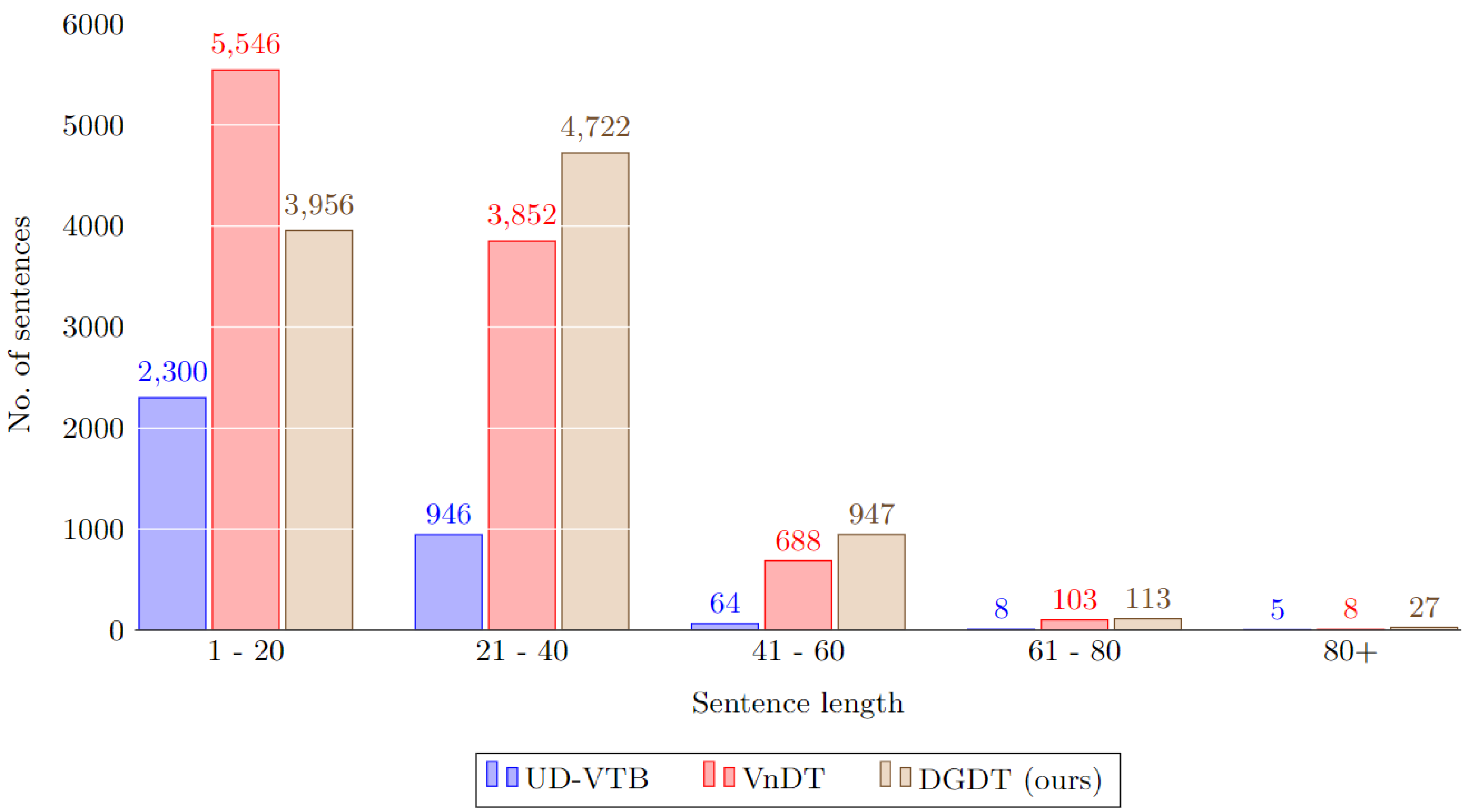
- Our dataset contains 9,765 sentences in 14 newspaper topics, crawled from the Thanh Nien Newspaper.
- We treat each topic as a single domain.

(1) C. M. Truong, T. V. Pham, M. N. Phan, N. D. T. Le, T. V. Nguyen and Q. T. Nguyen, "Converting a constituency treebank to dependency treebank for Vietnamese," 2022 RIVF International Conference on Computing and Communication Technologies (RIVF), Ho Chi Minh City, Vietnam, 2022, pp. 256-261
(2) Nguyen, Q.T., Miyao, Y., Le, H.T.T. et al. Ensuring annotation consistency and accuracy for Vietnamese treebank. Lang Resources & Evaluation 52, 269–315 (2018).

Dataset Statistics

Set	Domain	Number of Sentences
Train	Education	844
	Health	725
	Law	610
	Life_of_youth	635
	Military	690
	Politics_Society	712
	Science	692
	Sports	697
	Travel	540
	World	645
Dev	Entertainment	708
	Information_Technology	714
Test	Economic	725
	Life	828
	Total	9765

Dataset Statistics



The DGDTMark

To evaluate the effects of domain gap into the task, we released this benchmark suite, includes 4 scenarios:

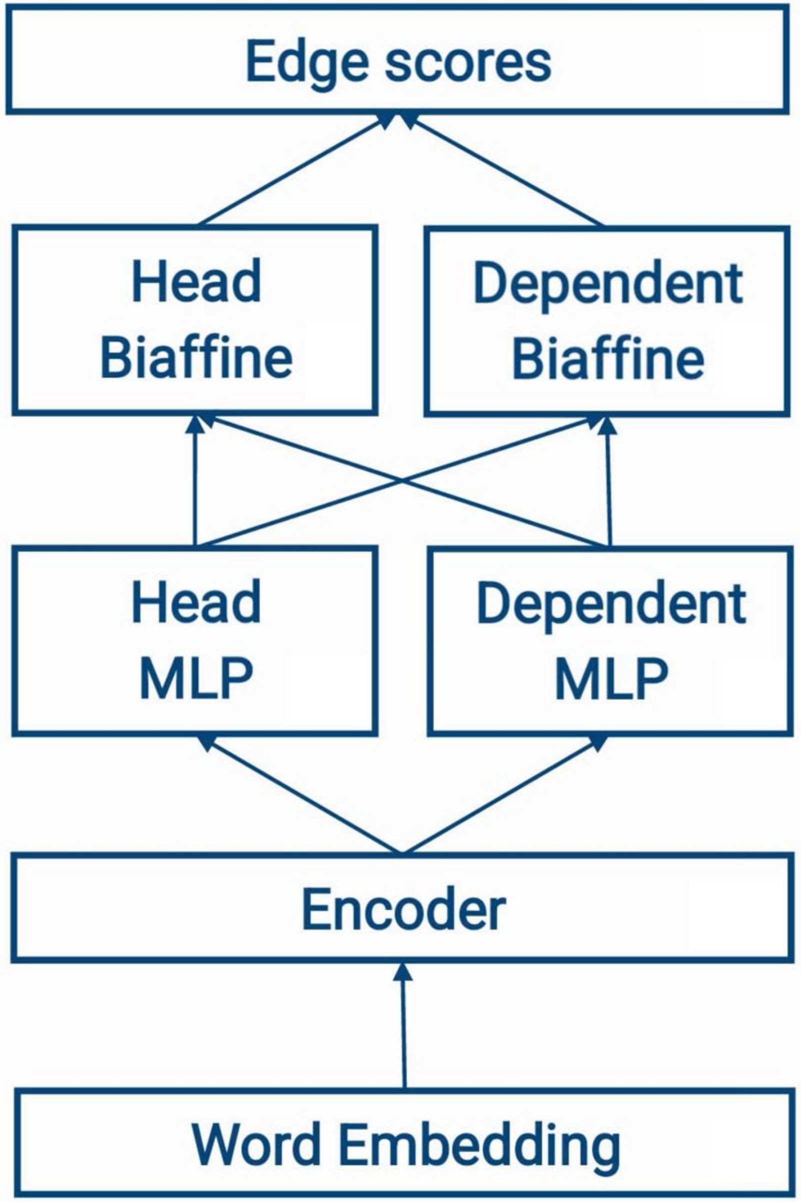
1. *in-domain:* split each domain with ratio 8:1:1 and merge the respective parts from all domains to build train/dev/test sets.
2. *domain-k-fold:* let each domain be the dev and test set, while the rest of treebank plays the role of train set.
3. *domain-generalization:* arrange domains exclusively to one of three train/dev/test sets.
4. *dataset-generalization: replace the test set of DGDT in the third scenario with test set of the NIIVTB_DT-1 (1) treebank.*

(1): first reference on the 7th slide

Models

- We use the Deep Biaffine Attention Model as our baseline for DGDTMark.
- We run our experiments on the implementation of Zhang et al. (3) with default hyperparameters.
- The original LSTM is replaced by transformer-based encoder including PhoBERT and XLM-RoBERTa (XLM-R).

(3) https://github.com/yzhangcs/parser

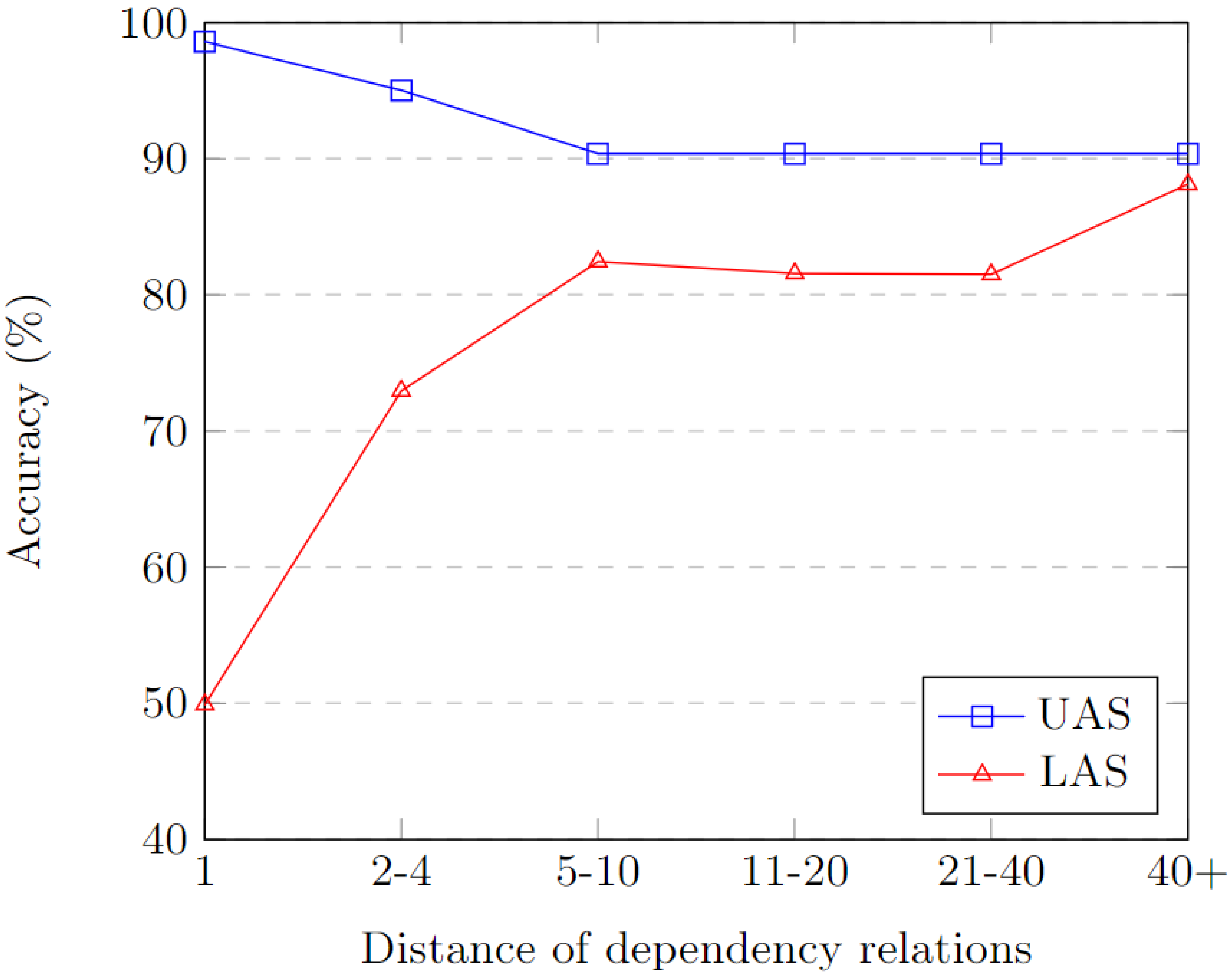


Experiment Results

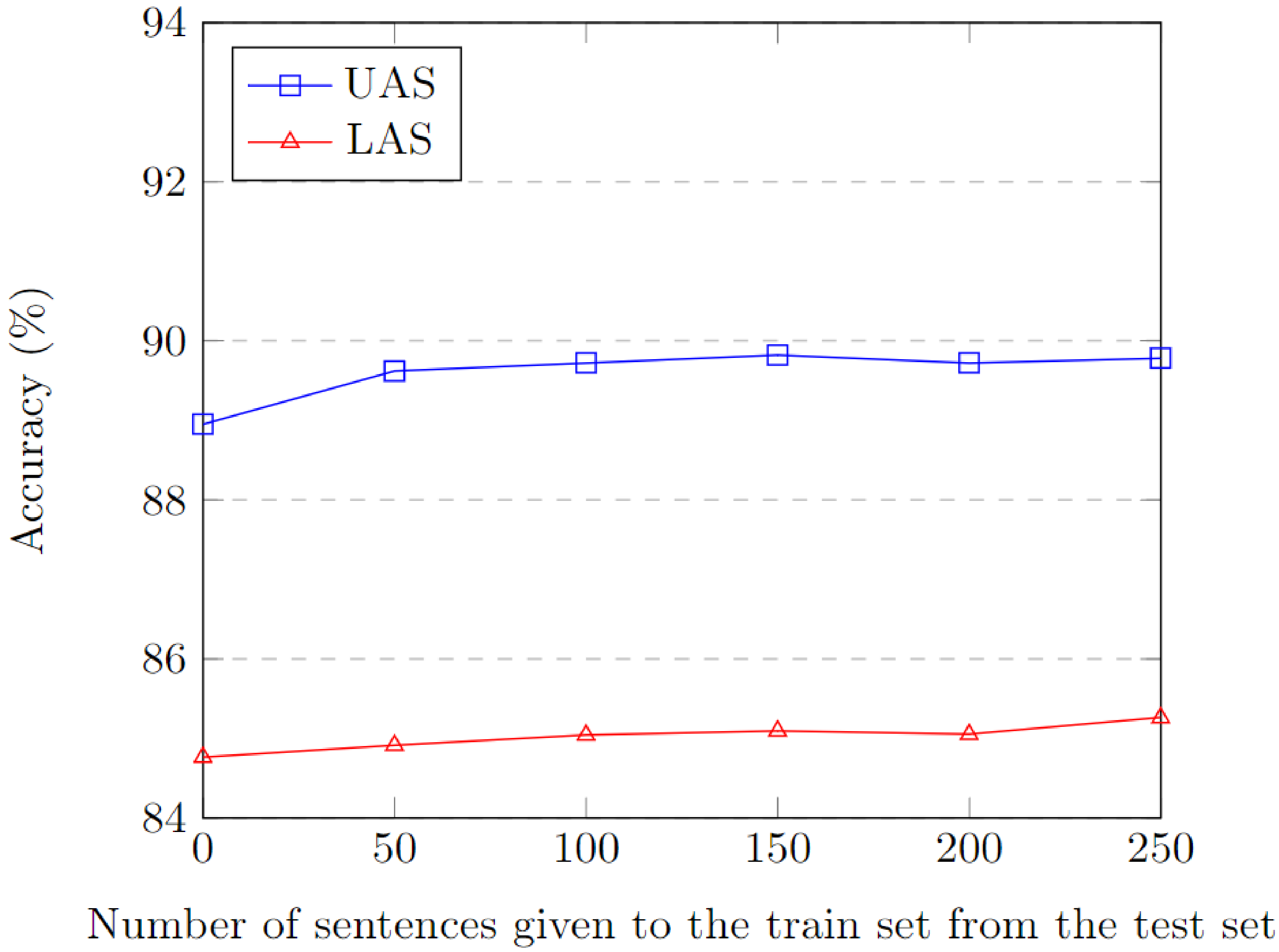
Encoder	in-domain	domain-k-fold	domain-generalization	dataset-generalization
PhoBERT	87.83	87.01	84.76	82.74
XLM-R	85.89	84.99	82.88	80.97

- Both encoders are evaluated with their *base* version.
- The evaluation metric is LAS.

How do the models capture long dependencies?



Can data from testing domains help the models?



Conclusion

- We introduce DGDT treebank and DGDTMark benchmark suite.
- Current models have performed well in this parsing task (87.83% LAS), but have still faced difficulties when handling the domain gap (>5% decrease of LAS).

THANK YOU

Q&A