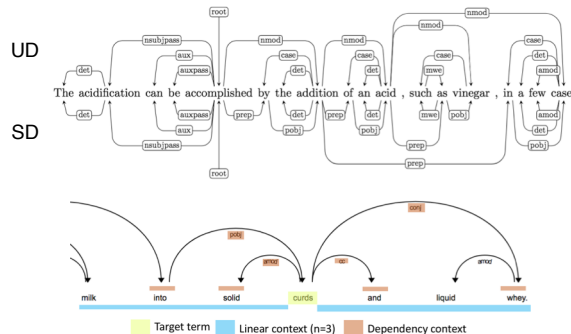


Problem Statement

- Prior work [1] has shown that embeddings trained using dependency contexts distinguish related words better than similar words.
- **What effects do decisions made with embeddings have on the characteristics of the word embeddings?**
- Do Universal Dependency (UD) embeddings capture different characteristics than English-tailored Stanford Dependency (SD) embeddings?

Training Variations

- **Universal Dependencies (UD):** Cross-lingual
- **Stanford Dependencies (SD):** English-tailored



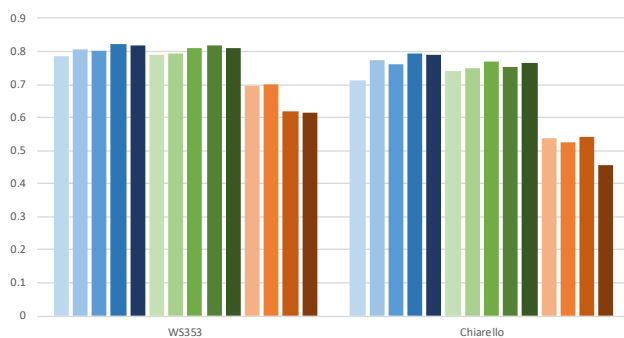
- **Unlabeled:** Context constructed without dependency labels
- **Simplified:** Functionally similar dependency labels are collapsed
- **Basic:** Standard dependency parse
- **Enhanced and Enhanced++:** Dependency trees augmented (e.g., new edges between modifiers and conjuncts with parents' labels)

Similarity over Relatedness

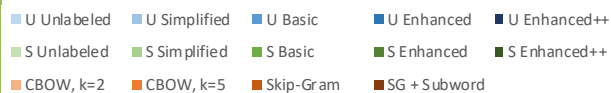
Does the model rank functionally similar words above related words (topically similar)?

Similar: camel + bear Related: camel + hump

Evaluation: WordSim-353, Chiarello (AUC)



Universal Enhanced work the best; all much better than baselines.

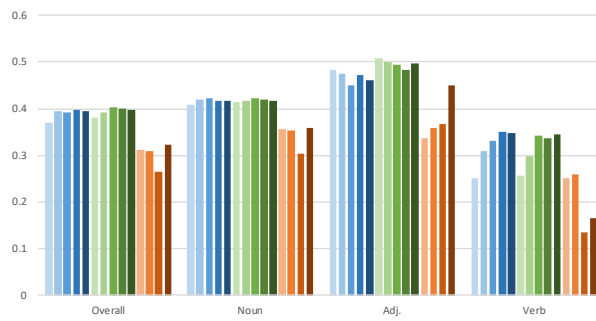


Ranked Similarity

Does the model rank "more similar" above "less similar" words?

ceiling-roof > ceiling-floor > ceiling-cathedral

Evaluation: SimLex-999 (Spearman)



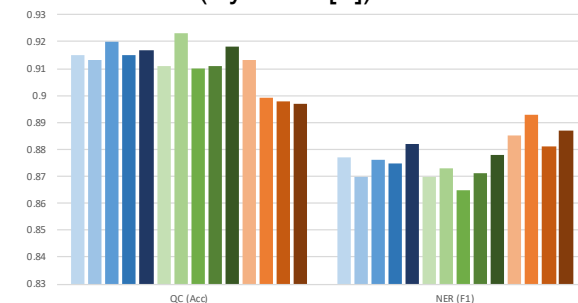
Stanford Basic work the best; verbs most difficult, adjectives easiest.

Downstream Tasks

Does the model have an effect on the downstream tasks of question classification and named entity recognition?

Evaluation: TREC QC (System: [2])

CONLL NER (System: [3])



Some tasks can benefit from dependency-based word embeddings, others not.

[1] Omer Levy and Yoav Goldberg. 2014. Dependency-based word embeddings. *ACL 2014*.

[2] https://github.com/zhegan27/sentence_classification

[3] Franck Dernoncourt, Ji Young Lee, and Peter Szolovits. 2017. NeuroNER: an easy-to-use program for named-entity recognition based on neural networks. *EMNLP 2017*. <https://github.com/Franck-Dernoncourt/NeuroNER>