Jointly learning to perform natural language inference and metaphor detection

The metaphorical phrase `He was living on borrowed time', illustrates how metaphors arise through systematic associations between concepts: time is considered to have monetary value and, as a result, we can borrow or steal time. Such associations allow us to project knowledge and inferences across semantic domains (e.g. from the source domain (money) to the target domain (time)), giving rise to a variety of metaphorical expressions. Metaphorical uses of words account for a large part of lexical meaning variation in language, known as regular polysemy. While many metaphor identification methods have been developed by the NLP community, none have yet been integrated with general-purpose meaning representation learning techniques. This project intends to fill this gap, by developing a novel joint model of metaphor identification and sentence representation learning in the natural language inference (NLI) task.

Metaphor processing, which requires us to model metaphorical inferences, is furthermore conceptually related to the task of natural language inference, which involves the classification of entailment relationships. Therefore, computational models for these tasks may mutually benefit from joint learning.

In this project, you will also investigate this question. The baseline model to use would be the model from the SNLI practical, which can be combined with the metaphor detection methods of Gao et al. (2018). You can then further experiment with contextualised representations, such as ELMo and BERT. You can also evaluate the resulting model using the recently constructed Word in Context (WIC) dataset.

Resources

- Metaphor Corpus: Dataset Vrije Universiteit Amsterdam Metaphor Corpus and SOTA neural model for metaphor detection of Gao et al. (2018) available at: https://github.com/gao-g/metaphor-in-context
- SNLI Corpus from practical
- WIC dataset: https://arxiv.org/pdf/1808.09121.pdf
- Baseline models: model from SNLI practical combined with Gao et al.'s model for metaphor identification

Further reading

- Shutova, E. (2015). Design and evaluation of metaphor processing systems. *Computational Linguistics*, *41*(4), 579-623.
- Gao, Ge, Eunsol Choi, Yejin Choi, and Luke Zettlemoyer. "Neural Metaphor Detection in Context." In *Proceedings of the 2018 Conference on Empirical Methods in Natural Language Processing*, pp. 607-613. 2018.
- Conneau, Alexis, Douwe Kiela, Holger Schwenk, Loïc Barrault, and Antoine Bordes. "Supervised Learning of Universal Sentence Representations from Natural Language Inference Data." In *Proceedings of the 2017 Conference on Empirical Methods in Natural Language Processing*, pp. 670-680. 2017.
- Mohammad Taher Pilehvar and Jose Camacho-Collados. 2019. WiC: the Word-in-Context Dataset for Evaluating Context-Sensitive Meaning Representations. In Proceedings of NAACL 2019.
- Matthew E. Peters, Mark Neumann, Mohit Iyyer, Matt Gardner, Christopher Clark, Kenton Lee and Luke Zettlemoyer. 2018. Deep contextualized word representations. In Proceedings of NAACL 2018, New Orleans, Louisiana.