Relation Extraction: Perspective from Various Supervised Approaches

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Abstract (should be within 1st page)

Relation extraction has been widely studied in a fully supervised learning approach by training models on large-scale labeled data. Following this approach, existing supervised models have achieved excellent performance. However, these supervised models cannot solve relation extraction in real-world scenarios, such as recognizing new relations or identifying entities and their relations jointly. Thus, in this dissertation, we focus on two other supervised approaches for relation extraction task, namely "*zero-shot relation extraction*" and "*end-to-end relation extraction*".

The first part of this dissertation addresses *zero-shot relation extraction*, which aims to recognize (new) unseen relations that cannot be observed during training. We propose two new methods to improve task performance. In the first method, we present a new model that mainly boosts discriminative feature learning on both sentence and relation spaces. This model is also equipped with a self-adaptive comparator network to judge whether the relationship between a sentence and a relation is consistent. In the second method, we argue that enhancing the semantic correlation between instances and relations is key to solving the zero-shot relation extraction task effectively. A new model entirely devoted to this goal through three main aspects was proposed: learning effective relation representation, designing purposeful mini-batches, and binding two-way semantic consistency. Experimental results on benchmark datasets demonstrate that the two proposed methods significantly improve task performance and achieve state-of-the-art results.

The second part of this study concentrates on *end-to-end relation extraction*, which aims to detect entity pairs and their relations to create relational triplets. We propose an improved decomposition strategy that overcomes two major problems of the previous decomposition strategy by Yu et al. (2020). Our improved decomposition strategy considers each extracted entity in two roles (*head* and *tail*) and allows a model to predict multiple relations (if any) of an entity pair. In addition, a corresponding model framework is presented to deploy our new decomposition strategy. Experimental results showed that our method significantly outperformed the previous method of Yu et al. (2020) and achieved state-of-the-art performance on two benchmark datasets. Besides, we also present CovRelex, a scientific paper retrieval system that can automatically detect both entities with various types and their diverse relations through papers. The system aims to support users efficiently in acquiring such knowledge across many COVID-19 scientific papers.