



Improving Relation Extraction Using Semantic Role and Multi-Task Learning

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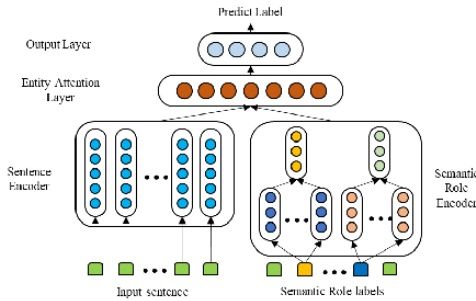
Abstract

Relation extraction (RE) aims at identifying the relationship between two given entities and plays an essential role in natural language processing (NLP). Most of existing relation extraction models use convolutional or recurrent neural network and fail to capture the in-depth semantic features from the entities. These models also only focus on the training data and ignore external knowledge. In this paper, we propose a relation extraction model that makes use of external knowledge and the semantic roles of entities. In our model, we first adopt RoBERTa to make use of the knowledge learned from the unsupervised pretrain corpus. Then we obtain the semantic role embeddings and propose an entity attention network to select important words for relation extraction. We also offer the multi-task learning module and further improve our model by learning from auxiliary tasks. Our model outperforms most of the existing methods. More ablation experiments on two different datasets show that semantic role information and multi-task learning can help improve the relation extraction.

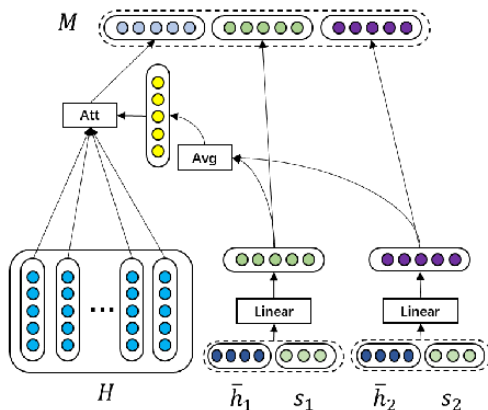
Approach

Single-Task Model

The RoBERTa and semantic role based single-task model contains four parts: sentence encoder, semantic role encoder, entity attention layer, and output layer.



Considering that different words in the sentence contribute to the relation differentially, We use entity attention layer to get the final representation of an input sentence.



Multi-Task Model

To further utilize the knowledge in other tasks and improve the performance of our model, we also propose a multi-task learning module.

Algorithm 1: Training the whole model.

Input: Main dataset: D_{re} , Auxiliary datasets: $D = \{D_1, D_2, \dots, D_T\}$.

Multi-task learning epoch: $epoch_{mtl}$, Max epoch: $epoch_{max}$, Sampling size: n .

Initialize model parameters randomly.

Use the pretrain RoBERTa-base model to initialize sentence encoder

for epoch in 1, 2, ..., $epoch_{max}$ **do**:

if $epoch < epoch_{mtl}$ **then**:

for D_i in $\{D_1, D_2, \dots, D_T\} \cup D_{re}$ **do**:

 Sample n instances from D_i .

 Use the instances to train the model.

end.

else:

 Use D_{re} to train the model.

end.

Conclusion

In this paper, we propose a novel relation extraction approach that can make use of the external knowledge and semantic roles of the target entities. In our method, we first use RoBERTa to encode the sentence to make use of the knowledge learned from the unsupervised pretrain corpus. Then we get the semantic role embeddings and propose an entity attention network to select important words for relation extraction. We also suggest the multi-task learning module and further improve our model by learning from auxiliary tasks. Experiments show that our model can improve the performance of relation extraction with the semantic role and multi-task learning.

Acknowledgments

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