

# A Neural Approach for Thematic Role-Fillers Prediction Based on Context Information

Abstract:

Thematic role-filler prediction refers to the prediction of certain words corresponding to given thematic roles, while selectional preference refers to a word's tendency to co-occur with other words that belong to certain lexical sets. Traditional approaches for thematic role-filler prediction or selectional preference rely either on hand-crafted resources such as word-net or on unsupervised machine learning mechanisms such as distributional similarity metrics. Throughout this research, we investigated the use of deep learning approaches for semantic role-filler prediction. Taking a large amount of automatically role-labeled text as input, the model is expected to predict a suitable role-filler given the target semantic role and the context of other role-fillers. In order to enable our model to present a high quality distributed representation of a semantic role under different contexts, the arguments of the predicate should take contextual information (e.g the entire noun phrase or sentence) into consideration. In our experiments, we explored various ways to embed important words contained in the noun phrase or sentence for semantic roles. The experimental results indicate that building factored role-specific word embedding matrices and factored role-specific classifiers are effective methods for sharing role and word information through the neural network. Regarding meaning composition, we apply a deep learning method for processing sequential data and sentence meaning. We further explore usage of attention mechanism to obtain a weighted meaning representation based on the Recurrent Neural Network(RNN) or word embeddings. We explore their performance at the phrase level and sentence level. Experimental results of perplexity indicate that the attention mechanism performs better at the phrase level than at the sentence level. Meanwhile, at the sentence level, the RNN is an effective method for sentence meaning representation. Furthermore, based on the evaluation of thematic fit difference, the attention mechanism applied in sentence level are also important for contextual meaning extraction.