

Probing Language Models for Multiple Linguistic Information

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Abstract : In recent years, large-scale pre-trained language models have achieved state-of-the-art performance on a variety of natural language processing tasks. The word vectors produced by these language models can be viewed as dense encoded presentations of natural language that in text form. However, it is unknown how much linguistic information is encoded and how. In this paper, we construct several corresponding probing tasks for multiple linguistic information to clarify the encoding capabilities of different language models and performed a visual display. We firstly obtain word presentations in vector form from different language models, including BERT, ELMo, RoBERTa and GPT. Classifiers with a small scale of parameters and unsupervised tasks are then applied on these word vectors to discriminate their capability to encode corresponding linguistic information. The constructed probe tasks contain both semantic and syntactic aspects. The semantic aspect includes the ability of the model to understand semantic entities such as numbers, time, and characters, and the grammatical aspect includes the ability of the language model to understand grammatical structures such as dependency relationships and reference relationships. We also compare encoding capabilities of different layers in the same language model to infer how linguistic information is encoded in the model.

Keywords : language models, probing task, text presentation, linguistic information

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