A Graph-Based Retrieval Model for Passage Search

Authors : Junjie Zhong, Kai Hong, Lei Wang

Abstract : Passage Retrieval (PR) plays an important role in many Natural Language Processing (NLP) tasks. Traditional efficient retrieval models relying on exact term-matching, such as TF-IDF or BM25, have nowadays been exceeded by pretrained language models which match by semantics. Though they gain effectiveness, deep language models often require large memory as well as time cost. To tackle the trade-off between efficiency and effectiveness in PR, this paper proposes Graph Passage Retriever (GraphPR), a graph-based model inspired by the development of graph learning techniques. Different from existing works, GraphPR is end-to-end and integrates both term-matching information and semantics. GraphPR constructs a passage-level graph from BM25 retrieval results and trains a GCN-like model on the graph with graph-based objectives. Passages were regarded as nodes in the constructed graph and were embedded in dense vectors. PR can then be implemented using embeddings and a fast vector-similarity search. Experiments on a variety of real-world retrieval datasets show that the proposed model outperforms related models in several evaluation metrics (e.g., mean reciprocal rank, accuracy, F1-scores) while maintaining a relatively low query latency and memory usage.

Keywords : efficiency, effectiveness, graph learning, language model, passage retrieval, term-matching model **Conference Title :** ICSLP 2023 : International Conference on Speech and Language Processing **Conference Location :** Stockholm, Sweden

Conference Dates : July 06-07, 2023

1