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Towards End-to-end Wikipedia-based Open-domain Question-Answering Systems for Single-hop and Multi-hop Questions in Low-resource Languages

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Open-domain Question-Answering (QA) task involves using a large knowledge base, such as Wikipedia, to answer a given question. This is often done using a two-stage framework that includes a Retriever and a Reader. The performance of the QA system is greatly influenced by the effectiveness of the Retriever stage. Despite being the first language of roughly a hundred million people worldwide, Vietnamese remains a low-resource language with a scarcity of research on QA systems. No efficient Vietnamese Open-domain QA system for single and multi-hop questions has been studied. Although resource-rich languages like English witnessed many advancements in Open-domain QA, these methods often suffer from low data situations. The objective of this study is to design an efficient Open-domain QA system utilizing the Wikipedia knowledge base, which can handle both single and multi-hop questions. The proposed system is robust when applied to low-resource languages. This research was initially conducted in the Vietnamese language, but the methodology can be generalized to other low-resource languages. This study proposes ViWiQA, an efficient Vietnamese Open-domain QA system over the Wikipedia knowledge base, with two novel retriever methods for single-hop and multi-hop questions. ViWiQA can be effectively trained with low data and significantly outperforms Lucene-BM25 and Dense Passage Retrieval when adapted to Vietnamese datasets. ViWiQA demonstrates a significant improvement of 20% in single-hop retrieval accuracy compared to Lucene-BM25 and sets a new standard in single-hop and multi-hop Vietnamese Open-domain QA benchmarks.