

The Exploration of an Interpretable Learning-To-Rank Model for Health-Related Decision Making

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Nowadays, web search engine systems play a remarkable role in bridging the ever-increasing World Wide Web (www) with vast user information needs ranging from simply finding information to acquiring knowledge and making decisions. For example, users may utilize web search engines to locate information regarding health-related problems or conditions. Physicians and other healthcare professionals may rely on search results to assist them to determine the optimal therapy, diagnosis, or testing for their patients. In fact, the accuracy and relevancy of search results might have severe implications for the health and well-being of individuals, especially for users that rarely have experienced skills in classification and assessment.

Therefore, an effective ranking model must be able to identify web documents containing correct information and rank them to top positions of the result list than documents containing misinformation.

This thesis focuses on the research problem of health-related decision making by exploring how to integrate the interpretable learning-to-rank model. Specifically, we proposed the Multistep Interpretable Retrieval System (MIRS), where the DuoT5 model trained on the Med-MARCO passage ranking dataset and the TabNet model with interpretability for document re-ranking are used. The key idea is to integrate the natural language knowledge contained in the pre-trained model and the interpretable model's ability to control feature importance to exclude the effect of incorrect health information on the ranking results.

Based on the datasets and evaluation tools released by the Health Misinformation Track 2021, we conducted a series of experiments to evaluate the proposed system. The experimental results demonstrate that the MIRS yields superior performance than the track organization's baseline method, and achieved a compatibility difference score of 0.0113. In a nutshell, the integration of an interpretable model (i.e., TabNet) helps to achieve both effective and interpretable results for health-related decision making.

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