Chapter 7
Internet Wizard for Enhancing Open Domain Question Answering Chatbot Knowledge-Base in Information Seeking

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ABSTRACT

As chatbots gain prominence across diverse fields, including education, their static knowledge base poses limitations. This study investigates the utilization of an internet wizard to enhance the knowledge base of an open-domain question-answering chatbot. The proposed approach leverages search engines, particularly Google, and their features, such as feature snippets, knowledge graph, and organic search, by integrating data science and natural language models. This enables the chatbot to access real-time and up-to-date answers from web documents, providing dynamic responses to user queries. A pilot study in higher education assessed the chatbot's mechanism and features, demonstrating its ability to generate responses across a wide range of educational and non-educational topics, supported by positive feedback and user satisfaction. The chatbot's dynamic feature of retrieving related or

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follow-up questions from search engines significantly enhances student engagement and facilitates exploration of additional information beyond the curriculum.

1. INTRODUCTION

Chatbots as an application of human-computer interaction have gained significant importance in the last few years and undergone remarkable developments. The growing interest in chatbots can be attributed to the proliferation of mobile devices over the past decade. As these smart devices, such as smartphones, have become increasingly popular, so too have the applications that run on them, including chatbots. Consequently, chatbots have transformed the ways in which humans interact with technology and have created new opportunities for organizations and businesses to engage with their clients. These programs are designed to perform a wide range of tasks in an automated manner, making them a useful tool in various settings (Grudin & Jacques, 2019). Chatbots, also called conversational agents, can be defined as conversational or interactive agents that provide an instant response to the user (Okonkwo & Ade-Ibijola, 2020; Smutny & Schreiberova, 2020). A computer program or artificial intelligence tool that conducts a conversation using auditory or textual methods.

Chatbots, or conversational agents, have been around since the development of the first application in 1960 called ELIZA by Joseph Weizenbaum at MIT. ELIZA used natural language processing (NLP) to recognize patterns and act as a therapist (Weizenbaum, 1966). Other notable examples include ALICE, developed by Richard Wallace in 1995, which uses Artificial Intelligence Markup Language (AIML) for pattern matching to recognize inputs and generate responses (Shawar & Atwell, 2015). Many current chatbots are based on ALICE's framework, such as HeX (Hutchens, 1997) and Claude (Laven, 1996) which were also developed based on standard pattern matching. HeX introduces a brand-new topic based on a certain probability (Y. Wu et al., 2008).

In the past, chatbots were primarily used in the customer service industry, but in recent years, they have become more sophisticated, able to understand and respond to more complex inputs. They are now used in a wide range of industries, such as healthcare (Feldman et al., 2012; Razzaki et al., 2018), finance (Mogaji et al., 2021; Wube et al., 2022), customer service (Følstad & Taylor, 2021; Ngai et al., 2021), psychology (Uludag, 2023, 2024), individualized support via intelligent audio device (Clark et al., 2019), and education such as using chatbots to learn Computer Programming concepts (Coronado et al., 2018; Daud et al., 2020; Okonkwo & Ade-Ibijola, 2020). The majority of chatbots are task-oriented and open-domain (Gao et al., 2019), and are now integral parts of many companies' customer service

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