Chapter 1
Recent Developments in Chatbot Usability and Design Methodologies

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ABSTRACT

Chatbots are rapidly growing and becoming prevalent in many applications, including healthcare, education, and consumer services. As such, it is crucial to design chatbots with usability in mind. Traditional usability heuristics call for error prevention, consistency, and task efficiency. The heuristics are suited for all types of user interfaces, including chatbots. However, chatbots have their unique challenges, and thus, recently, some researchers have developed sets of usability guidelines specifically for chatbots. However, there is a shortage of studies that summarize the latest advances in chatbot usability design and assessment. As such, this chapter covers the existing general and chatbot-specific usability heuristics and examples of usage. Moreover, the chapter presents the recent developments in chatbot design techniques and challenges.

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INTRODUCTION

Chatbots, also known as conversational agents, facilitate the interaction of humans with computers using natural language by applying natural language processing (NLP) (Bradeško & Mladenić, 2012). Chatbots are rapidly becoming prevalent as they imitate human conversations and thus automate service, and they are now utilized in various areas, including healthcare (Oh et al., 2017), consumer services (Xu et al., 2017), education (Kuhail et al., 2022), and academic advising (Kuhail et al., 2022).

Despite the popularity of chatbots in various fields and a plethora of studies on chatbots in academia, there is a lack of studies summarizing the recent development of chatbots' usability and user experience in terms of design and usability evaluation. In essence, usability assesses how easy a user interface is to use (Nathoo et al., 2019). Traditionally, Schneiderman et al. (2016), Sugisaki and Bleiker (2020), and Nielsen and Molich (1990) identified generic usability heuristics as useful for guiding and evaluating user interfaces. However, since they are generic, the usability heuristics are susceptible to different interpretations by designers (Sugisaki & Bleiker, 2020), especially for conversational interfaces, which have unique characteristics such as sequential communication and freedom of interaction and initiative (Shneiderman et al., 2016). Consequently, various researchers contributed usability heuristics to guide the design and assessment of conversational user interfaces (Bos et al., 1999) (Murad et al., 2019) (Sugisaki & Bleiker, 2020). These heuristics are established on the generic usability heuristics together with particularity connected to conversation and language studies. Other techniques and strategies have been used for evaluating chatbots, including log analysis and observations (Kawasaki et al., 2020) and surveys (Xiao et al., 2020).

In addition to usability heuristics, a few studies have contributed several methodologies guiding the design and development of chatbots. For instance, Pricilla et al. (2018) based their chatbot design on understanding user goals and tasks, while other studies based their design on interviews with users (Zheng et al., 2022) and eliciting scenarios (Kuhail et al., 2022). Nevertheless, there is a lack of studies that provide an overview of the existing approaches to designing and evaluating chatbots. Concerning design techniques, there are several design techniques presented in the literature. For instance, a rule-based approach uses predefined rules to generate responses (Agarwal & Mani, 2020; Thorat & Jadhav, 2020). Other approaches use information retrieval, including Word-level Vector space models with a cosine distance, to find the best match Q-A pair (Mnasri, 2019). Moreover, machine learning techniques commonly employ a different set of features. Sequence-to-sequence learning and reinforcement learning are the most used machine learning models (Mnasri, 2019). Thus, this study aims to bridge the gap by summarizing, analyzing,