RESEARCH PAPER

Virtual Assistance in Any Context

A Taxonomy of Design Elements for Domain-Specific Chatbots

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Abstract Several domain-specific assistants in the form of chatbots have conquered many commercial and private areas. However, there is still a limited level of systematic knowledge of the distinctive characteristics of design elements for chatbots to facilitate development, adoption, implementation, and further research. To close this gap, the paper outlines a taxonomy of design elements for chatbots with 17 dimensions organized into the perspectives intelligence, interaction and context. The conceptually grounded design elements of the taxonomy are used to analyze 103 chatbots from 23 different application domains. Through a clustering-based approach, five chatbot archetypes that currently exist for domain-specific chatbots are identified. The developed taxonomy provides a structure to differentiate and categorize domain-specific chatbots according to archetypal qualities that guide practitioners when taking design decisions. Moreover, the taxonomy serves academics as a foundation for conducting further research on chatbot design while integrating scientific and practical knowledge.

Keywords Chatbot taxonomy · Design elements · Domain-specific chatbots · Human computer interaction

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1 Introduction

Chatbots as a form of conversational agents have been developed for different applications. This is due to the evolving of artificial intelligence (AI) and natural language processing (NLP), which is changing the way artificial assistants communicate and interact with people (Nguyen and Sidorova 2018; Jain et al. 2018). By improving text-to-speech and speech-to-text communication, the use of chatbots has become more convenient and common (Bittner et al. 2019). For instance, new smart assistants, such as Cortana, Alexa, Google Assistant and Siri, have been designed with the intention of supporting users in everyday life as voice-activated intelligent personal assistants. The proliferation of these assistants has contributed to the popularity of chatbots worldwide (Di Prospero et al. 2017; Gnewuch et al. 2017; Jain et al. 2018; Diederich et al. 2019). This in turn has also led to an increasing use of domain-specific chatbots (Di Prospero et al. 2017). While Di Prospero et al. (2017) argue that there are similarities that unite all chatbots regardless of application purpose or domain, other scientists claim that there are several aspects in which chatbots differ (Følstad et al. 2019; Bittner et al. 2019; Diederich et al. 2019).

Although some elemental chatbot classification frameworks can be found in scientific literature, the research is dispersed into different thematic axes and research areas. Furthermore, the scientific and practical knowledge about chatbots has also grown in a segregated manner given a shortage of integrative perspectives to support chatbot development and design processes (Følstad and Brandtzaeg 2017; Jain et al. 2018; Piccolo et al. 2018). For instance, most scientific studies today concentrate on particular aspects of chatbots, such as the personality of cognitive chatbots, technical capabilities or their specific application