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Toward a Taxonomy of Service-Oriented Chatbots

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**INTRODUCTION**

The growth of chatbot applications has gained a momentum not only from tech developers, but also from academic community. In the last decade several studies have investigated chatbots from developers and users’ perspective covering a wide range of issues. Chatbots ability to perform tasks ranging from simple ones to complex natural conversations such as customer services support (Brandtzæ & Følstad, 2018; Feine, Gnewuch, Morana, & Maedche, 2019) has spiked the interest of service-oriented industries including HT. Despite its early stages, the literature of chatbots in HT field is advancing with conceptual and empirical research (Popesku, 2019). Recent publications turn the attention to the users’ perspective. For instance, Melián-González, Gutiérrez-Taño, and Bulchand-Gidumal (2019) investigated chatbot user intentions.

The authors concluded that there are several factors that influence chatbot applications in HT such as chatbots’ expected performance, the predisposition of users towards self-service technologies, the anthropomorphic characteristics of chatbots, the hedonic value of using chatbots, the social influences and the friendliness. Another study by Pillai and Sivathanu (2020) concluded that customers’ behavioral intention and actual usage of chatbots for HT organizations is influenced by perceived ease of use, perceived usefulness, perceived trust, and perceived intelligence and anthropomorphism. Other researchers have investigated the chatbots success in the parameters of a particular sector within HT such as lodging, restaurants, museums, and travel agencies (Leung & Wen, 2020). Based on the systematic literature review, Calvaresi, Calbimonte, Schegg, Fragnieri, and Schumacher (2021) conclude that the chatbot evolution in tourism is fostering remarkable change. Following on these optimistic notes, the research of chatbots in HT field is promising.

The branching of chatbot research has called for classifications of them to form a firmer understanding of their similarities, differences, and opportunities for the future. In the broader research about chatbots, they are classified under different taxonomies such as taxonomy of conversational agents (Feine et al., 2019), taxonomy of software bots (Lebeuf, Zagalsky, Foucault, & Storey, 2019), taxonomy of social bots (Lebeuf, 2018), and taxonomy of design elements of chatbots (Latah, 2019). In the context of HT, only a general discussion is provided for their classification based on the platform they are build, their recommendation abilities and incorporation of artificial intelligence (AI) solutions (Popesku, 2019). In conclusion, three types of chatbots were suggested: customer service travel bots, AI-empowered travel bots, and Facebook chatbots. Hence, the purpose of this study is to develop a taxonomy, and discuss relevant issues of chatbots research in HT. The taxonomy focuses on two dimensions: the type of information and the level of interaction. The findings of the study help to understand the possibilities for chatbot applications in HT, by showing the similarities and differences among the functionality of them.

**CHATBOT APPLICATIONS IN HT INDUSTRY**

Chatbots applications are a suitable fit for the service-oriented nature of HT industry, serving with FAQs information, planning, booking, customer support and recommendations (Pillai & Sivathanu, 2020). The use of chatbots benefits HT organizations as it enables them to provide a 24/7 customer support (despite of their human resources or the size of company), to increase their capacity of serving to multiple guests at the same time, to increase engagement with guests, reduce the operational costs for the organization, and create more revenue opportunities (Bowen & Morosan, 2018; Pillai & Sivathanu, 2020).

**ABSTRACT**

As applications of chatbots evolve, they become an appealing technology for service-oriented businesses in hospitality and tourism (HT). Indeed, the research about chatbots in HT context is growing rapidly covering a range of perspectives from users to experts. Nevertheless, chatbots research in HT field remains new with a wide-ranging variability of challenges. Hence, the purpose of this study is to develop a taxonomy for chatbots in HT guided by a phenetic approach. The taxonomy focuses on two dimensions: the type of information and the level of interaction. Four categories of chatbots were identified, respectively informer, facilitator, planner, and performer. We utilize this taxonomy to advance the discussion of research gaps about chatbots in HT, as well as indicate the future research opportunities. The findings of the study help to understand the potential for chatbot applications in HT.

**Keywords**

Chatbots, taxonomy, social presence, service industry.
Chatbot technology is embraced among different sectors of the HT industry, such as online travel agencies, lodging, restaurants, airlines, and attractions. From online travel agencies (OTA), Skyscanner, Expedia, Booking.com, Kayak, and Travelocity have deployed chatbots in messaging platforms (Facebook Messenger, Kik, Viber, Skype, Slack). These chatbots allow consumers to get information, book a flight, modify/cancel a flight, find the best deals, and to connect with a customer care associate if necessary (Granger, 2017). In the lodging sector, well-known brands such as Marriott International, Cosmopolitan Hotel, and Wynn Las Vegas are utilizing chatbots to help guests find information about the hotels and offer different services to customers. For instance, Chatbotler from Marriott International allows guests to find information about Marriott Hotels, assists in changing the reservations, and provides access to the loyalty program account (Hospitality Upgrade, 2017). The Cosmopolitan Hotel in Las Vegas developed a chatbot called Rose, a playful chatbot with an appealing personality, to exhibits the resort, guide art tours, arrange for amenity delivery to guest rooms, and suggests the best restaurant when needed (Granger, 2017). Wynn Las Vegas Hotel communicates with customers through chatbot and customizes the experience in hotel rooms by utilizing Amazon Alexa for Hospitality, a voice-enabled chatbot (Miller, 2016). In Edwardian hotels', Edward chatbot helps travelers with tips on sightseeing places, bars, restaurants and more (Granger, 2017).

Many businesses in the food and beverage sector are utilizing chatbots as well, such as Domino's, Starbucks, Cheesecake Factory, and Dunkin' Donuts. On the other hand, Google has deployed an overarching chatbot named Google Duplex, which calls a restaurant and makes a reservation successfully (Wakabayashi, 2018). In travel, Emirates Airlines has deployed a chatbot called Emma, which searches personalized vacation packages for customers and suggests destinations (Viewpoints, 2018). As for tourist attractions, the Heinz Nixdorf Museums Forum in Germany is a compelling case of applied chatbots technology in touristic attractions. The chatbot called Max engages visitors of the museum in conversations and provides information about the museum and related topics (Kopp, Gesellensetter, Krämer, & Wachsmuth, 2005). Museum visitors insert the input by using a keyboard, while the chatbot, which is projected in a large flat screen, responds to visitors with voice, gestures, facial expression, and gaze, and entertain the visitors by talking naturally and funny.

Even within the same sectors, chatbots do not offer the same performance, which leads to some of them being more advanced and sophisticated than others. Nevertheless, it could be argued that the spread of chatbots application is still in the early stages for hospitality and tourism organizations. However, it is logical to expect a further expansion considering the benefits from this technology. For instance, only in 2017 about fourteen percent of the airlines globally were using chatbots (Aviation Pros, 2017), while for 2020 chatbots the rates were estimated to go up to sixty-eight percent. The service-oriented nature of activities for HT organizations significantly benefits from chatbot operations. According to Aspect software research, 44% of consumers prefer AI-based chatbots over humans for customer care services (Sweezey, 2018). This is helpful in a way that in different stages of travel, chatbots support with different functions and services. For example, before traveling to a destination, travelers can use a chatbot to search for flights, schedule tours, book a flight, access the loyalty program. During the travel stage, other functions such as check-in at a hotel, events guide access, or trip updates are more important. In the post travel stage, chatbots can help with receiving feedback on the experience of the travelers and share future deals. A summary of the main services is provided in figure 1.

A TAXONOMY OF CHATBOTS IN HT

The development of taxonomy for this study is guided by a phenetic approach. In other words, the categories are formed based on the similar characteristics of the objects of the study, such as functional chatbots in HT (Nickerson, Muntermann, Varshney, & Isaac, 2009). The study is approached by the customer-centric value chain perspective where the value created by the functions of chatbots, and also the level of interaction with user are key factors. The list of chatbots included in the research is retrieved from case studies of Chatbotguide.org, compiled in 2018. In addition to the chatbots in traveling segment, the restaurant segment was merged to gain a more comprehensive list of functions from chatbots that are applicable to HT field. In total, the functions of more than seventy chatbots were analyzed using phenetic approach. The categorization of chatbots functions into groups was based on similarities. The list of groups created was expended in circumstances where the chatbot did not fit any of the previously established groups. While some chatbots would be clearly placed into a particular group, for some of them it was challenging to state the exclusivity to a certain group considering their complexity. From the analysis, the chatbots in HT field

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**Figure 1:** Summary of the main services provided by chatbots in HT.
were grouped in four categories such as informer, facilitator, planner, and performer as showed in figure 2.

![Figure 2. Taxonomy of Chatbots Based on Interactions with Users (tourists, guests, customer)](image)

**CONCLUSION**

This article develops a comprehensive taxonomy of chatbots in hospitality and tourism based on two major dimensions, their functionality, and the interaction with users. The taxonomy provides valuable insights on the categories of chatbots, and the value generated from each of them. The results from taxonomy show that chatbots are diverse, but mainly in tourism they oversee tasks with low complexity. With the advancement of chatbot technology and the integration of AI in performing more complex functioning, it is reasonable to believe that chatbots will become a tool of experience enhancement. Furthermore, the research about applications of chatbots in HT remain only few years old and the challenges that contribute to the current version of the taxonomy remain to be further explored. Understanding those barriers, the practitioners and academic community can benefit on pushing further specific categories of chatbots that would benefit the service-oriented nature of it. In addition, the diverse nature of HT organizations and their goals for chatbots applications remain essential factor to be analyzed for shaping the current state of art of chatbots and their classifications.

**REFERENCES**