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A Review on AI Based Chatbot with Virtual Assistant

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ABSTRACT

Conversational interfaces (CIs) have been a trending topic in recent years. As of the last decade, CIs have emerged with the aim of simplifying human-machine interactions and found a wide use case in the market. For example, Siri and Google Assistant are some of the most well-known CIs developed by the tech giants Apple and Google. The digital landscape has evolved from web, to mobile apps, to recently CIs. Nowadays, CIs, in particular chatbots and voicebots, are becoming increasingly common. Whether navigating the web or messaging on a phone, it is likely that CIs have been confronted offering the user help. However, CIs have not managed to reach a large-scale use. Furthermore, the reasons regarding the challenges faced by CIs as well as their usability are not greatly explored. In this thesis, we explore the most relevant uses of CIs and the reasons hindering a widespread use of CIs. Our goal is to provide an insight into CIs' uses and list the reasons regarding the challenges faced by CIs. The research study followed a mixed method approach connecting an explorative qualitative literature study, a survey and an interview. The data was collected by using a systematic mapping approach for it being more suitable for conducting an effective literature review. The survey and the interview were conducted in order to confirm the findings. According to our research, it was found that the most common use cases of CIs were in customer service, sales, travel and bookings, education, healthcare and as voice assistants. The most prominent challenges faced by CIs were poor usability, language processing and understanding, speech recognition and natural language generation and security and privacy. As a conclusion, the future looks promising for CIs, however, they need to be further researched and developed in order to help them reach a widespread use in the future.

Keywords: ***Chatbots, Voicebots, Voice assistants, Conversational interfaces, Artificial intelligence.***

1. INTRODUCTION

The world has always been led by human commands. Many believed that technological advances would make everyday tasks easier, such as booking a trip or controlling the indoor temperature at home. Advances in technology have contributed to ease people's lifestyles. For example, CIs, software interfaces providing people with the capability of interacting with a computer based on human terms . have emerged with the aim of simplifying human-machine interactions. They are of great importance when it comes to people being busy with other activities, for example as in the case of driving. CIs also aim to help businesses in assisting customers in various ways . CIs are mainly of two types: chatbots and voicebots. Chatbots use natural language to simulate a human conversation with a user via text, usually through websites or mobile aplications Voicebots, on the other hand, use speech recognition technology to interpret natural language commands. They work differently to chatbots by maintaining the interaction between the user and the machine more natural and smoother since it gives the feeling that the user is interacting with a real person. This has been linked to many advantages they provide such as being always available and supporting multiple languages. An additional advantage is that they are independent of the platform. This means that any device with internet access can be used to employ a CI, whether it is a laptop, a tablet or phone.

2. LITERATURE SURVEY

A survey is a great way of learning different people's opinions about the subject the information gathering is done for. In our case, we made use of a survey to understand people's experience with the use of CIs. The survey was created on an online-based survey platform called SurveyMonkey [1].

The choice of the platform was considered appropriate due to its ability to create a survey that could be deployed on a link and is easily accessible from mobile devices. In addition to this, the platform provides useful analysis tools for the surveyor. Selecting the user sample was based on the judgmental, also known as purposive, sampling type .The judgmental sampling type is a non-probability sampling method since the random selection of users is done by the researchers [2].

According to this sampling type, the selection of the participants is based on the research requirements, thereby excluding others who do not fulfill the requirements. In our case, the selection criteria were that the participants were required to be older than 18 years old and have used either a chatbot or a voice assistant [3].

Qualitative research focuses on ideas, opinions and trends with the aim of delving deep into the subject and analyzing it in a careful manner [4].

3. PROBLEM STATEMENT

The problem is that the reasons regarding the challenges faced by CIs as well as their usability are not greatly explored. CIs have been limited to some use cases. Even though some studies have been made on CIs, in particular chatbots and voicebots, more research is still needed on what is hindering their improvement. Therefore, the challenges that keep CIs from dominating the market should be highlighted.

3.1 Propose:

The purpose is to explore CIs most relevant uses and the reasons hindering a widespread use of CIs.

3.2 Goal:

The main goal is to provide an insight into CIs' uses and list the reasons regarding the challenges faced by CIs.

3.3 Background:

This chapter is divided into a number of subsections each of which aims to make the reader familiar with the general concept of CIs. Section (i) provides general background information about CIs. Section (ii) explains the underlying core mechanisms such as Natural Language Understanding (NLU), Natural Language Processing (NLP) and Natural Language Generation (NLG).

3.3.1 Conversational Interfaces:

A CI can be defined as an interface providing people with the capability of interacting with a computer, based on human terms [5]. An even simpler definition of a CI is a way of communication for people to tell the computer what to do. In the early ages of communication, people had to input commands to the computer in the form of some specific syntax to do the same thing. They can be integrated into a number of different platforms including Google Assistant, Alexa, Cortana, Facebook Messenger and many others. Two main types of CIs are chatbots and voicebot.A chatbot, as stated by Oracle , is a computer program that communicates with the user by simulating a human conversation to deal with their queries. Before chatbots were invented, people had to navigate through graphical interfaces to search for what they were looking for or to achieve a certain task. However, after the invention of chatbots, it introduced a new way of interacting with the software. Many websites now implement a chatbot which makes the process of searching the website easier. This is because with the chatbot use, the need to search through the graphical user interface is eliminated. The user simply uses the chatbot's interface to make it understand their intent and do the task for them.

A voicebot is used to achieve a similar function of a chatbot but relies on speech recognition technology to interpret natural language commands[6]. Voicebots provide a more human-like communication between the user and the machine. Therefore, the user feels as if they are talking to a real person rather to a machine. Consequently, the conversation becomes smoother and more natural for the user.

3.3.2 Natural Language Processing:

As defined in the article, "NLP is a theoretically motivated range of computational techniques for analyzing and representing naturally occurring texts at one or more levels of linguistic analysis for the purpose of achieving human-like language processing for a range of tasks or applications.". In simpler words, NLP is the mechanism that makes it possible for machines to understand human language, also known as the natural language. This means that humans do not need to know any programming languages to interact with the machines. Two core elements of NLP are NLU and NLG.NLP is usually used interchangeably with AI and Machine Learning (ML). However, they are different from each other. As stated in the article , NLP and ML are parts of AI. AI helps machines in solving complex problems that are of great importance for humans. NLP is the system which makes it possible for machines to understand the way humans communicate in both written and spoken language. ML is a software system which enables the machine to learn and develop from its own observations and previous experiences Figure 1 shows the relation between NLP, NLU, NLG, ML and AI.

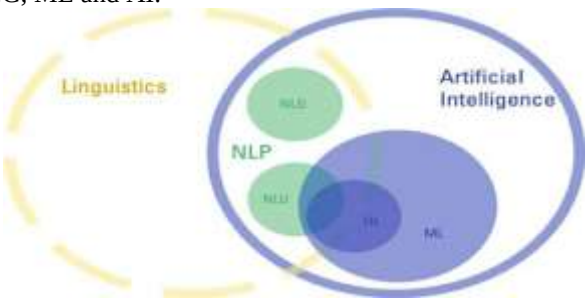

Figure 1. Representation of AI, ML and NLP

3.4 AI Driven Chatbots:

AI-driven chatbots are based on the concept of NLP since these chatbots employ NLP as their core mechanism as well as ML .AI driven chatbots are able to simulate a human conversation. They are good at spotting the intention of the user and arrange the responses accordingly. For example, when a user responds by saying "Why not?" as a response to a suggestion, the chatbot interprets this as a confirmation rather than a question. In addition to that, AI-driven chatbots are mostly equipped with ML to reinforce their development over time thereby improving their ability to provide useful responses.

3.5 Rule-Base Chatbots:

Rule-based chatbots are programmed for specific tasks and therefore can only answer the type of queries they are hard-coded for. However, these tasks can have a varied range of complexity, all from simple to complicated queries. On the other hand, it is very challenging and, in most cases, almost impossible for rule-based chatbots to handle all the cases in a particular situation. Therefore, it is generally not very hard for users to spot a rule-based chatbot's deficiencies.

3.6 Voice Bots:

Voicebots are another kind of CI that use speech recognition technology to interpret natural language commands. Voicebots can be thought of as voice assistants. Voice assistants are digital interfaces that imitate a human to human conversation flow. They use sound as a means of communication and eliminate the need for a graphical interface As with the case with AI-driven chatbots, voicebots are built on AI and ML in addition to voice recognition technology. Voice assistants have software for listening to the sound around them. When a keyword is recognized by the software, a mechanism is triggered to wake up the voice assistant.

3.7 Use Cases:

Conversational interfaces were examined as two different types, one being chatbots and the other being voicebots. According to the research conducted we found the most common use cases of chatbots to be in *customer service, sales, travel and bookings, education* and *healthcare.*

4. CONCLUSIONS

For a long time, we navigated the web by clicking buttons, scrolling through pages and switching between tabs. Times change and new technologies arise. Human-machine interactions are no longer based only on visual interfaces as CIs are becoming common nowadays. CIs have a vision of making online experiences simple, hassle-free and enjoyable thereby contributing to a life of ease. They also give people a deeper understanding about what this technology can achieve and what use cases are most relevant. We see CIs across different sectors today but their uses have been limited. They have not reached a widespread use. This could have been due to that the reasons regarding the challenges faced by CIs as well as their usability are not greatly explored. In order to address this problem, the purpose of our study was to explore CIs most relevant uses and the reasons hindering a widespread use of CIs. Our goal was to provide an insight into CIs' uses and list the reasons regarding the challenges faced by CIs. After a mixed method approach connecting an explorative literature study, a survey and an interview, it was found that most relevant uses of CIs and the reasons hindering CIs from a widespread use are many. Our findings have shown that CIs, in particular chatbots and voicebots, have found various uses in different industries. They are most commonly used to enhance customer service, boost sales, promote education, ease booking, improve healthcare and impersonate voice assistants.

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