CHATBOTS AND THEIR DIFFERENT ASPECTS : A REVIEW OF LITERATURE

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ABSTRACT

Chatbots are computer programs which simulate or imitate human language with the help of text based dialogue system. Chatbots help in not only answering customer queries but also help in movie and travel bookings, fashion counselling, colour application in a new home, weather forecasting. From an overall point of view, 104 scholarly articles related to chatbots have been utilized to conduct this study. The study delves into various aspects of chatbots through detailed literature review. Starting from theoretical analysis the study has got into deeper analysis of different articles related to development of chatbots; connection between chatbots and learning, human emotion, design, mobile technologies, commerce, advertising, healthcare, document enrichment, smart answering, uncanny valley theory, personalized ranking. Lastly limitations of chatbots as collected from different articles have been also discussed. The article concluded with areas of improvements and future studies related to chatbots.

Keywords : Chatbots, AI, Customer, Emotion, Learning, Advertising, Healthcare, Education, Commerce

INTRODUCTION

2020 is the year of chatbots and artificial intelligence(AI) .Chatbots that aid in conversations are slated to carry out savings worth of US$79 million annually. The efficiencies to be generated by them will be in excess of 30%.Around 20% ofcompanies, had already implemented chatbots by 2018. By 2021, this percentage is slated to touch a figure of 57%. It can be expected that with the use of chatbots, a good number of manual errors can be reduced.

AI is being applied in a number of areas in our daily life. AI based chatbots are used alongside other technologies such as machine learning, predictive learning, social media, neural networks, predictive technologies, robotics, natural language comprehension (Buzzle, n.d.; William, Schatsky, &Viechnicki, 2017;Androutsopoulou et al.,2019). Chat bots are also known as bots or conversational agents as they interact with humans just like humans (Abu Shawar & At well, 2007; Poola,2017). Chat bots consist of software which helps in proper management of transactions and communications with customers. Currently, chatbots are being applied in a number of areas such as in apps (Cortana, Google, Alexa), telecom, financial services, retail, tourism, education, media etc.(Business Insider, 2017; Lokot & Diakopoulos, 2016; Zsarnoczky, 2017). With the advancement of AI technologies, from simple query handling, chatbots have graduated to more complex tasks. Even Governments have also started carrying out chat bot implementation in their work ranging from education, taxation, public safety to health (Mahdavi & Shepherd, 2004; Capgemini, 2017; Business Insider, 2016). The benefits of working based on AI based chat bots are customer satisfaction, proper service delivery, sufficient resource allocation, productivity enhancement, new employment generation, cost savings (Capgemini, 2017; William et al.,2017; White House, 2016).

As customers are spending most of their time in the digital world, so brands are also going digital. Through chats bot's real time interaction, customer satisfaction is attaining the height of customer delight((Hagberg, Sundstrom & Egels-Zanden, 2016).

In the world of marketing and branding, traditional customer care associates have long served customers with utmost care. Infact they have been quite successful in their work by providing enjoyable environment and right information to customers (Kim & Ko, 2012; Kim, Kang, & Taylor, 2018),

driving 87% purchase of consumer buying decisions in store(Insider-Trends, 2017). Along with traditional customer care associates, through social networks, a lot of value added services are provided to customers at real time. This is leading to both types of savings in terms of cost and time (Escobar, 2016). The flourishing of digital channels have given enormous opportunities to marketers with regard to satisfying and surprising customers through excellent customer service (Calantone, Di Benedetto, & Rubera, 2018; Perrey & Spillecke, 2011). By harnessing digital technologies, brands are now providing round the clock customer services and information (Dhaoui,2014; Ko, Phau, & Aiello, 2016). In luxury retailing, chatbots are giving an opportunity to provide an extra layer of service for the customers. Generally chatbots provide services in luxury retailing like provision of product information, product care, information on offline stores availability etc (Forbes, 2017a, 2017b, 2017c). Due to the usefulness and helpfulness of chatbots, consumers have also shown a favourable attitude towards chatbots (Zarouali, Van den Broeck, Walrave, & Poels, 2018).Social media channels like Facebook are using chatbots to carry out sponsored messaging for customers (Facebook, 2018). Thus a new channel of advertising titled "Chatbot advertising" has taken birth in the world of management.

A good number of researchers have pointed out towards lack of research towards chatbot communications. Also, to the best of our knowledge, a comprehensive literature review on chatbots and their different facets is almost non-existent. Our objectives are to study chatbots in details. This study will delve deeply into different areas of applications of chatbots. This study will provide detailed insights into the world of chatbots and how they are making significant contributions in every aspect of man's life.

THEORETICAL BACKGROUND

Chatbots were created to imitate inter personal communications with a mixture of personalization (Letheren & Glavas, 2017). Chatbots help in a great way by providing a sense of employee presence and a feeling of being served(L. C.Wang et al., 2007). Previously, chatbots assisted customers in navigating a website and carrying out purchase(Lind & Salomonson, 2006). Example of the first generation of chatbot is IKEA's virtual assistant "Anna" (Lind & Salomonson, 2006). Anna chats and answers to customer queries regarding IKEA's products and services. Over the years, chatbots have evolved drastically (Letheren & Glavas, 2017). Chatbots were used for fun, educating customers or as FAQs guide (Y. F. Wang & Petrina, 2013; Zumstein & Hundertmark, 2017). Nowadays chatbots have penetrated into social media, trip planning or medical counselling (Letheren & Glavas, 2017).

With regard to interaction with chatbots, the most important attributes are helpfulness and usefulness as pointed out by different studies. Perception with regard to a chatbot's helpfulness and usefulness plays a determining factor in favourable consumer behaviour in e-commerce space (Zarouali et al., 2018; Brandtzaeg & Følstad, 2017). Through the Technology Acceptance Model (Davis,1989) and Consumer Acceptance of Technology Model((Kulviwat, Bruner, Kumar, Nasco & Clark, 2007) perceived usefulness and helpfulness have been proved to be the main features as expected by customers. Broeck, Zarouali & Poels(2019) enquired about effectiveness of chatbots in their study.

From an overall point of view it has been proved that in order to build more consumer trust towards chatbots, researchers must bring in more humanlike features in chatbots. More humanlike visual cues must be added in chatbot technologies, Humanlike features will bring in more favourable reaction towards chatbots (Sundar, 2008). These minor improvements with regard to humanness of chatbot sensure favourable response from customers (Gong &Nass, 2007; Kim & Sundar, 2012). As a second step human name or identity addition will increase the humanness of chatbots. If the chatbot's identity generates humanness then in such a regard quality of its service won't also matter(Koh and Sundar,2010). Scientists thus are investing their time and energy in developing human like robots(Ghose&Barua, 2013). In this manner, "message interactivity" is being emphasized upon by scientists (Sundar, 2009).

METHODOLOGY

This study explores the different effects chatbots as can be in everyday lives of people. To understand the role of chatbots, literature review of chatbot related articles were carried out. Trans field approach (Tranfield et al. 2003) was adopted to carry out the literature review. The review consists of three phases.

In phase 1, the articles were selected from databases like Springer, Elsevier, Emerald, Taylor & Francis, IEEE. After that, a detailed article search was carried out using different keywords like chatbots, bots, chatting agents, conversation agents, virtual agents, e-service agents. In phase 2 the articles were reviewed meticulously by the researcher to understand the different aspects of chatbots. For this, the title, abstract and keywords were given emphasis.

In phase 3 the articles were finally chosen for review. Lastly, 104 articles were chosen for conducting the whole study.

The following research question (RQ) was proposed as per the study of Manimuthu et.al.,(2019).

CHATBOTS

Chatbots can be defined as computer programs which with the help of text based dialogue system simulate or imitate human language (Zumstein & Hundertmark, 2017). Chatbots at first were introduced in messenger apps of Facebook and aided in proper delivery of customer service (Constine, 2016). By 2020, 25% of global customer interactions will be handled by chatbots (Gartner,2018). Through chatbots, companies interact with customers very efficiently and in an automated manner(Kunze,2016). Chatbots help in not only answering customer queries but also solve lots of customer issues. The issues can include movie and travel bookings, fashion counselling, colour application in a new home, weather forecasting (Letheren & Glavas, 2017; Tate,2016; Zumstein & Hundert mark, 2017).

DEVELOPMENT OF CHATBOTS

Chatbots started as an experiment based on computer language. ELIZA (1966) developed by Joseph Weizrnbaum was the first attempt of mankind in developing a software to converse with humans. The ELIZA was designed to engage human beings in conversation thus aiding in psychoanalysis. Though the interactions between ELIZA and human beings were limited but it was found that the patients were feeling more comfortable in expressing their feelings before a machine (Block, 1981). Infact such is the popularity of ELIZA that it's in use till today (Heller, Proctor, Mah, Jewell, & Cheung, 2005). Though, good developments have taken place in chatbot technologies but till now no chatbot has won the Turing test. Chatbots are putting immense impact in the world of commerce(Huang et al., 2014; Lasek & Jessa, 2013). Other than contributions in sales, chatbots are also getting employed in such myriad fields like from library support (Allison, 2013) to stress management (Huang et al., 2015). The most widely used application of chatbots have been into language practice.

CHATBOTS AS FOUND IN VARIOUS STUDIES

After going through detailed literature review the researcher has found variety of studies in which chatbots were researched thoroughly. The different studies will be discussed in details as below.

CHATBOTS AND HUMAN BEINGS

A good number of studies have dealt with relation between human beings and chatbots.

Banchs, R. (2017) in his paper suggested to make more human like chatbots. In his paper he argued that affect and emotion are primary element during interaction with a human being. So, chatbot and human interaction must be filled up with emotion and affection in terms of both attitude and behaviour. His work primarily dealt with the creation of different personality types or trends in chatbots that can be perceived well by customers. This can be done by analysing a large data set based on emotional, affective and tonal bias.

Carayannopoulos, S (2018) in his study dealt with student problems and how chatbots can help students effectively in handling those issues. The first issue is the perception of a disconnection with teacher and second issue is overload of information. According to him chatbots can be an effective tool for students to face these issues. Benefits of this plan are reduction in classloads and no consumption of the teacher's recess time.

The third study, i.e. of Fryer (2017) delved into chatbot's contribution to course interest and student task. The study pointed out areas of improvements for chatbot technologies as after a certain period, student's course interest with chatbot task masters gets down whereas it remains same with regard to human task masters.

Lee, Oh, Choi (2017) dealt with chatbots as counsellors. In their study they emphasized on factors like continuous conversation, close monitoring of user, emotion recognition, conversational context, natural language processing, expected reaction.

On the other hand, Ciechanowski et al., (2019) studied the nature of interaction process between human beings and chatbots. They also studied the different affective responses of users towards different interfaces. In the study they emphasized on the psychophysiological reaction of the chatbot users through electromyography. respirometer, electrocardiography and electro dermal activities. Also user's willingness and interaction with a bot was also taken into consideration.

Humanization of chatbots was the main essence of study by Go & Sundar (2019). They found out impersonal nature of a chatbot can be compensated by a high degree of message interactivity. Also if the user perceives the virtual agent as a human due to high interactivity then it raises performance expectation. A related study was also conducted by Daniel et al., (2018), who emphasized on the personalization or customization of chatbots to put the user more in control of the human-chatbot interaction.

Shank et.al., (2019) studied about the emotional reaction of people during interaction with a chatbot. The emotions

include confusion, unease, amusement, disappointment, happiness, amazement, surprise. Emotions come out during extra ordinary performance of chatbots or when they exhibit human like features. They also emphasized on the ethical aspects of using chatbots.

Lastly, Skjuve et al., (2019) applied uncanny valley theory to understand the reaction of users with regard to the transparency that whether a conversation agent is a human or chatbot. They found that lack of transparency does not affect user experience.

CHATBOT DESIGN

Araujo (2018) tested regarding how human like cues such as name and language style influence perception about social presence. The study also delved into drawing a relation between social presence and anthropomorphism and such company related outcomes such as emotional attachment, satisfaction and attitude customers feel after interaction with chatbots.

On the other hand, Angga P et al.(2015) studied on how facial expression, voice interface and 3D avatar can be used efficiently in designing a chatbot. According to them, interaction for customer service will become more natural through the design. Also through the use of web camera the efficiency of the chatbot in understanding user's reaction and emotion can be also studied.

Lastly, Liu, Zhang &Feng (2015) worked on how to add more knowledge and awareness in chatbots.

CHATBOTS AND LEARNING

Chatbots are assisting human beings in every aspect of their lives. Their applications can be found in such diverse areas ranging from entertainment to commercial as well as scientific areas, As the knowledge base of the world is increasing at a steady pace so chatbots also need to be updated regularly. A good number of studies have been done enquiring about chatbot learning.

One of the earliest studies in this regard was carried out by Ghosh & Barua (2013). They studied on an NLP chatbot based topic specific dialogue catering towards advising undergraduates.

Reshmi & Balakrishnan (2018) used Natural Language Processing(NLP) techniques to enhance the interaction and inquisitiveness of chatbots. In this regard they emphasized on the framework of Stanford CoreNLP. The results were very encouraging. So, customer satisfaction reached the level of customer delight.

A detailed study was conducted by Fryer, Nakao & Thompson (2019). They found out three factors for ensuring success of chatbot learning. The factors are:

a. Prior interest towards human conversation partners.

b. Prior language competency.

c. Qualitative experience of learning with chatbot.

An article by Weber.E (2018) had taken the concept of chatbot and learning to atotally different level. The article has argued that when it comes to coaching for behavioural change, Artificial Intelligence (AI) enabled chatbots can be more effective than human beings. Some of the benefits of a chatbot coach are:

a. It can slow down and help learners to focus on their learning outcomes.

b. It can help in proper review of coaching and learning through a structured process.

c. Learners get the ability to change themselves.

d. Scalable solution.

CHATBOTS IN MOBILES

Good number of studies have taken place with regard to presence of chatbots in mobiles.

The first study which can be mentioned in this regard is the one by Piau et al. (2019). Their study circled around a smartphone based chatbot app which can be used to monitor older cancer patients as around 67% of cancer patients are of the age 65 or older. They carried out tests on 61 cancer patients. The results were really encouraging as the study showed the importance of timely interventions in case of blood test or fever.

Another study which can be mentioned in this regard is of Carolous et al., (2019).They studied on the aspect of politeness or impoliteness in chat-human interaction. In a laboratory based experiment respondents were asked to talk to a smart phone. The phone's interaction was sometimes polite and sometimes impolite. After the experiment the study revealed that customers equalize politeness of a phone with friendliness but not necessarily with competence. Whereas impolite phones failed in both cases whether friendliness or competence.

A ground breaking study was carried out by Koumaraset.al (2018). When everybody is studying about the different applications of chatbots, their study monitored the performance of chatbots under different reception conditions and network. Another great aspect of the study has been that it was conducted by using the 5G mobile network based

emulation testbed. The study showed the robust performance of chatbots even under extreme conditions of network.

COMMERCE

Nuruzzaman & Hussain (2018) carried out a survey on existing chatbots and their techniques. In their survey they found that nearly 75% of customers have faced poor customer service. According to them only Deep Neural Network can help in improvements of chatbot performance. They also delved into the reasons of failure of chatbots.

A study onchatbots required during shopping in an e-commerce website was carried out by Pricilla, Lestari &Dharma (2018). Their study showed that the interaction of existing chatbots still have big areas of improvement. As a result, they developed a prototype which after testing was found to solve at an incredible rate of 100%. Handoyo et al. (2018) also found that chatbots can become very efficient ticketing agents if natural language processing (NLP) technology is applied on them.

The real estate industry is employing chatbots in large numbers to generate leads. Though chatbots has not been able to supplement the relation between traditional agents and real estate clients but still they have made huge strides in the real estate industry. Quanet.al (2018) has done an extensive study on chatbots in the real estate industry. They had also developed a chatbot combining machine learning technologies. Already corporate clients have started employing their chatbots.

ADVERTISING

Through chatbots, not only advertising can be done but a lot of personalization can be brought in the advertising process (Letheren & Glavas, 2017. For their sponsored messages Facebook uses chatbots heavily connecting customers with a bot for getting information (Facebook, 2018). The primary response of the Facebook user towards the bot is considered as a favourable signal for taking things forward. Offcourse, in order to have a strong impact the advertisement must consider the below factors in mind.

a. Perceived intrusiveness: It means the psychological reaction taking place in a consumer's mind due to an advertisement which further impacts his/her cognitive process. A good number of studies have already taken place in this regard. The studies were related to the relation between perceived intrusiveness and deficiency of explicit consent(Truong & Simmons, 2010; Heinonen & Strandvik, 2007), offering complimentary suggestions or products(Facebook, 2018), interruptive push messaging(Truong & Simmons, 2010, Merisavo et al., 2007, Li, Edwards, & Lee, 2002), advertising outcome(Broeck et al.,2019) .Too much of personal intrusiveness may lead to negative attitude and irritation towards the advertisement (Edwards et al., 2002; S.; Lee, Kim, & Sundar, 2015).

b. Perceived usefulness: Usefulness means the utility a consumer gets out of an advertisement. Helpfulness and perceived usefulness were considered to be the main factors of chatbot advertising (Jenkins et al., 2007; Brandtzaeg & Følstad, 2017; Zarouali et al., 2018; Broeck et al.,2019).

c. Perceived helpfulness: Helpfulness with regard to an advertisement do aid in sales. The salesman whether online, offline or virtual if helpful then definitely lead to positive consumer behaviour towards sales (Wakefield, Wakefield, Baker, & Wang,2011; Tafesse & Korneliussen, 2012; Broeck et al.,2019)

d. Patronage intentions: Patronage intentions mean the willingness and likelihood to buy products as informed in the chatbot advertisement and refer it to others. Edwards et al., (2002); Truong & Simmons(2010) ; van Doorn & Hoekstra (2013) are some of the important studies done in this regard.

e. Message acceptance: Appropriateness and fairness are the important factors in case of message acceptance (Kelly, Kerr, & Drennan, 2010; Van den Broeck et al.,2017). Incase of especially mobile based chat bot advertising, ad acceptance is a very important factor(Barnes and Scornavacca,2004).

f. Perceived relevance: A number of studies have pointed out that the perception of an ad's relevance plays a very important role in processing an advertisement and thus influences behavioural, affective and cognitive outcomes (Jung, 2017; S. Lee et al., 2015; Petty, Cacioppo, & Schumann, 1983). Ad relevance leads to several positive effects namely lesser ad scepticism (Baek & Morimoto, 2012), greater purchase intention(Rettie, Grandcolas, & Deakins, 2005) and favourable attitude (D. J. Xu, 2006).

Lastly, chatbots are being used in academic advertisements also in a large manner.

HEALTHCARE

Healthcare is another area where chatbots are being applied in a big manner. What is the opinion of literature review regarding chatbots in healthcare?

According to Bates.M (2019) chatbots can be used in a variety of uses such as proper record keeping, health counselling at lesser cost, screening medical conditions, providing medical information, booking doctor's appointment. But, even at the highest level, chatbots can complement doctors and healthcare professionals but not replace them. Algorithm of chatbots need to be upgraded.

As per Pereira and Diaz (2019),chatbots right now are being applied to detect and cure nutritional and neurological disorders. In this regard, consumability and personalization should be the main technical enablers. Ethical and sociological implications of chatbot technology are still to be found out.

Chung & Park(2018) in their study proposed a chatbot based healthcare service with an emphasis on cloud computing. This setup will act as a mobile healthcare unit dedicated towards giving fast medical care to accident patients or patients suffering from erratic chronic diseases. As per the researchers their proposed framework will lead to efficient human-machine interaction thus ensuring proper implementation of chatbot based healthcare services. For success of the framework four levels are to be kept in mind i.e. service level, knowledge level, information level and data level.

OTHER STUDIES

A good number of studies have been carried out on myriad topics related to chatbots. These studies are also very important for the overall journey of mankind towards better and better chatbots. The studies have been enumerated as below:

Pichponreay, L (2016) and four of his colleagues investigated on smart answering chatbots. Their idea circled around the notion of converting documents into chatbot's knowledge system. Users can simply ask chatbots different questions for their own learning. The resultant chatbot system will be an integrated one enriching documents like PDF to digital photos. The system will run on Optical Character Recognition(OCR), Over generating Transformations and Ranking Algorithm. Finally, after the impact of user's question with string pattern the chatbot will give it's answer.

In another study of Micaud, L (2018), observations were carried out on a chatbot named "Edward project" to know about the directions of chatbotresearch.The results showed the below conclusions:

a. Data is the oil of today's knowledge economy. So, even in chatbot research, data needs to be given due importance.

b. In case of complex sentences, keyword based approaches may fail.

c. Whatever may be the framework,chatbot research will need good number of iterations.

d. No single chatbot design can know all of the diversities of human language.

Based on the Uncanny Valley (UV) Theory, Mathur & Reichling (2016) did a good study. The UV theory states that dislike of users gets provoked by imperfect humanness of chatbots. Unnatural super imposed images were used in the previous studies which resulted in inconsistent UV results. In order to get away from this limitation the authors used controlled edited faces and 80 real world robotic faces. Their study found that UV put a deeper impact on the respondent's decision making with regard to trustworthiness of robots. They also found that in general, human beings judge certain facial cues commonly used to express and understand human emotion. For personalized ranking of responses in chatbots, content orientation based user model is required. That was the study's topic of Liu et al. (2018).

Getting away from the above style of research studies Telang et al., (2018) proposed a conceptual framework in their study in relation to chatbots. The conceptual framework was created in relation to enterprise chatbots which employs proper sequencing of plans, commitments and goals. Benefit of this style is that the complex chatbot can be developed in a flexible manner and it's also cost effective.

LIMITATION OF CHATBOTS

According to Nuruzzaman & Hussain(2018), below are the limitations of chatbots.

a. Though good progress have taken place on chatbot research but still due to technical limitations, new age chatbots are bound by rules.

b. Chatbots can't recognize grammatical errors.

c. Most chatbots can answer only predefined structured questions.

d. Many times ambiguity remains in answers of chatbots.

e. People of this world speak in different languages. Chatbots can't recognize all of them.

f. Most of the chatbots can' detect human emotion.

g. Chatbot technologies still need to carry out lots of value additions with regard to natural language processing.

h. Recommender system of chatbots till now is not upto the mark.

i. Many of the existing chatbots often change topics, respond without any reason. These need to be taken care of.

j. Self-learning is another area of development for scientists.

k. Current chatbots do not support third party integration.

l. Along with absence of relational database, data processing is also poor in the existing chatbots.

m. Interactive user database is absent in existing chatbots.

CONCLUSION

The study carried out detailed review of scholarly articles related to chatbots. Through literature review, it attempted to study the impact of chatbots in our daily life. It tried to provide a normative aspect of chatbots. The study started with definition,development, design aspects ofchatbots and delved into the different applications and limitations. To answer the "Research Question" different aspects of chatbots have been discussed in the article. From the study it's evident that chatbots have got a lot of applications. Though a good number of studies were reviewed none was found to delve into security aspect of chatbots. With the arrival of Internet of Things(IOT) and 5G,chatbots are vulnerable to hacking. Also, customerprivacy will become another issue. Thus, chatbot security and customer privacy are going to the areas of further studies in future.

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