



Artificial Intelligence Powered Chatbots for Business

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Abstract

Text has become an essential interaction manner between people. The use of chatbots improved quickly in business area including marketing, customer service and e-commerce. Users value chatbots because they are fast, intuitive and convenient. This paper discussed about the artificial intelligence technology that used to develop and implement chatbots which can the organization used to benefit in their businesses. A chatbot is a computer program that can interact with a human by using natural language. The main three areas in business that using chatbot the most are marketing, customer service and e-commerce fields. The roles of chatbot in mentioned areas has been discussed in this paper. AI powered chatbots transform business by reducing costs, increasing revenue and enhancing the customer experience. The benefits and limitation of chatbots have been also discussed in this paper.

Keywords : Chatbot, Artificial Intelligence, Natural language Processing, Chatbot in Marketing, Chatbot in E-Commerce, Chatbot in Customer Service

1. Introduction

Eleni Adamopoulou and Lefteris Moussiades states on their paper that the Artificial Intelligence (AI) increasingly integrates our daily lives with the creation and analysis of intelligent software and hardware, called intelligent agents [1]. An intelligent agent is a program that has been developed to make decisions or provide a service based on its environment, user input and experiences [2]. According to what Sirini Janarthanam presents in his book, one of the long-term goals in the field of artificial intelligence is to build computer systems that can have human-like conversations with users [3]. Eleni Adamopoulou and Lefteris Moussiades mentioned that a chatbot is a typical example of an AI system and one of the most elementary and widespread examples of intelligent Human-Computer Interaction (HCI) [1]. Soufyane Ayanouz et al., point that chatbot stands for a “chatter robots” which are software agents that emulate human conversation via text or voice messages [4]. According to what Ayse Baris states in his paper, chatbot are tools that interact with users and communicate with them in a specific subject or matter using a natural language [5]. Soufyane Ayanouz et al., listed the fundamental

technologies for chatbots which are: machine learning, natural language processing (NLP), and Artificial intelligence (AI) [4]. They mentioned that these technologies brought chatbot invention of brands communication to a completely new personalized level [4]. According to what Charles Waghmare has mentioned in his book, natural language processing (NLP) refers to an AI method of communicating with an intelligent system by using a natural language used by humans, where NLP is required to perform the tasks based on the required instructions and to retrieve information helps users in making decisions; inputs and outputs for NLP based AI systems are written text and speech [6]. Eleni Adamopoulou and Lefteris Moussiades refers about how chatbots can mimic human conversation and how they can be useful in applications such as education, information retrieval, business, and e-commerce [1]. Rachel Batish pointed out in her book that people nowadays are considering the text conversations as a primary method for interaction and communication between each other [7]. She mentioned that about 50% of adults aged 18 to 24 said that text conversations are just as meaningful as a phone call due to that the text message is short, focused, and faster than making a phone call with a

high response rate [7]. She referred to that so often many people don't call service providers, they more tend to visit their websites directly to search for what they want where the information there is not focused and take sometimes for people to find what they are looking for; the first way to solve this issue was to have a chat solution [7].

Regarding the importance of chatbots for the business's future, the goal of this paper is to present the role of chatbot in different fields of business and discuss about the benefits and limitations of utilizing chatbots in business fields.

This paper is organized as follows. Section 2 is presenting a brief description of Chatbot system by presenting multiple definition and related design. Also, section 2 provides a history of chatbots and differentiate between two main chatbot types which are rule based and machine learning chatbot. I describe on brief about the AI powered chatbot in section 2 with presenting the chatbot classification based on the goal created for. Also, in section 2 present the applications and development tools that can be used to develop interactive chatbots for various purposes. In section 3, I describe on details the role of chatbots in business including marketing, customer service and e-commerce. Section 4 presents on details the benefits for using chatbots in business. In section 5, the limitations of chatbots are discussed. Concluding remarks are given in section 6.

2. Chatbots

There are various definitions that define chatbots. Rizky Meidina mentioned that according to Han definition "A chatbot is an automated, yet personalized, conversation between software and human users" [8]. Another definition is the one mentioned by Ayse Baris which contains that "Chatbot is an artificial intelligence supported service tool that communicates with users over messaging apps, websites, mobile apps or over the phone" [5]. Defined chatbot on their research in term of "chatbot is a computer program which simulates human language with the aid of a text-based dialogue system" [9]. All definitions are agreed on that the chatbot is a software program uses AI technologies to communicate with users using text and voice.

According to a paper presented by Minal Dahiya about "A tool for conversation: chatbot" which describe the design of chatbot, the author mentioned that the chatbot is all about the conversation with the user and answering to the questions asked by the user [10]. The simple design of chatbot use case represented in (Figure 1) [10].

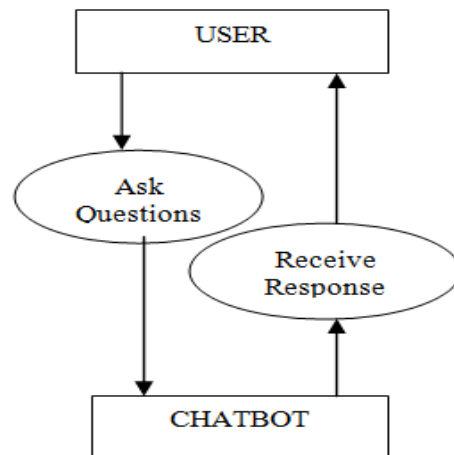


Figure 1: A use case of chatbot design

In the upcoming subheading I present first the brief history about chatbot, then I move to differentiate between the two main types of chatbot. For the third subheading I describe the concept of chatbot in AI, NLP and natural language understanding (NLU). In the fourth subheading I list the chatbot classification based on the goal implemented for and in the last subheadings in this section I talk about the applications and development tools related to chatbots.

2.1. History of Chatbots

According to a research about "A Brief History of Chatbots", Tomar Zemcik states that in 1950, Alan Turing who is a computer scientist, who has developed a Turing text to determine whether a person could recognize a human from a machine [11]. Sirini Janarthanam states in his book that the source of modern chatbots is back to 1964 at Massachusetts Institute of Technology (MIT) when Joseph W. Developed a chatbot called Eliza which used a simple rule of conversation and rephrased most of what user said [3]. In the same book mentioned that in 1991, the Loebner prize was provided to encourage AI researchers to build chatbots that can beat the turing test [3]. Charles Waghmare mentioned that in 2000, Robert Hiffer from ActiveBuddy Inc. created a chatbot called SmarterChild that used AOL Instant Messenger and MSN Messenger to build a relationship which provided access to new, weather etc and acted as a personal assistant using a natural language comprehension [6]. In 2014, at a turing test competition to mark 60th anniversary of Alan Turing's death, a chatbot called Eugene Goostman has been prototyping a 13 years old kid managed to fool 33% of the judges thereby beating the test [3].

2.2. Chatbots Types

Kaila Krayewski presents in the article that the majority of chatbot development tools today are based on two main types of chatbots which are: rule

based chatbots and machine learning (AI chatbots) which is based on natural language processing [12]. The rule based chatbot are also referred to as decision tree bots which uses a series of defined rules that are the basis for the types of problems the chatbot is familiar with and can deliver solutions for [13]. Ruled based chatbot often built using a graphical user interface where a bot builder will design paths using a decision tree [14]. AI chatbot which uses machine learning understands the context and intent of a question before producing a response, it generates their own answers to more complex questions using natural language responses; the bot program got learn from the more using and training done [13].

2.3. AI powered Chatbots

Anirudh Khanna et al., refers on their paper about that the creation and analysis of intelligent agents is called Artificial Intelligence and one of the main example of AI system is a chatbot which is a computer program that responds to a user during the conversation in text or voice, where the chatbot program understands human language by using natural language processing (NLP) [15]. Eleni Adamopoulou and Lefteris Moussiades defined NLP as an area of AI which explores the manipulation of natural language text or speech by computers [1]. They state that knowledge of the understanding and use of human language is gathered to develop techniques which make computers manipulate natural expressions to perform the required tasks [1]. They mentioned that most NLP techniques are based on machine learning (ML) [1]. Al-Mahmudur Rahman and Abdullah Al-Mamum discussed on their paper about the programming challenges of chatbot and they mentioned that machine learning (ML) getting NLP is one aspect of designing and development of chatbots while ML is another aspect of the chatbot design and development [16].

Soufyane Ayanouz et al., states that NLP acts as a basic pillar for recognition of language which used to recognize human natural language text and speech commands which includes one of the main components that is natural language understanding (NLU) [4]. They also mentioned that NLU is responsible for handling and converting formless data into an accurate form in which the system can understand [4]. NLU also defined by Eleni Aamopoulou and Lafteries Moussiades as a core of any NLP task and an aim to extract context and meanings from natural language user inputs and respond according to user intention [1].

2.4. Chatbots Goal Classification

Ketakee Nimavat and Prof. Tushar Champaneria classified chatbots based on the main goal they are achieving into three classes which are: informative, chat based/conversational and task

based [17]. They defined the informative chatbots as bots which are designed to provide the user with information that is stored before or is available from a fixed source where most of the times, they will refer to a static source of information such a site's FAQ page or a warehouse database with inventory entry [17]. They described chat based or conversational chatbots as a bot that talk to user which their goal is to respond correctly to the sentence they've been given for example: Siri and Alexa [17]. They state that the task based used to perform one certain task such as booking a flight or helping the user browsing a store where the bots are intelligent in the context of asking for information and understanding the user's input for example: Restaurant booking bots [17].

2.5. Chatbots Applications and Development tools

Sirini Janathanam discussed about the applications of chatbots in his book, he mentioned that there are several of chatbots applications made by the top leading industry giants in technology like Apple, Amazon, Google, Facebook, IBM, and Microsoft [3]. He states that in this time, chatbots are applied in multiple sectors with various conversational scenarios within these sectors which include: retail, banking, finance, governmental, health, legal, commercial and other sectors [3].

Ketakee Nimavat and Tushar Chamaneria discusses about several development tools and platforms which are available that make it easier to make chatbots includes: Recast.ai, Chatfuel and Pandora bot [17]. They considered Recast.ai as an entity extraction and intent detection chatbot which allows the user to create custom queries and train the bot on them and its apart from providing machine learning services to extract entities and intent, it provides everything from templates to analytics for deployed bots [17]. They considered the other two platform which are Chatfuel and Pandora bot as a generating story flow based (rule based) chatbots. They mentioned that Chatfuel tool provides a drag and drop interface for making a rule based bot, but the Pandora bot tool provides Artificial intelligence as a service along with a platform to build bots. It also makes custom bots on a paid basis [17].

Pavel Kostelnick et al., discussed about another development tools which used to develop chatbots includes ManyChat and Botsify [18]. They mentioned that ManyChat is similar to Chatfuel in its concept in which it tries to abstract bot building into a form of a conversational designer and supportive advertisement too, it offers a set of predefined templates that can be adjusted for a specific business [18]. They state that botsify includes a drag and drop conversational designer similar to those provided in the Chatfuel or ManyChat platforms and it also offers an integrated AI and automated entity recognition [18].

3. Chatbots in Business

According to a research made by Eleni Adamopoulou and Lefteries Moussiades about an overview of chatbot technology, they've mentioned that the chatbots have become so famous in the business fields due to the reduction in customer service costs and the ability to handle many users at a time [1]. Christian Hildebrand and Anouk Bergner discussed on their paper about how using chatbots can boost sales which based on their series laboratory studies they found out that chatbots can indeed alter consumer preferences and purchase decisions. They also figured out that what consumers enjoy in particular about the chatbot is the ability to engage in natural dialogue [19].

The followed subheadings contain the description of chatbot role in marketing sector, customer service and e-commerce based on several studies on the field.

3.1. Chatbot Role in Marketing

Dominika Spsychalska wrote an article about how chatbots influence marketing, the objective was to identify the opportunities connected with implementing chatbots in marketing sector with main focus on their role in the interaction process between human and machine [20]. The writer states that chatbots which are used in marketing strategy are helpful in activities implemented in social media space while proposing determined contents of interpretation and understanding reality [20]. He presents that the well prepared chatbot will efficiently leads a buyer through subsequent stages of transactions while saving their cognitive effort and time, may become a key value distinguishing a given brand from its competitors [20]. He mentioned that the chatbot is definitely more sociable, friendly and real than current market applications, especially in a way it establishes contact, conducts a conversation or makes an attempt to build a relation [20].

3.2. Chatbot Role in Customer Service

Asbjorn Folstad et al., who are a researcher from University of Oslo mentioned that chatbots represent a potential means for automating customer service because it is increasingly provided through online chat [21]. In their research they use an interview method to generate the responses from the participants which were all users of chatbots for customer service to ensure that all participants had recent experiences with chatbots, they were invited to the study as part of their chat dialogue with one of a small number of customer service chatbots [21]. The researches discussed the results of this interview which lead to that most of these participants agreed that the chatbots provide fast and accessible help and information [21]. They mentioned also that most of participants agreed that chatbots provide 24/7 access to customer service [21]. They presented that some

of participants noted that since the chatbot is not human they do not feel any time pressure in which they can take the time they feel necessary to formulate questions and read answers [21]. They also discussed about the main challenges of chatbots in customer service based on the answers of some participants. They mentioned that the main challenge was related to interpretational problems in which the chatbot does not always understand what the customer is intends to ask [21]. Also, several of the participants noted as that the chatbots does not allow for answering complex [21]. At the end of their research, the researchers came up with five key implications that can be take in consideration while developing or designing a chatbot for customer service which are: prioritize efficient service provision, be transparent on the chatbots features and limitations, strengthen the user experience through human like conversation, leverage users trust in the brands and demonstrate the security and privacy are prioritized [21].

3.3. Chatbot Role in E-Commerce

Bayan Abu Shawar and Eric Atwell presents an example on their research about an e-commerce chatbot which has been developed in 2000 called "Happy Assistant" which is a natural language dialog based navigation system that helps users access e-commerce sites to find relevant information about products and services" [22]. They mentioned that the system is composed of three main modules: the presentation manager (PM), the dialog Manager (DM), and the Action Manager (AC) [22]. They define the role of each model, first the presentation manager applies a shallow parsing technique to identify semantic and syntactic information of interest from the user textual input [22]. Second, the dialogue manager is responsible for matching concepts from user's query to business rules found in the knowledge domain [22]. Third, the role of the action manager is to access the product that matched the query [22]. Lei Cui et al., presents in their paper about what they have developed which is a chatbot called "SuperAgent" for e-commerce websites [23]. They mentioned that SuperAgent takes an advantage of large scale, publicly available, and crowd-sourced customer data [23]. They referred to the effect of SuperAgent which leads to improve the end to end user experience in terms of online shopping [23]. Siddharth Gupta et al., discussed on their paper about an e-commerce website bead chatbot E-Commerce website contain a wide range of products in each of its category which results in a vast and complex database [23].

According to what mentioned by Siddharth Gupta is that the user visiting an E-commerce may look for a specific product, or generally browse the website [24]. They present that the search tools use keyword matching to display multiple results to the user's query and out of these results, some might be

relevant to the user or the results might be inconclusive which will lead to an unpleasant user experience [24]. They mentioned that the problem was that the search tools fail to deliver relevant results when ambiguous words are used to describe a product and the system may not display a relevant product and also if the users don't have much knowledge about the product they intend to buy, the conventional systems don't help these users [24]. They mentioned that the solution for the previous problems is to use chatbot which can present more intuitive way of interacting with the website and interacting with users and also suggesting suitable and appropriate products for users [24].

4. Chatbot Benefits for Business

There are many benefits of implementing and using chatbot in business some of the benefits has been mentioned in the previous section 3 under the subheadings of chatbot role in marketing, customer service and e-commerce. This section will preset all the benefits for business in general.

Charles Waghmare lists in his book about eight benefits of using chatbot in business which are: availability, capacity management, flexibility, greater user experience, faster onboarding, work automation, new sales channels and personal assistance [6]. He mentioned that the availability of chatbot allows the users to connect with chatbot whenever they want because its available 24/7 for 365 days per year and it never get tired and don't require breaks [6]. He described the capacity management benefit is that the chatbot able to communicate with multiple users at the sometime but in opposite the call center agent can only communicate with one person at a time [6]. He presented that the flexibility provided to business due using the chatbot is that the chatbot can be developed and designed to be used in any type of industries which can be possible to change the conversation flows of relevant words connected to database [6]. He described how chatbot provide greater user experience because it is easy to manage customers of any type because chatbots are programmed to respond to any type of customers based on the information fed to them and the rules build inside the chatbot [6]. He mentioned that the low cost that the business can benefit from using chatbot is related to that the employee may not able to manage two or more customers at one time but the chatbot can engage thousands of customers, so chatbot require a minimal development cost compared with hiring many employees to support customers [6]. He mentioned the reason of why chatbot provide faster onboarding to business is because employee come and go which is a natural fact of business and the new employees must be trained and the companies need this to occur quickly; chatbots could eliminate onboarding time by providing clear and easy to understand conversation flows with new employees [6]. For the benefit of work automation, he

mentioned that the chatbot have the capability of overcoming repetitive tasks by making them automated and executing them whenever they are required [6]. The benefit of providing new sales channels that the chatbot can provide to business, the author states that people prefer texting rather than calling by which the chatbot provides the opportunity to sell products based on the needs of each customer and able of remembering customer's answers [6]. For personal assistance benefit that the chatbot provides to business, he mentioned that people are able to use chatbots as personal fashion advisors to get recommendations for clothing, as financial advisor to request trading tips, as travel agents to suggest places to visit and as medical receptionists to book doctor's appointment [6].

Also, Sirini Janarthanam has discussed in the book of "Chatbots and Conversational UI Development" [3] about six benefits of using chatbots in business which match the same as mentioned before by Charles Waghmare in his book "Introducing azure bot service" [6]. Sirini Janarthanam listed the benefits as following: first, the availability which means chatbot is available 24/7 [3]. Second, personalized experience which means that chatbot understand user's goals and preferences to suggest products and services for them [3]. Third, low cost due to that chatbot are ten times cheaper than human doing the same tasks [3]. Fourth, quick response times which unlike the human based system, the chatbot responses much quicker [3]. Fifth, the consistency which means that the chatbot can consist in the service [3]. The last benefit mentioned by Sirini Janarthanam is scale up which means that the chatbot can scale up to handle the increasing seasonal traffic [3].

5. Chatbot Limitations

Dr. Satyen Parikh and Helly Raval discussed on their research about the limitations of existing chatbot due to main challenges that developers and businesses currently facing. They say that first limitation is user's way of writing text where different people have their own way of typing a message, so how to understand user intention is a very challenging task [25]. The second limitation they mentioned is user way to speak their Language where different users have different ways of writing the text on and chatbot often doesn't understand it, and sometimes it doesn't give enough time for the human to explain the issue [25]. They presented third limitation which related to natural language processing due to no developing it to handle everything where the NLP handles synonyms and extraction of entities but local language mixing with words and slang to the vocabulary is not taken care of [25]. The fourth limitation they discussed is recognizing user intent, while the user talks with a bot and got a response "Sorry, I couldn't understand" condition are handled intelligently and chatbot is not

a chatbot if it is not capable of managing a simple hi, hello replies [25]. The randomness of being a human in which user behavior is controlled by emotions and feel different due to different instances, so users may want to tell the bot what to do at times and then will want it to be recommended very next moment [25].

6. Conclusion

The goal of this paper is to discuss about the use of chatbots in business and how the organizations can benefit from implementing chatbots in different areas. This paper started with defining chatbots with history of its implementation in the area on artificial intelligence.

Chatbots as resulted are user friendly and any people are tending to use it more than calling and anyone who has the ability to type on their language using their personal computers or mobile can directly use chatbots which are available in may application and websites. The increasing development in artificial intelligence and have the chance to quite change the experience of customers to provide the best services in such a way that satisfy customers' needs especially in the field of business. In the future, the recognition of the symptoms of bots and the performance of diagnosis will be highly improved with the addition of support for other business features.

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