CHATBOT- A Conjectural Understanding on Evolutions and Stages of Chatbot Enhancements with Human Users via Natural Conversational Language

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Abstract- New platforms like Facebook Messenger, Slack, Outlook, and Skype, and augmented realities are evolving more and more with artificial intelligence and machine learning along with deep learning theories are peaking in the technical industry with new opportunities, possibilities and facets. Chatbots are the need and tune of the hour. Sooner would transform all walks of domain under its mechanism of work. Chatbots or chatterbots are used to be exclusively embedded into smart devices but can now be expanded across channels, whether chat or voice based. Claiming that, they are the upsurge of the future, that chatbots will replace applications and make the 1000s of odd number technology obsolete. Undoubtedly, they will transfigure search, and reduce not only wait time to reach a human but also the cost of the workforce needed to serve the customer, with a side of innovation. They can be designed and involved for anything from automated customer support to e-commerce, interactive experiences, and entertainment. They are continuously being revamped to streamline the customer experience and meet the hastening human need for speed. Theories of Big data, cloud and IoT would evidently start to evolve around mechanisms of chatbot. This paper emphasizes and stands a hold on Conjectural understanding of all the recent advancements over the terminology of chatbot and its stages of evolutions.

Keywords- E-commerce, Interactive experiences, Slack, Augmented realities, Chatterbots

I. INTRODUCTION

A chatbot is a machine conversation system which interacts with human users via natural conversational language [1]. Software to machine-learn conversational patterns from a transcribed dialogue corpus has been used to generate a range of chatbots speaking various languages and sublanguages including varieties of English, as well as French, Arabic and Afrikaans [1]. The ability to generate different versions of the chatbot in different languages, bringing chatbot technology to languages with few if any NLP resources: the corpus-based learning techniques transferred straightforwardly to develop chatbots for Afrikaans and Qur'anic Arabic. With the growth in World Wide Web, it becomes difficult for any user to access the required information quickly and in a simple way.

In order to increase and improve the ease of user interaction with any system, human and artifact collaboration is necessary [2]. A chatbot can be considered as a question-answer system where experts provide knowledge for solicitation of user. A chatbot is a software designed to simulate an intelligent conversation with a human partner. Much research work has focused on improving recognition rates of the human voice and the technology is now approaching viability for speech based human computer interaction [3]. Speech Interaction splits into more than one area including speech recognition, speech parsing, NLP (Natural Language Processing), keyword identification, Chabot design/personality, artificial intelligence etc. Chatbot is computer programs that have the ability to hold a conversation with human using Natural Language Speech [4]. Despite the popularity of chatbots today, we are not aware of any research analyzing how humans converse with them, particularly from a linguistic perspective. Several extant studies on chatbots have focused on developing or improving their ability to interpret and respond meaningfully to human language: one study examined a chatbot's ability to respond correctly when faced with common CMC features like abbreviations and overlapping utterances from multiple speakers, while another examined a chatbot's robustness when faced with unconventional linguistic features from non-native ESL speakers. They are continuously being revamped to streamline the customer experience and meet the hastening human need for speed [5]. Bots can, among many other tasks:

- check shipping orders
- order food, a car, or flowers
- check weather and traffic
- give you the news
- access product info
- help you shop
- manage your calendar
- play your favorite music
- give answers to questions depending on the span of their vocabulary
- book travel and hotels…

CHATBOTS – HISTORY

The history of chatbots can be traced back to 1950, when Alan Turing published his paper "Computing Machinery and Intelligence"[6] . This paper is widely regarded as one of the foundations of Artificial Intelligence and the Turing Test he proposed in this paper can be considered as a benchmark for evaluating the intelligence of a computer system [7]. The fame of

his proposed test drew a lot of attention to Joseph Weizenbaum's program ELIZA developed in 1966 at the MIT AI Laboratory [8]. ELIZA simulated a simple, text based conversation between a human user and the computer posing as a Rogerian psychotherapist. Weizenbaum's main intention in creating ELIZA was to exhibit the superficiality of human-computer interaction. However, he did not anticipate how many people easily attributed human-like feelings to the program [9]. However, the first chatbots were not actually intelligent, but were programs that had a collection of predefined set responses corresponding to specific inputs. They were rudimentary and used pattern matching and string processing to keep conversation moving between the computer and human [10]. They merely created an illusion of intelligence of the computer, but the reality was that the programs had minimal to none contextual understanding [11].
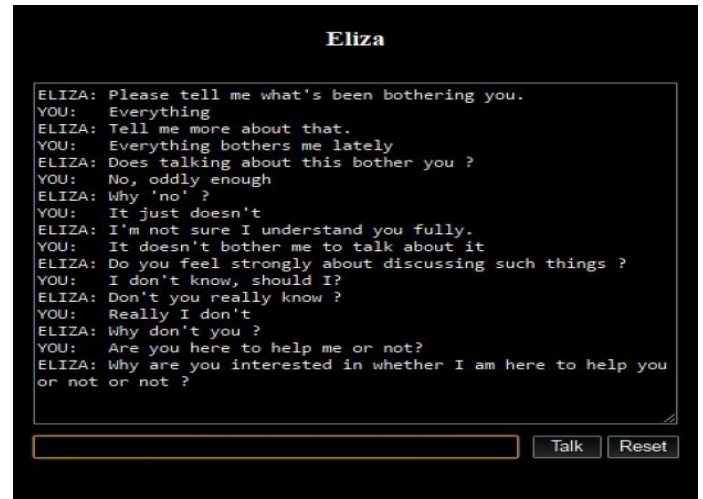

Fig.1: ELIZA chatbot view

PARRY was written in 1972 by psychiatrist Kenneth Colby, at Stanford University. PARRY attempted to simulate a person with paranoid schizophrenia. It embodied a conversational strategy, and as such was a much more serious and advanced program than ELIZA. It was described as "ELIZA with attitude". PARRY was tested in the early 1970s using a variation of the Turing Test [11]. A group of experienced psychiatrists analyzed a combination of real patients and computers running PARRY through tele printers. The psychiatrists were able to make the correct identification only 48 percent of the time [10].
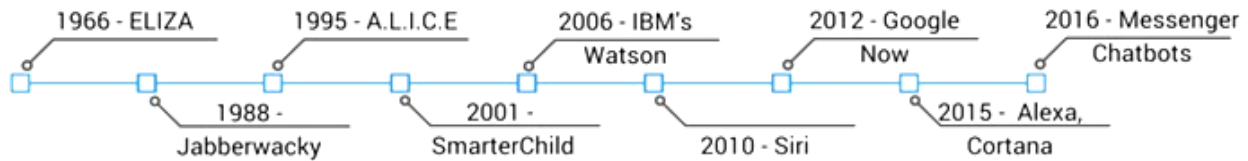

Fig.2: Chatbot Generation History

AI – CONTRIBUTOR

Artificial intelligence, by definition, is intelligence exhibited by machines to display them as rational agents that can perceive their surroundings and make decisions. A rational agent defined by humans would be a computer that can realistically simulate human communication [12]. In the 1950s and '60s, computer scientists Alan Turing and Joseph Weizenbaum contemplated the concept of computers communicating like humans do with experiments like the Turing Test and the invention of the first chatterbot program, Eliza [12]. The Turing Test was developed by Alan Turing in 1950 to test a computer's ability to display intelligent behavior equivalent to or indistinguishable from that of a human [13]. The test involved three players: two humans and a computer. Player C (human) would type questions into a computer and receive responses from either Player A or Player B [14]. The challenge for Player C was to correctly identify which player was human and which player was a computer. The computer would offer responses, using jargon and vocabulary that was similar to the way we humans communicate in an effort to mask itself. Although the game proved enticing for players, the computer would always betray itself at one point or another due to its basic coding and lack of inventory of human language. The game was invented much before the time of A.I., but it left the desire. for artificial intelligence in our minds as an aspirational goal that we might one day reach when our technological knowledge had progressed enough. In the past decade, however, progress in computer science and engineering has compounded itself. We live in an era of tech mobility and functionality that was unfathomable even in the '90s. So it's no surprise that finally, in 2016, we are beginning to attain what we wanted from

computers all along: We are beginning to converse with them. Machine learning capabilities are greatly improved in terms of understanding user intent and relationships between words and its meaning. The promise of ultimate convenience from chatbots depends heavily on quickly understanding a consumer's intent [9]. If you thought converting text to speech was hard, considering the dialects spoken in the US alone, interpreting intent is orders of magnitude harder. AI is finally getting to the point where it can understand what is in an image or what a consumer means when she says, "I need to get to the airport." Platforms like IBM Watson make this intelligence easily accessible to developers via open web APIs. The concept of artificial intelligence is nothing new [10]. It first appeared in the decade of 1950, when British mathematician Alan Turing developed a test making it possible to judge a machine's level of semantic similarity to a human being [6]. This Turing Test was also called the "imitation game," as it entailed verifying whether the computer was capable of perfectly imitating a person.

Today, AI could be defined as an automated system capable of analyzing data and making choices [7]. As a result, chatbots are regularly associated with the notion of artificial intelligence.

However, they aren't intelligent in the true sense of the word: conversational agents function with the aid of software programs containing information that is triggered when a user asks this or that question. More precisely, most chatbots used in companies function based on a series of scripted questions and answers [8]. Different scenarios—parameters that are established upstream according to the recurring challenges of the entity in question—enable the bot to respond as effectively as possible to the users' needs.

HUMAN-AUGMENTED CHATBOT – MACHINE LEARNING

AI-powered chatbots have obvious advantages over humans, but their limitations are just as important to understand. They are better than people at computational tasks, crunching huge data sets, looking for patterns, performing repetitive tasks and viewing millions of records in seconds.

Most bots are not ready to handle the complexities of conversation and still depend on human intervention to succeed [8]. Successful chatbots depend on core technology such as natural language processing, artificial intelligence, and machine learning — aided by thousands of iterations to drive learning. Augmenting humans with Artificial Intelligence is the greatest theory that human race would witness soon. AI today is capable of many things, but they are certainly better at some tasks than when compared with others [17]. Organizing, looking up and providing accurate information is one of AI's strong suits. This is why we use Natural Language Processing (NLP) to detect the incoming intent and suggest answers for agents to use. In addition, with each interaction, our Machine Learning (ML) algorithms are teaching our AI to give answers that are even more relevant in the future. Building a conversational AI takes time and a lot of data, so this is why today we propose to take care of all your customer interactions, based on your business's interaction history. We provide you with the humans and the AI to provide fast, accurate and personal service to your customers that scales with you [18]. Today, approximately 70 percent of the inquiries submitted to bots on the Messenger app remain unanswered because of poor comprehension or because the questions are not anticipated in the scripts [3]. Consequently, whether intelligent or not, conversational robots have trouble responding relevantly to users' needs [6].

A user converses with the chatbot to request an information

The chatbot can understand user requests, it can reply with answers, perform action, ask for more inputs and finally responds.

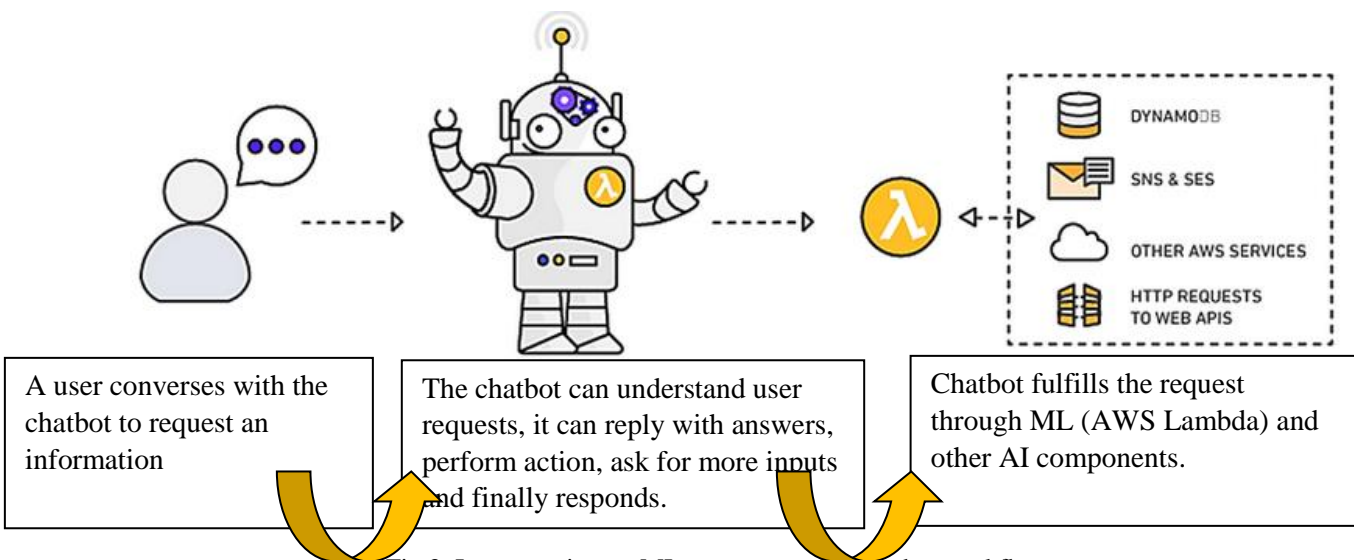Chatbot fulfills the request through ML (AWS Lambda) and other AI components.

Fig.3: Interpretation on ML as a resource to chatbot workflow

In this context, the possibilities for optimization offered by machine learning, which falls within the jurisdiction of artificial intelligence, represents a major advantage [3]. In fact, self-learning allows the chatbot to decipher the intention hidden behind the question in order to provide the user with a pertinent, personalized response [5]. Capable of understanding natural language, a proactive virtual assistant adapts and adjusts its behavior.

Regardless of the method (whether deep learning, natural language processing, neural networks or some other approach), machine learning always begins with the same preliminary stage: collecting personal data [7]. This is what enables the chatbot to analyze, process, compare, and utilize the information and then make a decision based on its reliability rate.

The more data the chatbot receives to analyze and process, the better it will understand the question and the better it will perform. Furthermore, this method implies a form of self-sufficiency: by being fed astronomical amounts of knowledge automatically, the bot becomes capable of responding to all types of inquiries.

So you understand that, if you are launching or planning to launch a virtual assistant, its autonomy is a key challenge. And in that context, machine learning has no shortage of advantages. But it's only one of the many building blocks of artificial intelligence!

AVATAR CHATBOT - SOON A TALKING CARTOON!

In the current sea of instant responses everywhere, it is ever more crucial to resonate on chat bot's personality with the user's expectations. This follows a short mention of numerous human psychological effects and how to harness them with the endeavor of aligning the best parts of a chat bot's personality to the user's needs, life's goals, identification, personal fulfillment along with motivation. When that right alignment occurs, it will most likely yield the user's acceptance of the bot's personality, which in turn affects their gratification of the entire chat bot experience [8]. One of the most exciting talks will be about Avatar Chatbots. You can literally talk via Skype to these chatbots [8]. Talking to these Chatbot Avatars is like talking to a Cartoon! The crazy part is that these bots are already developing facial recognition [9]. This means that they can read your facial expressions and judge your sentiment and mood in real time. I imagine in the near future such avatars will be extremely persuasive [9].

Fig.4: Human chat interpretation

One of the earliest steps in developing a chatbot is deciding how to give it a personality. Some companies take the Siri approach and choose not to give their chatbot a visual avatar, while Slack, for example, created the slackbot to make things a little more fun. If you decide to create an avatar, here are a few things to consider.
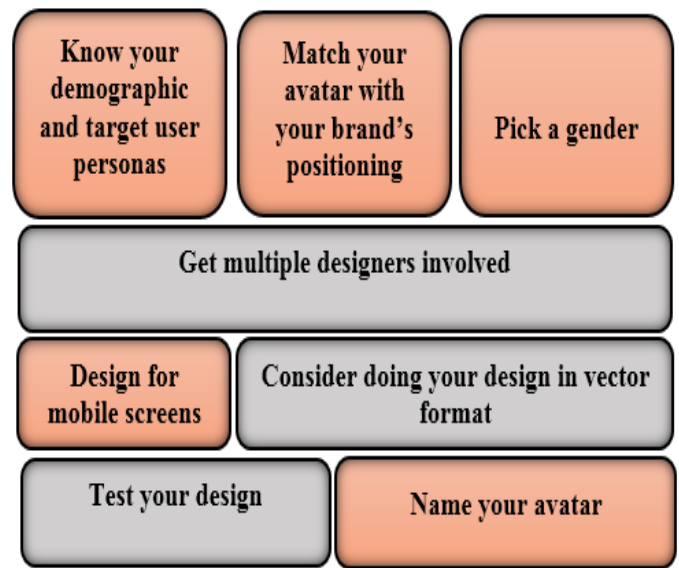

Fig.5: 8 step process for designing a chatbot avatar

Working on the identity of your chatbot is an essential process for satisfying your users. A well-planned virtual agent improves the effectiveness of your customer relations and tells the story of your brand with ease. Living Actor helps you find the right tone and configure your bot in order for it to become the ideal vehicle for your brand and your values [9]. Chatbot's missions differ in relation to your targets, and the same goes

for its behavior and its tone. A humorous conversational agent is a better match for an audience of millennial B2C prospects than for the profiles of B2B prospects who are seasoned entrepreneurs. The first generations of chatbots were weak interaction tools, only capable of offering scripted responses to a given number of inquiries [10]. The efficiency was there, it's true. But there was no room for sensibility or awareness of clients' needs. Today, thanks to technological advances, avatars have become smarter and more human. Within a few years, austere, inflexible machines have been replaced by evolved virtual characters, from Robby the Robot (Forbidden Planet) to TARS (Interstellar).

As technology continues to progress, chatbots are becoming increasingly humanized. They're smarter: small talk has become an essential component in the configuration of virtual assistants (here is an example of off-topic questions that users can ask Siri) [17]. They're also more expressive: the creation of avatars (the bot's visual identity), the diversification of their tone (whether formal or humorous) and the interjection of emotion (in their behavior and their voice) have all helped forge a stronger affinity with clients[17].

II. CONCLUSION

Whenever we interact with our environment or with other people, we put to use our adaptive processes. This is how we can walk our house in the dark, search for items in an unfamiliar grocery store, or converse with a stranger. While these adaptive processes allow us to successfully negotiate the novel and unexpected events in our lives, they nonetheless come with a cost. Such situations require that we pay more attention, draw more from the history of our experiences, and be ready to change tactics quickly. In such situations, the burden of this overhead of effort may eventually exceed the perceived value of the activity itself. When we originally formed our hypotheses for this study, we were mindful of this overhead. It seemed reasonable that the effort required to communicate with a chatbot, an entity both unfamiliar and less intelligent than humans, would quickly exceed the intrinsic novelty of the interaction. The results of this study suggest, however, that this was not the case. In spite of the costs, participants sent a greater number of messages to a chatbot than they did to another human, even though the shorter message lengths and more limited vocabulary in these conversations clearly illustrated the overhead of the adaptive processes present. Alongside these processes, the greater use of profanity in these conversations suggests that participants never lost sight of the fact that they were communicating with a computer. This study evidently analyzed the fair play of machine and deep learning has contributed and one has necessarily unstated that chatbots are next level generation of technology.

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