Survey of Intelligent Chat Bots Using Machine Learning

Prof. Anup W. Burange Prof. Yugandhara A. Thakare Prof. Harshal D. Misalkar

Abstract- **Chat bots are intelligent systems that recognize user‟s queries in natural language and reply accordingly in a discussion. It is like a virtual assistant, user feels like they are talking with actual person. They can respond in the same language, in which questions are asked. Chat bot would help to replicate the customer service experience with one difference that the customer would be interacting with a bot instead of a real person and yet get the queries attended and resolved. It can help to solve problems of daily life, by providing solutions to help desks, telephone answering systems, customer care centers. A chat bot is just a robot chat that imitates human conversations through voice commands, text chats, or both. It is a virtual dialogue in which one party is an online chatting robot. The artificial intelligence feature within talking robots has been used in different industries to convey information or execute tasks, such as determining the weather, making flight reservations, or purchasing products.**

Keywords- **Chat bot, NLP, Hybrid Approach**

I. INTRODUCTION

Inside the artificial intelligence of a chatbot is machine learning and it is known as natural-language processing (NLP). In different fields machine learning can be applied to create various chatbot algorithms, while NLP has the capability to pick up conversational cadences and mimic human conversation. Generally a chat bot works by a user asking a question or initiating a new topic. Chat bots is nothing but software agents that simulate an entity usually a human. These kinds of software with artificial intelligence which allows them to understand users input and provide meaningful response using predefined knowledge base[1].

Applications

Customer service

One of the most obvious uses for chat bots is customer service and we might have encountered one of these bots already, without realizing it. Many websites, upon visiting, may have a small live chat tool, present on home page to help you discover the information that you need. Historically, these have been prepared by human beings, but it is far more cost efficient now days to have bots fielding simple requirements. If a request happens to be difficult, it may always be forward to a human agent. Customer service chat bots are now getting to be used over the phone, replacing the past mechanical dial tone-based phone menus.

Education

Facebook developed a new trial Artificial Intelligence program that mimicked Albert Einstein, appealing with users in natural conversation and speaking out facts about his life as if you were having a discussion with the man himself. It was not completely immersive, and possibly didn‟t capture the complexities of his personality, but it show off the capability for chat bots to be use as educational tools. If chat bots can be programmed to behave like historical figures, or even provide users with basic information, they could make education more reachable and more attractive for most of the populations [6].

Assistance

Chat bots are being used as modes of personal assistance, and the best example here is still Siri (and other digital assistants like it). These chat bots are usually linked to an operating system, and are capable of thousands of tasks, including playing music, performing online searches, and even buying products online. Smart speakers like Amazon Echo and Google Home are also becoming more popular, introducing more users to the reality of controlling their daily tasks through voice commands [5].

Developing a chat bot will offer a smart way out to solve the queries, give information as and when required, improve service and increase number of customers. It eliminates human factors included in organization and can give 24/7.

hours service to enhance productivity. Chat bot interfaces for customers which could be available on the web and on any hand-held devices are being developed. Customers can point out their queries in natural language and the chat bot can reply to them with correct answer. As there will be fast reply for

inquiry, this will be time efficient for both bank and customers in banking industry. An intelligent query handling program are being developed which could in next phases not just respond but self-learn to improve itself thereby increasing not just the quality of customer service but also reducing human load, raise in productivity and of course increasing number of satisfied customers.

CHATBOTS GETTING SMARTER

With the advancements in artificial intelligence and the fast growth of messaging applications, chat bots are becoming increasingly essential in many industries. Although bot technology has been around for decades, machine-learning has been improving significantly. Natural language processing impose human speech patterns to simulate a human tone in computer-human interaction, which creates more close interactions. The predictive analytics within bots uses statistics, modeling, data mining and more to produce information proactively. The sentiment analysis in machine learning uses language analytics to decide the attitude or emotional state of whom they are speaking to in any given condition. This has proven to be difficult for even the most superior chat bot due to an failure to detect certain questions and comments from context. Developers are creating these bots to automate a broader range of processes in an increasingly human-like manner and to continue to develop and learn over time.

Present chat bots are developed using variety of methods like rule based where rules are hard-coded in code, AI based bots, pattern-based which can handle only mentioned patterns for retrieving answer. There are frameworks existing for developing chat bots but they also use either rule-based or pattern-based techniques. In rule based chat bots which are simpler to build, one need to write rules like If X then Y else if P then Q etc. So if there are 200 scenarios, developer needs to write 200 rules for each of the scenarios. The volume, variety and complexity of data makes such techniques incompetent. It"s nearly impossible to write rules and/or patterns for massively available data. AI based bots are built on NLP and Machine Learning. They are based on human ability of learning information but with more efficiency. Natural Language Processing (NLP) can be used where predefined or static rules, patterns may not going to work.

II. LITERATURE SURVEY

Eliza is considered as the first chat bot whose mechanism is based on pattern matching. It is prepared by Joseph Weizenbaum in 1964 [2]. ALICE [3] is rule-based chat bot based on the Artificial Intelligence Markup Language (AIML). It has more than 41,000 categories, where each category has grouping of pattern and its response.

Md.Shahriare Satu and Shamim-AI-Mamun [7] explained the review of applications of the Chat bot which are developed using the AIML scripts. They describe that AIML based chatbots are uncomplicated to implement, they are lightweight and capable to work. Their paper specifies the detailed information about the different applications of the chatbots.

Thomas N. T. and Amrita Vishwa [4] designed a AIML and LSA based chatbot to offer the customer care service over the E- commerce websites. Their approach shows that chatbot"s ability can be improved by adding other models to it. In android operating system, we can execute the chatbot using the various approaches. One of the approaches is shown by Rushabh Jain and Burhanuddin Lokhandwala in their Android based Chat-Bot [8]

III. CHATBOT NLP VS RESPONSE BUTTONS

When it comes to deciding between the use of chatbot NLP (Natural Language Processing) or a more button-focused flow when building a chatbot, there"s a lot to consider. Chatbot NLP is the ability of a chatbot to intelligently respond to a user"s text input by understanding what a user is looking for based on keywords.

For example, if someone were to ask a chatbot „What is the weather like in Delhi today?" most chatbots would identify „weather", „Delhi", and „today" as the three primary keywords that will dictate a response. Based on those keywords the chat bot will try to find the correct response. Without chatbot NLP, chatbots would not be able to effectively reply to text inquiries and would have to rely solely on visual UX flows such as the use of response buttons.

Pros & Cons of Chatbot NLP

Pros:

User freedom
Surprise effect (natural conversation tendencies)

Cons:

Intent comprehension
Response relevance
Domain clarity

Fig.1 NLP VS Buttons

The pros of chatbot NLP are relatively apparent and straight forward. Chatbot NLP allows users to interact with a chatbot like they are a friend or family member via a messaging application or SMS. This gives users the liberty to ask whatever they want without knowing what the chatbot‟s reply will be. The chatbot NLP allows the chatbot to respond cleverly (or at least try to) so the user can get the value they‟re looking for from the chatbot. The pros of chatbot NLP, open up the opportunity for its cons. By allowing users to have a freedom to ask whatever they want, there is far more scope for error and misguidance. Poor chatbot NLP can result in a chatbot not understanding the intention of the user‟s conversation and therefore responding in a manner that isn‟t appropriate to the user‟s intended conversation. Is the user looking for weather, technical support, contact information, sales assistance, etc. When it comes to domain clarity, i.e. understanding what topics the chatbot is designed to support, it is crucial to have a well-crafted welcome message that sets the tone for the conversation and lets the user know what topics are in range. Without, a chatbot is basically allowing a user to ask anything and everything.

Pros & Cons of Chatbot Buttons Pros:

- Intent comprehension
- Response relevance
- Domain clarity

Cons:

- User freedom
- Surprise effect (natural conversation tendencies)

Like chatbot NLP, the pros and cons of chatbot buttons are reasonably straightforward. Because chatbot buttons don‟t allow users to ask whatever like and instead force them down guided conversation paths, there is less room for error and misunderstanding when it comes to a user‟s intent. In reality, chatbot buttons force intents on the users by only allowing them to go down specific topic flows. This is a contrast to chatbot NLP which opens things up entirely for the user and allows them to have more control over the conversation.

Hybrid Approach

Hybrid chatbots give users the liberty to manage the conversation and ask whatever they want if they please via chatbot NLP, while also providing suggested guided conversation flows through the use of chatbot buttons. In this case, the user gets to choose from two completely different approaches based on their preferences and requirements. When it comes to chatbots, it‟s hard to get much better than that.

IV.CONCLUSION

Chat bots can be enabled with intelligent query handling program which could not just respond but self-learn to improve itself thereby increasing not just the quality of customer service but also reducing human load, increase in efficiency and of course increasing number of fulfilled customers. In this paper pros and cons of chat bot NLP along with pros and cons of chat bot buttons are explained also the combination of these two called hybrid approach is proposed.

REFERENCES

1. J. Chai and J.Lin, "The role of natural language conversational interface in online sales: a case study," International Journal of Speech Technology., vol. 4, pp. 285295, Nov. 2001

2. Shawar BA, Atwell E, "A comparison between Alice and Elizabeth chatbot system, "University of Leeds, School of Computing research report 2002.

3. Bayan AbuShawar,Eric Atwell, "ALICE Chatbot: Trials and Outputs,"Computación y Sistemas, Vol. 19, No. 4, 2015, pp. 625–632

4. Thomas N. T., Amrita Vishwa,"An E-business Chatbot using AIML and LSA,"2016 Intl. Conference on Advances in Computing, Communications and Informatics (ICACCI), Sept. 21-24, 2016, Jaipur, India

5. R. Moore, G. Gibbs, "Emile:Using a Chatbot Conversation to enhance the learning of Social Theory" Univ. of Huddersfield, Huddersfield, England,(2002)Ausburg, Germany, University of Ausburg. 2002.

6. R. P. Schumaker, Liu Y., Ginsburg, M., Chen H.," Evaluating Mass Knowledge acquisition in the Alice chatterbot: The AZ-ALICE dialog System." Int J. of Human Computer Studies, 64: 1132-1140 (2006).

7. Md. Shahriare Satu, Md. Hasnat Parvez," Review of integrated applications with AIML based chatbot,"1 st International Conference on Computer & Information Engineering,Nov 2015,Dept. of CSE, Rajshahi University of Engineering & Technology, Rajshahi, Bangladesh.

8. Rushabh Jain, Burhanuddin Lokhandwala , "Android based Chat-Bot,"International Journal of Computer Applications (0975 – 8887) Volume 137 – No.10, March 2016.