SURVEY ON CONVERSATIONAL CHATBOT

Shantanu Sawarkar, Shubham Jagadale, Sahil Pandit, Padmajitsinh Patil

SKNSITS, Lonavala, India

ABSTRACT

Chatbots, or conversational interfaces as they are also known, present a new way for individuals to interact with computer systems. Traditionally, to get a question answered by a software program involved using a search engine, or filling out a form. A Chatbot allows a user to simply ask questions in the same manner that they would address a human. The most well-known Chatbots currently are voice Chatbots: Alexa and Siri. However, Chatbots are currently being adopted at a high rate on computer chat platforms.

The major role of today's technology is played by the artificial intelligence along with the NLP processing integrated with the machine learning algorithms. The computer program which uses artificial intelligence to imitate the behavior of the human decision making as well as providing the various kind of services forms the basis for the survey on artificial intelligence on the chatbots. Thus, the paper provides a survey based on the different platforms used to build a chatbot for providing various kind of services to different kind of users. The design techniques for building the chatbot depends on the services meant to provide for the users. The chatbot will get the experience by learning through the past experience using various algorithms. The data can be trained to the chatbot which will enable it to check with the knowledge base for providing accurate results to the query of the user through client side applications.

Keywords: *NLTK, NLP, MACHINE LEARNING, CHATBOT*

INTRODUCTION

A Talkbot is a program that communicates with you. It is a layer on top of, or a gateway to, a service. Sometimes it is powered by machine learning (the Talkbot gets smarter the more you interact with it). Or, more commonly, it is driven using intelligent rules (i.e. if the person says this, respond with that). The services a Talkbot can deliver are diverse. Important life-saving health messages, to check the weather forecast or to purchase a new pair of shoes, and anything else in between.

The term Talkbot is synonymous with text conversation but is growing quickly through voice communication…

"Alexa, what time is it?" (other voice-chatbot are available!)

The Talkbot can talk to you through different channels; such as Facebook Messenger, Siri, WeChat, Telegram, SMS, Slack, Skype and many others.

Consumers spend lots of time using messaging applications (more than they spend on social media). Therefore, messaging applications are currently the most popular way companies deliver Talkbot experiences to consumers today world, Chatbot plays an important role in people life. It is used in communication or interaction purpose with human Due to the existence of Natural language

interaction between humans and computers, chatbot is very useful for humans. It is used for knowledge seeking purpose and also entertainment purposes. It is demonstrated by using machines where machines are feed with human intelligence and mimics their actions. It also helps to learn, think, behave and communicate like humans and able to solve the problems. Chatbot is classified into two types as web Chabot and standalone chatbot. Web chatbot is used to communicate with users automatically and Standalone chatbot is one which interacts only when it is installed in any available device. Apart from these types of chatbots many other chatbots are also available which makes human tasks and solve other decision making problems. Chatbot is considered as a virtual human being which interacts with the human based on trained texts. This is mainly based on machine learning and artificial intelligence. Chatbots are mainly built using interactive languages like Natural Language Processing and conversion services. Natural language processing plays an important for conversion which is used for closer communication for humans and machines. Besides this we are able to give the information about railway booking and reservation system. This tells about information of railway through the standalone Chatbot. The dialogues which are given as inputs are being trained by natural language processing. Due to the advancement developed in the field of machine learning algorithms and deep learning applications combined with the artificial intelligence, have dominated human works.

LITERATURE SURVEY

Artificial intelligence applications The authors Anirudh Khanna, Bishwajeet Pandey, KushagraVashishta, Kartik Kalia proposed a survey on Artificial Intelligence in machines which seems to be a demanding task . It consists of the process for prompting to create intelligent machines. It provides a discuss on some of the recent practices in AI and it also provides an alternate theory for the improvement in the today's well known and suggestions for distributed acceptance. Thus came the existence of the implementation of the machines with artificial intelligence or intelligent machines is made. It also shows that AI only can't provide an adequate result, it must also incorporate the different concept that the intelligent machines will automatically become the intelligent system's future scope. Such creation of intelligent machines integrated with the algorithms at backend is known as Artificial Intelligence or AI.

Intelligent machines are capable of performing many tasks. Leading trends in the field of artificial intelligence includes the learning about machines, simulation of human brain, NLP processing, facial recognition and works related to neural networks, cyber security, etc. One such example of an AI system includes the design of chatbots. Any such program of the chatbot can understands multiple languages of the human by the concept of NLP processing. Natural Language Processing (NLP) which belongs to study of artificial intelligence is concerned about the study of interaction between humans and machines using their own natural language. Such AI chatbot can also performs some prominent functionalities like performing calculations, creating alarms or remainders for the users in order to intimate them with their planned works, etc.

CHATBOT AND TECHNICAL COMMUNICATION

The author John P. Mclntire, Lindsey K. Mclntire, Paul R. Having has provided a survey on the chatbot which provides service to users that people use to communicate with the system through a chatbot interface or client side application. User can request the queries using texting or by voice. The chatbot will carry out actions for the user request in response to your conversation. Chatbots are developed generally only for individual purpose. This is explained by combination of two features such as: 1. A Conversational User Interface (CUI) can be used as both voice recognized and text queries. 2. It also provides answers from various sources and it can also be in a variety of different formats. Most of the chatbots works on a basic model of these three properties namely: x Entities x Intents x Responses In the current trend, there is a lot of opportunity for professional technicians in the aspects of technology to get involved with the designing, training and implementation part of the intelligent machines or user interface like chatbots. Thus it can help them to learn some new skills. In this paper, it is mainly focused on the AI based chatbots. AI based chatbots will interact with the users and used to process more complex requests queried by the users or customers. AI based chatbots are used widely in almost all fields to reduce the complexity of searching and responding answers to the complex requests asked by the customers

METHODOLOGY

CREATING YOUR OWN BOTS

A. Exercise details

The hands-on part of the technical briefing will be organized in two subsections:

• Predefined exercises (75%): a series of bots to build where each exercise focuses on a different dimension of the bot building process

B. Predefined exercises

We will start the predefined exercises session with a classical Hello World chatbot that replies to users greetings. While simple, this initial exercise emphasizes some core aspects of chatbot development: on which platform should the bot listen and reply? what is a user intention and how to train the bot to recognized it? what should the bot do once it has answered the user? what if the bot doesn't understand the user input?

Then, we will start building on top of this initial bot and we will introduce the concept of entity extraction and how to use it to tune our bot with personalized messages. This exercise will emphasize the need to carefully craft training sentences for optimal results, and will introduce powerful NLP engines such as DialogFlow5 and NLP.js6. We will also show how different entities can be used to extract city names, dates, or custom domain-specific information.

C. NATURAL LANGUAGE UNDERSTANDING

Natural language understanding (NLU) is a branch of artificial intelligence (AI) that uses computers to understand input made in the form of unstructured text or speech. The field of NLU is an important and challenging subset of natural language processing (NLP)). NLU is tasked with communicating with untrained individuals and understanding their intent, meaning that NLU goes beyond understanding words and interprets meaning. NLU is even programmed with the ability to understand meaning in spite of common human errors like mispronunciations or transposed letters or words . The NLU provides a direct human-computer interaction. The NLU allows human languages to be understood statically by the computer without the use of if / else. The Natural Language Understanding (NLU) covers one of AI's complex challenges . NLU mainly consists of two tasks - Named Entity Recognition (NER) and Intent Classification (IC). Figure 1 gives an example of Natural Language Understanding in AI agents.

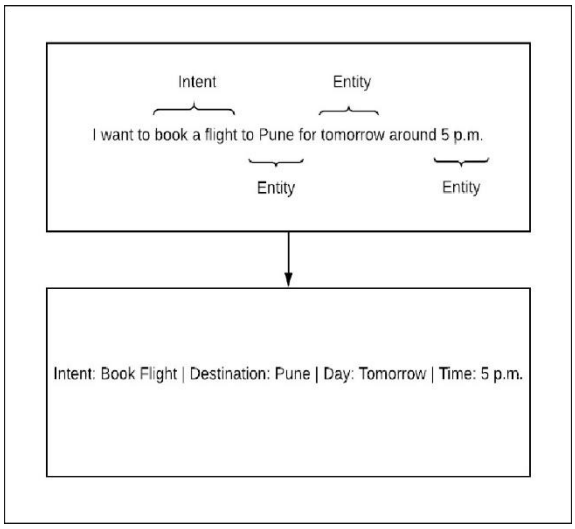

Fig. 1. Natural Language Understanding

DIALOGUE MANAGEMENT

Dialogue Management (DM) is an important module in the Conversational AI framework that is responsible for governing the actions of the Conversational Agent and mapping inputs to appropriate outputs and has been an area of tremendous research interest for the past two decades . The DM system is responsible for developing an interaction strategy that can guide the agent in deciding its own actions based on the inputs that have been received from the user. DM systems can be of two types viz. Goal/Task Oriented Systems and Non-Task Oriented Systems .

Task Oriented DM Systems are responsible for guiding the user from one state of the conversation to another so as to successfully achieve a predefined or dynamically understood task . Examples of Task Oriented Conversational Agents are widely found today such as conversational agents designed for performing simple tasks like booking a movie ticket, scheduling meetings , task

management, FAQ answering and can range up to agents designed for performing more complicated tasks like open domain question answering , visual question answering and medical diagnosis .

The DM system also functions as a state tracker that continuously maintains the state of the conversation and is also responsible for initiating a transfer from one state to another when the control of the conversation is with the Conversational Agent . Table provides details about the different states that a conversation can be in during an interaction between a human and a Conversational Agent.

Following are some of the traditional, current state-of the-art and promising methods of Dialogue Management System implementation

Sr. No.	State	Conversation Control	Description
1.	Grounded	Agent	Acknowledging the users input while deciding upon the agents actions
2.	Slot Filling	Agent	Requesting extra information from human to resolve actions
3.	Initiative	Agent / Human	Steering of the conversation by either entity
4.	Context Switch	Human	Change of the basis or the premise of the conversation

TABLE. STATES IN DIALOGUE MANAGEMENT

Machine Learning based Approaches ®

A Machine Learning (ML) based approach for DM realization takes the user intents from human input as the input parameters to the ML algorithm and predict what the Conversational Agents actions should be. However, the use of a classic ML algorithm on natural language inputs requires significant pre-processing thus making it an unattractive choice . Deep Learning can help in overcoming this

NLG plays the important role of making the conversation seem more natural for the human participant which is a critical factor for judging the effectiveness of Conversational Agents.

The NLG module receives input from the Dialogue Management system in a structured format that is based upon the dialogue history and the current context . Thus, the output from the NLG component in a Conversational Agent is a natural language sentence or text which is also the final output of the Conversational AI framework for each dialogue instance. The output of the NLG component is based upon the processing and results of the Natural Language Understanding and Dialogue Management Systems. Following are some of the traditional, current state-of-the-art and promising methods of Natural Language Generation .

SL. No	Metrics	Existing System	Using Chatbot
1)	User Queries	Text Enabled	Both Text and Voice Enabled
2)	Time Saving	Efficient	More Efficient
3)	Cost Saving	Less cheap and faster	Much cheaper and faster
4)	Performance	No accuracy	Consistent and Accurate
5)	Flexible attribute	Lot of development and testing needed to change platforms	Easily be used in any platform in any industry
6)	Resolution speed	Slow response	Quick response
7)	Keeping Up with the Trends	User wants to download the App	Being Present on Messaging Platform
8)	Extensive Customer Assistance	Lack of information about a product	Provide assistance real-time
9)	Always-Available Customer Support	Not available all the time	Available at any time
10)	Proactive Customer Interaction	Not initiate the communication	Initiate the communication
11)	Easier Approach	Unilingual	Multilingual
12)	Customer Satisfaction	Not that much user friendly	User friendly and smooth interaction
13)	Increased Customer Engagement	Less interactive	More interactive
14)	Operational cost	Not reduced	Reduced
15)	Handling capacity	Communicate with one human at a time	Have conversations with thousands of people
16)	Faster Onboarding	Not easy for human employees	Easy to understand conversation flow and structure
17)	Better Lead Generation	Lower conversion rates	Higher conversion rates

CONCLUSION

Chatbots or smart assistants with artificial intelligence are dramatically changing businesses.There is a wide range of chatbot building platforms that are available for various enterprises, such as e-commerce, retail, banking, leisure, travel, healthcare, and so on.chatbots can reach out to a large audience on messaging apps and be more effective than humans. They may develop into a capable information-gathering tool in the near future

ACKNOWLEDGMENT

We would like to express our sincere gratitude towards our guide Prof. R.S.Patil for her in-valuable guidance and supervision that helped us in our research. She has always encouraged us to explore new concepts and pursue newer research problems. We credit our project contribution to her. Collectively, we would also like to thank our Head of Department Prof. G. M. Kadam and our principal Prof. M. S. Rohokale for their time, suggestions, and for always making themselves available. We cannot thank them enough

REFERENCES

1. Vishal Aggarwal, Anjali Jan, Harsh Khatter , Kanika Gupta “Evolution of Chatbots for Smart Assistance,”2019 IJITEE Blue Eyes Intelligence Engineering Sciences Publication,2019,pp.77-83,doi:10.35940/ijitee.I8655.0881019.
2. M. Ganesan, D. C., H. B., K. A.S. and L. B., ”A Survey on Chatbots Using Artificial Intelligence,” 2020 International Conference on System, Computation, Automation and Networking (ICSCAN), 2020, pp. 1-5, doi: 10.1109/ICSCAN49426.2020.9262366.
3. J. Bozic, O. A. Tazl and F. Wotawa, ”Chatbot Testing Using AI Planning,” 2019 IEEE International Conference On Artificial Intelligence Testing (AITest), 2019, pp.37-44, doi: 10.1109/AITest.2019.00-10
4. P. Kulkarni, A. Mahabaleshwarkar, M. Kulkarni, N. Sirsikar and K. Gadgil, "Conversational AI: An Overview of Methodologies, Applications & Future Scope," 2019 5th International Conference On Computing, Communication, Control And Automation (ICCUBEA), 2019, pp. 1-7, doi: 10.1109/ICCUBEA47591.2019.9129347.
5. G. Daniel and J. Cabot, "The Software Challenges of Building Smart Chatbots," 2021 IEEE/ACM 43rd International Conference on Software Engineering: Companion Proceedings (ICSE-Companion), 2021, pp. 324-325, doi: 10.1109/ICSE-Companion52605.2021.00138.
6. H. K. K., A. K. Palakurthi, V. Putnala and A. Kumar K., "Smart College Chatbot using ML and Python," 2020 International Conference on System, Computation, Automation and Networking (ICSCAN), 2020, pp. 1-5, doi: 10.1109/ICSCAN49426.2020.9262426.
7. International Journal of Innovative Research in Computer Science & Technology (IJIRCST) ISSN: 2347-5552, Volume-6, Issue-3, May 2018.