

A Survey of Various Chatbot Implementation Techniques

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Abstract: In today's era of artificial intelligence in machines. With the advances in AI, machines are day by day impersonating different human traits. AI conversational entities, also known as chatbots or chatterbot, are an excellent example. Chatbots are programs capable to perform near - natural conversation with real world people. In this work, we describe and compare the evolution of chatbots from a elementary model to a highly advanced intelligent system. Chatbots or chatterbots are currently gaining a lot of popularity especially in business sector as they have the potential to automate customer services and minimize human efforts. For a typical chatbot to perfectly imitate a human dialogue, it must analyze the input given by a user correctly first and then formulate a relevant and appropriate response.

Keywords: Chatbot, Information Repository, OCR, AIML, Knowledge Base, LSA

1. Introduction

With the expansion in WWW (World Wide Web), it becomes troublesome for any user to access the desired info quickly and in a very easy approach. So as to extend and improve the convenience of user interaction with any system, human and artifact collaboration is important. A chatbot or chatterbot can be considered as a question-answer system wherever specialists offer information for solicitation of user. A chatbot is a code designed to simulate an intelligent speech with some human partner. This survey paper aims to represent a summary of the present approaches of implementing a chatterbot system. The essence of this paper is to arrange a comprehensive comparison of chatbot systems right from the primary chatbot ELIZA to one of the latest chatbots like Alexa. We've got studied the design and implementation of many chatbots and developed an in depth survey of these systems.



Fig. 1. Chatbot



Fig. 2. Robotic chatbot

2. History of chatbots

The first voice of chatbots came back in 1950, when Alan Turing printed his research paper "Computing Machinery and Intelligence" which was widely considered as the basic building block for the foundations of the new emerging technology of computer science i.e. "Artificial Intelligence". Along with this ,Turing test discussed in this research paper was considered as a benchmark for the exploration of intelligence of a computer system.The emerging fame of "Turing Test " collected plenty of attention to Joseph Weizenbaum's program ELIZA developed in 1966 at the Massachusetts Institute of Technology AI Laboratory. ELIZA performed an easy, text based communication test between the human intelligence and the computer machine reacting as a Rogerian therapist. Weizenbaum's main intention in making ELIZA was to exhibit the superficiality of human-computer interaction. However, he failed to anticipate that how plenty of individuals simply attributed human-like feelings to the program. First Chatbot was totally based on the programs having a huge collection of predefined pairs of response corresponding to specific input. Pattern matching and string processing was used to keep conversation in process between the computer and human and hence it was not considered as an Intelligent Chatbot. They just created associate illusion of intelligence of the pc, however the fact was that the programs had nothing much to be so called as Intelligence.

A. Survey of chatbots

Turing test was performed on ELIZA and after successfully passing the Turing test, it became first program to qualify

Turing test. At the start, ELIZA examined the text given as an input by the user for the defined keywords. Then it applied values to them, and reworked the input into a response. The script that ELIZA ran determined the keywords, set the values of keywords and set and set the principles of transformation for the output. PARRY was written in 1972 by head-shrinker Kenneth Colby, at Stanford University. PARRY tried to simulate strategy, and intrinsically was one step more serious and advanced program than ELIZA. It fully was delineate as "ELIZA with attitude". PARRY was tested in the Nineteen Seventies using a variation of the turing test. Among the several earlier approach, Jabber wacky is one of them which strive at turning out with Artificial Intelligence through human interaction. It aimed to move over from a text primarily based system to entirely voice operated system. ALICE (Artificial Linguistic internet computer Entity) created by Richard Wallace in 1995, is an open source NLP chatterbot program that converses with an individual's by evaluating user input victimization through heuristical pattern matching rules. ALICE depends in XML information databases. All that it do is that, It checks for the user input against the predefined set of responses available in its database. As a result of it, chatbot encompasses a predefined depart responses, it cannot answer all the queries adequately. It is accomplishable for ALICE bots to expand their information bases through associate degree XML accent AIML. And this can make ALICE more expert in various domain. Watson, built by IBM is a great computation system based on question and answer and it hasbeen designed to use advanced NLP, information retrieval, information illustration, automated reasoning, and machine learning technologies to the sphere of open domain question respondent. Watson uses IBM's DeepQA code and also the Apache UIMA framework. It runs on the SUSE UNIX system Enterprise. Automatic speech recognition is being used by SIRI to translate human speech including short utterances of commands, dictations or questions into text. Mistreatment tongue process (part of speech tagging, noun-phrase unitization, dependency and constituent parsing) It interprets transcribed text into "parsed text". Mistreatment question & intent analysis it analyzes parsed text, and detects user commands and actions. ("Schedule a meeting", "Set my alarm"). Third party internet services like Open Table, Wolfram Alpha square measure interfaced mistreatment information mashup technologies. They perform actions like search operations, and question respondent. Speech that SIRI has known as a matter, however it cannot directly answer, is forwarded to a lot of general question-answering services like Wolfram Alpha. Alexa uses tongue process algorithms for voice interaction. She uses these algorithms to receive, acknowledge and reply to voice commands. She is capable of music playback, creating flutter lists, setting alarms, streaming podcasts, enjoying audiobooks, and providing weather, traffic, and different real time data. Alexa can even management many sensible devices mistreatment itself as a home automation hub. Mitsuku uses an

artificial language known as AIML to grasp and reply to folks. Her intelligence includes the flexibility to reason with specific objects. She is the Loebner winner for two times in 2013 and 2016 .Along with this, she has been the runner-up for the same in 2015.

Charbot	Year	Description	Creator	Open Source / Proprietary	Technology / Approach	Self-learning	Inquisitive	Type
Eliza	1964	a simulation of a Rogran psychotherapist, replacing her response with a few grammar rules	Joseph Weizenbaum	Open Source	MAD-Sip	no	no	text
Parry	1972	PARRY attempted to simulate the behavior of a person with paranoid schizophrenia	Kenneth Colby	Proprietary	complex system of assumptions, attributions, and "emotional responses" triggered by shifting weights assigned to verbal inputs	no	no	text
Jabberwacky	1982	Chatbot with stated aim to "simulate natural human chat in an interesting, entertaining and humorous manner"	Rollo Carpenter	Proprietary	contextual pattern matching, learns by association, storing replies to inputs in a database	yes	no	text
ALICE	1995	a natural language processing chatbot—a program that engages in a conversation with a human by applying some heuristical pattern matching rules to the human's input	Richard Wallace	Open Source	AIML	no	yes	text
Watson	2006	A question answering system that won the Jeopardy! Contest.	IBM	Proprietary	Watson uses IBM's DeepQA software and the	yes	yes	text

		defeating the best human players in February 2011.			Apache UIMA (Unstructured Information Management Architecture)			
Mitsuku	2012	Mitsuku claims to be an 18-year-old female chatbot from Leeds.	Steve Worswick	Proprietary	AIML	yes	yes	text
Siri	2011	Computer program that works as an intelligent personal assistant, part of Apple Inc.'s operating systems. The feature uses a natural language user interface to answer questions.	Apple	Proprietary	Java, Javascript, Objective C, NLP, TTS, STT	yes	yes	text + voice
Alexa	2015	An intelligent personal assistant developed by Amazon Lab126, capable of voice interaction, music playback, making-to-do lists, setting alarms, streaming podcasts, playing audiobooks, and providing weather, traffic, and other real time information	Amazon	Proprietary	NLP, TTS, STT, Python, Java, Node.js	yes	yes	voice
Tay	2016	An artificial intelligence chatbot that caused controversy on Twitter by releasing inflammatory tweets and was taken offline shortly after.	Microsoft	Proprietary	Python, Java, Node.js	yes	yes	text

3. Approaches

The following figure shows a generic flow of operating of a chatbot. Once the user has entered the question, the chatbot sends it to the machine learning informatics (Natural Language Processing) Engine. The basic informatics returns the entities within the phrase which are responsible for finding the relevant data. This information is given back to the chatbot which bring it in use in order to send the proper response to the particular user.

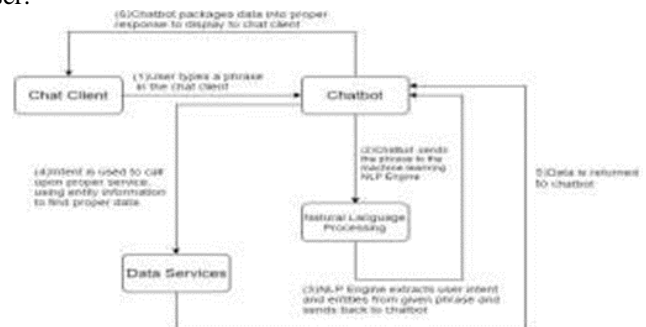


Fig. 3. Generic Chatbot Workflow

One of the approaches of implementing a chatbot could be a domain specific chatbot. The hypothesis that a website specific chatbot yields higher potency than a generic chatbot can be easily tested by using this approach. Such chatbots can be employe in various different- different domains that embrace education, help desks, e-commerce and so on. Within the planned system the user input is given to the linguistics plotter that maps the input to semantic elements.

A. Applications

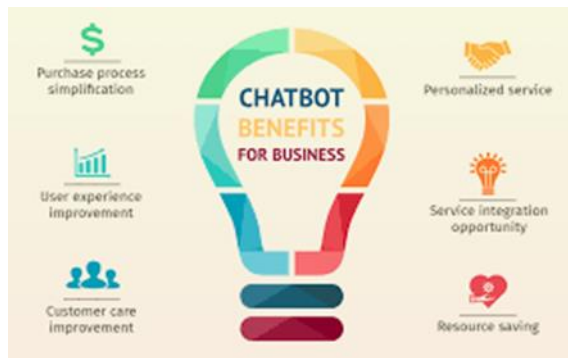


Fig. 4. Chatbot benefits

An application of chatbots lies within the field of E-business and e-commerce. The major drawback that each e-business model presently faces is that of quality client service within the slimmest of your time. As an answer to the current drawback, an answer is planned by Thomas N T that consists of a chatbot system to get immediate responses, that could be a combination of AIML and LSA User question is initial passed to the AIML block that checks if the question is model based mostly. If yes, then a pattern based mostly answer is generates as response. Otherwise, the question is routed to the LSA block wherever trained information is needed to match the user question with expected output. The FAQs in any specific e-business domain is employed for coaching the model. The list is formed mistreatment on-line information from the web. The list corpus passes through a series of steps starting with tokenization wherever tokens area unit fashioned. Then stop word removal is performed by mistreatment Porter stemmer algorithmic rule. After this, a word-document matrix is generated so SVD is computed. Trigonometric function similarity is employed to gauge result with minimum distance from user question and this result's generated because the response. User queries area unit keep in HBase and AIML info is updated to enhance answers to model based mostly queries. With the speedy advancement of technology, chatbots have become more and more vital in numerous domains like scientific, Industrial and academic. Chatbots is enforced as intelligent personal assistants (also known as virtual assistants) on mobile devices, as artificial tutors within the academic field as they will give instant and personalized feedback to learners, and conjointly in social networking domain for providing personalized selling to customers. Chatbot is an enormous breakthrough in enhancing human pc interactions. A number of the foremost notable

applications of chatbots are as money advisors [Credit Score Coach], providing free legal aid personalized stylist, and providing personal caretaker services, giving preliminary medical recommendation .The widest application of chatbots is within the field of e-commerce for automating client service. Chatbots facilitate to enhance client relations .It also minimizes human efforts in various field.

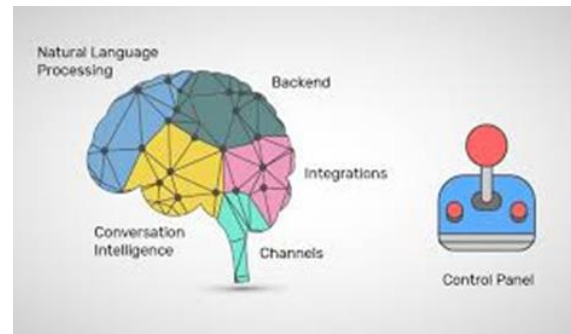


Fig. 5. Natural language processing

4. Future scope

Currently chatbots have restricted language support. Chatbot don't provide service for multiple languages, dialects and don't perceive informal usage. Therefore, there's a good scope for removing such language barriers in future chatbots. Also, AIML templates may be improved to incorporate additional variations for an equivalent input. Intelligent personal assistants integrate varied chatbot services into one single platform and pave the approach for a very intelligent self-learning artificial entity.

5. Conclusion

This paper presented the study of various chatbot implementation techniques.

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