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A Survey on Chatbots in Healthcare Domain

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Abstract: **The aim of the survey is to review the work done in field of chatbots for healthcare. According to research, 60% of medical visits are for minor ailments that may be treated at home with easy home remedies. Colds and coughs, headaches, and stomach pains are among the most frequent illnesses. They can be caused by changes in the weather, poor food, exhaustion, and other factors, and they can be treated without the help of a doctor. There are a variety of chatbots available. The Chatbot is a software application that uses natural language processing to engage with clients via text or text to speech. In today's world, one of the most significant difficulties that India has is providing high-quality, cheap healthcare to its rapidly rising population while being cost-effective. Nowadays, providing healthcare services is becoming increasingly challenging, as we saw in COVID-19 extreme conditions, when the situation in India was deteriorating due to a shortage of transportation, physicians, and hospitality. It can sometimes drive patients to postpone their treatment, as well as an increase in the number of deaths. According to this survey goal to create Conversational AI-powered Chatbot for Medical Diagnostics that employs Deep Learning and focuses on rural areas as well as the impoverished and needy people of our country. Such chatbot system is capable of comprehending the patient's symptoms and communicating with the patient (end-user) via web-UI.**

Index Terms: Chatbot, Healthcare Domain, ML (Machine Learning), NLG (Natural Language Generation), NLU (Natural Language Understanding), Smart Communication, Virtual Communicating Friend

1 Introduction

CHATBOTS are computer-assisted systems that mimic user behaviour on one side of a talking conversation. They're mimic systems that pretend to be two people having a discussion. They serve as a model for effective and intelligent communication with the user on the other end. They work to give services similar to those provided by marketers, salespeople, counsellors, and other mediators. Business, market, stock, customer care, healthcare, counselling, recommendation systems, support system, entertainment, brokering, journalism, online food and accessory buying, travel chatbots, banking chatbots, recipe guides are just a few of the fields where chatbots may be found. The most well-known chatbots, such as Alexa and Google Assistant, are the greatest instances of smart conversing chatbots. These are all-purpose chatbots that offer services across all domains and are not limited to a single one. Domain-specific chatbots are also available, which give functionality to the aforementioned domains. The following are a few of them: Botsify is a chatbot that assists developers in creating intelligent Facebook Messenger Chatbots and collects data from Facebook users. Imperson is a chatbot that assists developers in the creation of business chatbots and the provision of customer support. NBC is a chatbot that assists newsreaders in efficiently navigating through the most recent headlines.

The above-mentioned chatbots were commercial or market-related systems. The purpose of this article is to examine the necessity for and application of chatbots in the healthcare industry. There are several chatbots in the

healthcare industry that perform various functions. Endurance is a chatbot that helps people who have dementia (disease). Casper, a chatbot, assists patients with insomnia in passing the time during restless nights caused by loneliness. Med What is a question-answering chatbot that provides information about various diseases and their symptoms as well as solutions to basic healthcare FAQs? The issue with these chatbots is that they just respond to users' inquiries in a boring manner. They are unable to develop intelligent conversation with the user in the same way that a doctor can. These technologies are also incapable of anticipating the user's difficulties (diseases). To determine what the patient is suffering from, the system should be user-friendly, allowing the user to express all of his issues to the system. The goal of the study is to provide a chatbot system that can build smart dialogue. This may be accomplished by building a clever and responsive chatbot that can converse with the user in the same way that a human can. NLU, NLG, and ML(NLP) algorithms must be included into the system to make traditional chatbots behave like virtual buddies. These strategies make the system more conversational in plain language, are useful for counselling, and may be used to simulate illness prediction.

3. Generalized Architecture of Chatbot

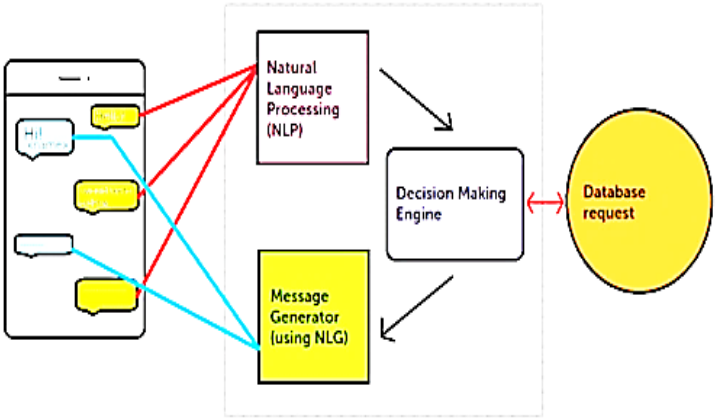


Fig. Generalized Architecture of chatbot

4. Literature Survey

This Literature Survey is divided into six categories i.e,

- Review Based on Chat Interface,
- Review on NLP Engine,
- Review on Word Segmentation,
- Review on POS Tagging
- Review on Existing Chatbot Systems.

4.1 review on Chat Interface

This unit is the front end of the system. It is responsible for collecting the user queries from the user which are the input to the system. It's also in charge of showing the user the results generated by the system. As a result, the chat interface might be considered the system's face, through which all conversation takes place. It serves as a conduit for communication between the system and the user. The chatting backend, which works as a message delivery mechanism between the Chat interface and the Machine Learning Layer, receives the user's inquiry on the chat interface. This interface is available as a website or a mobile application. The type of interface is determined by the user's criteria that the system must meet. The interface will be in the form of an app if the system is accessible via a smartphone, and a website if the system is accessed via a website. It will be necessary to utilise Android for Android phones or Swift for iOS to develop apps for smartphones. Only the interface platform will be developed on Android in this scenario, with the entire backend processing of the system taking place on a server where the system will be deployedJava or Python web frameworks can be used to create a website. Spring and Struts are the most powerful and recent web frameworks available in Java. Similarly, Python supports the Django and Flask frameworks for website development. The criteria for choosing a programming language are determined by the system's intended functionality, the needs of the people who will use the system, the algorithms that will be employed by the system, and so on. Selecting the right programming language makes it easier for developers to create a system that gives maximum functionality to the user while maintaining high accuracy and simplicity.[16]

4.2 review on NLU Engine

Natural Language Understanding (NLU) is a subset of Natural Language Processing (NLP) that allows a system to understand natural language or conversational language spoken by people. Human conversational language is not as flawless as formal language in everyday situations. It does not place a strong emphasis on vocabulary or grammar. As a result, a system's ability to interpret the sentence's intent is hampered. The user's input is in an unstructured text format

that the system cannot understand. It only accepts input in organised forms. The unstructured text obtained from the user is transformed to structured format by applying NLU algorithms to extract relevant terms and patterns from the user content. Mispronunciations, homophones, swapped words, shorter forms of words (such as "it's" for "it's"), slang words or phrases, and terms not used in formal vocabulary but found in everyday discussions are all understandable to humans. NLU methods allow the system to recognise these twerks if they are used by the user while interacting with the chatbot, giving the impression that the discussion is between two humans rather than a person and a bot.[14]

4.3. review on Word Segmentation

The practise of breaking text into smaller and meaningful parts is known as segmentation or tokenization. Paragraphs, sentences, clauses, phrases, words, and letters are examples of these units. The letters are the smallest unit. The separating of sentences into individual words separated by blank spaces is known as word segmentation.[7] Tokens are the tokenized units of the sentences. The tokenizers separated the sentences into individual words and punctuation marks. The most popular tokenizer is a space tokenizer, which divides sentences into words at blank spaces. The tokenizer must also take into account abbreviations, acronyms, dates, numerals in decimal forms, and other characters that cannot be separated at punctuations or blank spaces since their meaning will be lost.

Naeun Lee et al.[2017] proposed utilising NLTK to implement word segmentation. Natural Language ToolKit (NLTK) is a Python module that provides services for Natural Language Processing (NLP). It has tokenizers built in. Users must first import the package and then use the appropriate tokenizer, which is available in the form of functions. Standard, letter, word, classic, lowercase, N-gram, pattern, keyword, path, and others are some of the tokenizers included in the NLTK. The word-punkt tokenizer, which breaks sentences at blank spaces, is the most often used tokenizer. The NLTK tokenizers are impressive in terms of accuracy, speed, and efficiency. It also doesn't necessitate any algorithm implementation because the package runs them in the background[9].

4.4 A review on POS Tagging

The practise of giving grammatical annotations to specific words in sentences is known as POS Tagging. The Parts-Of-Speech Tags are among the annotations. They indicate the grammatical value of a word in a sentence based on its relationship to other words in that phrase, clause, sentence, paragraph, and so on. Noun, verb, pronoun, and other POS tags are widespread. There are several methods for performing POS Tagging. Some of these are discussed farther down[19]

Liner Yang et al. [2018] put forth the technique of implementing the POS Tagger using Neural Networks. There are "n" hidden layers in this method. The amount of iterations or permutations needed to appropriately tag the necessary sentence determines which layers are used. Each word in the phrase is tagged with an appropriate POS tag at each layer of the algorithm, and the tags are then passed on to the next layer to be checked for accuracy. If the following layer does not give the same tags as the preceding layer, this will continue to happen. Another method for implementing the POS tagger is to use the usual method, which is to keep a dictionary of tags for the supplied language. Python NLTK has a built-in Tagger that may be used to create custom tags.accuracy is provided by the neural network algorithm as it undergoes many iterations[7].

LinHua Gao et al. [2018] describes how to extract synonyms using the classic dictionary technique the system database maintains a collection of synonyms for relevant terms in that area using this way after then the users statement is mapped to the synonym dataset the discovered keywords from the sentence are then compared to the synonym list to see if they have the same intent after that all possible synonyms of that term are searched in the main database for a match the closest sentence to the user sentence is retrieved this approach takes longer and necessitates greater storage and complexity.[19]

4.5 review on Decision or ML Engine

Chatbots that are scripted or monotonous have predetermined responses. They respond to the user by selecting from a list of predetermined responses grouped according to the user's question. The use of machine learning in chatbots allows them to generate responses from scratch. It is used to create predictions about how the system will respond to user inquiries and to improve the system based on its previous experiences. It constantly updating the databases as new information from the user comes in. This engine analyses what the user demands using supervised, unsupervised, or both methodologies. It also employs a model to read the user's intent and deliver the right results. The outcomes might take the shape of forecasts or any other type of analysis based on the execution and analysis of mathematical models.[15] The majority of machine learning

models are built on statistical and probabilistic assessments of the instances that occur, and the computations result in a prediction for the test case. The decision engine incorporates not only prediction models, but also information retrieval methods such as entity extractions, multiple text classifications, and so on. A machine learning layer in a chatbot system is also used to construct an ontological link for things retrieved, as well as associate them with context-specific queries, alternatives, synonyms, and machine-enabled classes. Machine learning features transform a static and simple FAQ system into a smart and tailored communication experience. The machine learning layer extends the capabilities of chatbots that deliver services across several areas. It aims to improve the accuracy of the system's replies to users while also broadening the breadth of the system. The system can learn from its past experiences and update itself. As a result, the system is less likely to produce incorrect predictions. For illness prediction, chatbots in the healthcare area can utilise a variety of methods, including clustering, Bayesian networks, decision trees, and so on. The techniques of their execution, as well as a comparison of the algorithms for proper selection, are discussed here. A decision engine is the system's brain. It entails using machine learning algorithms to make predictions, as well as statistical and probabilistic computations. ML also allows the system to learn from its previous experiences, resulting in improved and updated outputs. Disease prediction algorithms are required for chatbots in the health care industry. Prediction may be done in a variety of methods, some of which are discussed here.[16]

4.6 General review

Sachin S. Gavankar et al.[2017] proposed the eager decision tree algorithm for prediction. This is an improvised variation of the classic decision tree. It builds this tree at runtime depending on the user's requests and updates it when fresh user messages arrive. Consider how it may be used to forecast illness. The symptoms found in the user query are added to the root node as child nodes in this approach. For each new symptom discovered, new nodes are added. Furthermore, for each symptom, the algorithm looks for the second symptom that has the greatest recurrence with the first and asks the user for it. If he responds yes, the system follows that path to see if the sickness has spread to the root node. For all users and the system, this will continue to iterate.[10]

Connor Shorten et al. [2021]

This survey explores how Deep Learning has battled the COVID-19 pandemic and provides direction for future research on COVID-19.

Limitations: Interpretability, Generalization Metrics, Learning from Limited Labeled Data, and Data Privacy[12]

Kevin MUGOYE et al. [2019] A comparison was made between machine learning and AI algorithms. Inside the conversation manager is the MAS (Multi-Agent System) support tool kit, which explains projected behaviour and RL (Strengthening Learning), which makes learning easier. Between machine learning and AI techniques, the bot was trained with RL. The MAS (Multi-Agent System) support tool kit, which explains projected behaviour, and RL (Strengthening Learning), which makes learning simpler, are both contained --inside the conversation manager. To educate the bot, we utilised RL.[3]

Dipesh Kadariya et al.[2019]

kbot: Knowledge-Enabled Personalized Chatbot for Asthma Self-Management

The chatbot was created as a kBot, which is a knowledge-enabled chatbot built for health applications and customised to assist paediatric asthmatic patients . The system keeps track of key health signals as well as monitoring the patient's health. Patients' responses to surveys and day-to-day chats are used to personalise the experience. The client-server architecture used by kBot is based on a lightweight frontend chat interface. Text communications, as well as photos, audio, and video messages, are supported by the system. The client captures the voice input and then converts it to textual data for speech-based communication. kBot makes better use of rich media assets and more effectively provides information. The technology displays graphics of asthma drugs and inhalers to assist patients in swiftly distinguishing between different types of medications. The DialogFlow makes it simple to detect asthma-related items. The KBot script follows typical UX design criteria in its design and writing. Based on the information obtained from past medical records, the system develops a user profile. To assess the technical viability and efficacy, a preliminary assessment is carried out. Chatbot quality, technological adoption, and system usability are the assessment criteria.[4]

Dr,Paul Raj et al. [2019]

Emergency Patient Care System Using Chatbot

The author aims to provide a medical chatbot application using machine learning. Before the patient contacts a doctor, the programme is used to diagnose the ailment and present a list of likely disorders. A SOS button is included with this

chatbot. There is a map that shows the location of a local doctor, which may be utilised to receive emergency assistance. The Google Application Program Interface (API) is used to operate on the map (API). The tool also allows clinicians to view and amend the patient's drug profile. Natural Language Understanding (NLU), Natural Language Processing (NLP), and the Multinomial Naive Bayes method are the machine learning algorithms employed. Natural Language Understanding (NLU) is a type of computer software that interprets user input in the form of text or speech. Also utilised is a Natural Language Processing (NLP) algorithm. It requires a lot of effort Converting the patient's text or speech into structured data necessitates a series of processes. Multinomial Naive Bayes is a probabilistic text categorization and NLP technique. The benefit of combining Natural Language Understanding with Natural Language Processing is that it improves the chatbot system's flexibility and efficiency, and the training dataset may be minimised by employing Multinomial Naive Bayes.[13]

Belfin R V et al. [2019] A Graph Based Chatbot for Cancer Patients

author describes about the chatbot that is specifically used for cancer patients and it provides a possible treatment solution to them. The chatbot was trained using numerous pieces of information from several medical forums, as well as sentiment analysis. A user may ask the chatbot anything,
including questions regarding cancer symptoms, treatment, and survival. Python and lovely soup are used to store the data in the database. Beautiful soup is a data extraction package written in Python. The user's raw data may be in an incorrect format that may be preprocessed with Python's NLTK (Natural Language Tool Kit). Preprocessing can be accomplished in a number of ways, including tokenization, elimination, and lemmatization. It produces a graph using the Neo4j database after implementing all of the stages in the data. Data is kept as edges and nodes in this graph, which effectively link and establish the relationship between diverse data. Cbot will also classify cancer types and offer patients with relevant information. The algorithm utilised here is NLTK (Natural Language Tool KIT), which processes input sentences, compares them to the database, and delivers critical information such as a list of cancer symptoms with explanations for patients. The advantage of Cbot is that patients are more comfortable sharing their health information with it than they are with humans, and it answers all of their questions about cancer[5]

Prof. Dr. Rajashekarappa et al. [2019]

Chatbot a Virtual Medical Assistant

The author has provided a web application with chatbot that acts as a virtual medical assistant. The chatbot interface is designed in such a way that is used to get the users symptoms by entering manually. Based on the symptoms provided by the user the chatbot predicts the disease and shows the nearby hospital to the patient. The patient can book a appointment with the physician. The model used is retrieval based Natural Language Processing (NLP). These are bots that are trained with a set of questions along with the possible outcome. The web application consists of various modules such as one for the user and administrator, chatbot module and Knowledge Base (KB) for storing the history of all user queries. The algorithm used is the Decision Tree. It is used for prediction in data mining, machine learning and statistics. The implementation is done using Google's dialogflow Application Programming Interface (API).[14]

Ali Bou Nassif et al. [2019]

Speech Recognition using Deep Neural Networks [2019]

Automatic speech recognition Is the capability of a machine to recognize the content of words and phrases in an uttered language and transform them to a machine-understandable Format. The discrimination between two languages may become challenging as well as accent recognition.[6]

Dhebys Suryani Hormansyah et al. [2018]

N-gram Accuracy Analysis in the Method of Chatbot Response, International Journal of Engineering & Technology.

The chatbot is being developed for a customer service that also serves as a public health service. N gram TF-IDF, and cosine similarity are all used in the application. The knowledge base is set up to keep track of the questions and answers. The software's application clearly illustrates the keyword retrieved from the query and by employing the use of unigrams, bigrams, and trigrams, which aid in the speedy completion of tasks answering[15].

Shafquat Hussain et al.[2018]

VDMS is a web-based chatbot that was built using program-o, an open-source PHP interpreter tailored specifically for AIML. The use of AIML pattern tags creates the native cognitive content of VDMS on polygenic illness. A pattern matching method was also utilised in this. A test

was conducted in which 10 individuals answered questions to VDMS, and the chatbot responded to up to sixty-five percent of the queries, which the users appreciated [8]

Divya S et al. [2018]

A Self Diagnosis Medical Chatbot Using Artificial Intelligence

The author plans to use Artificial Intelligence (AI) to create a medical chatbot. A text-to-text interaction takes place, allowing the bot to learn about the patient's present medical condition. The bot offers a customised diagnosis based on the ailment that has been forecasted. The method involves three conversational phases: gathering basic information, extracting symptoms, and diagnosing. There are three primary components in the system. The first step is to validate the user and retrieve the user's symptoms. The second step is to match the extracted symptoms to the symptoms that have been described. The next step is to refer the patient to a doctor if required.The string search technique is used to extract the symptoms.[17]

5. Analysis of Literature Review :

Table: Analysis of literature review

The string search algorithm carries out the search by utilising the substring to match the user's symptoms, and the bot only responds if the user specifies the symptoms directly. By developing a list of proposed near symptoms, the extracted symptoms are mapped to the training dataset. In addition, the user's symptom is matched to common diseases in the database. The benefit of employing a healthcare chatbot is that it is constantly available and may provide medical information to the user at any time.

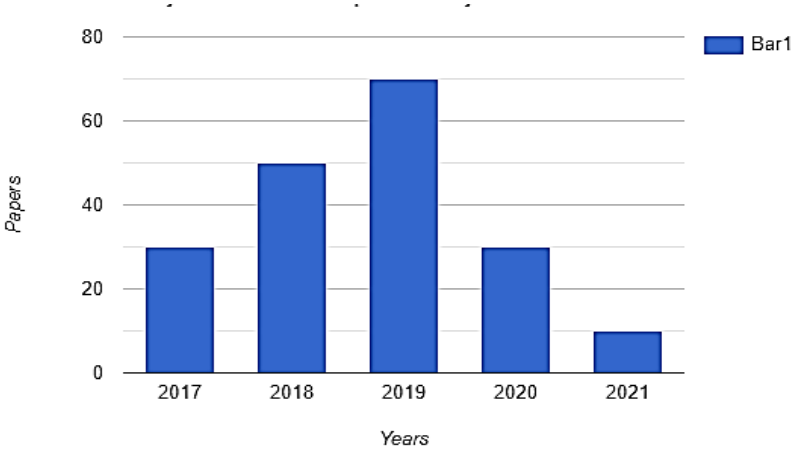
Mrs. Rashmi Dharwadkar et al.[2018]

The author created this approach to provide customers with information on how to consult about their health difficulties in an expedient manner. The user may utilise the chatbot to ask any health-related question. The bot assists customers in resolving issues by employing LUIS and cognitive services on an AWS public cloud to provide human-like interactions. The method allows the patient to submit a question to the chatbot, which then responds with relevant answers and displays them on an Android app. The main goal of the system is to provide a web-based platform for analysing client attitudes. It aids in the recognition of text contents and employs Software as Service (SaaS) to aid in message analysis.It aids in text recognition and employs Software as a Service (SaaS), which aids in the analysis of each application server's message. The system responds to the user's questions, and it recommends drug and dosage information depending on the user's age. On the basis of medicine names, the user can also inquire for medicine-related details. Based on the symptoms supplied, the Support Vector Machine (SVM) method is utilised to forecast the illness. The chatbot API delivers a question to a chatbot, which receives related replies and analyses them before displaying the results on an Android application. Support Vector Machine (SVM), a learning technique for classification, is the algorithm used in the system and it is a classification learning approach that tries to find the best distinguishing hyperplane that minimises the error for unseen patterns. SVM is also capable of handling more complicated classification jobs. This approach has the advantage of improving customer service and providing help and more information.[16]

S.N.	Authors	Problem discussed and solved	Method/ Algorithm/ Tools Used	Results	Highest Accuracy of Algorithm
1	Naeun Lee et al. [2017]	To implement word segmentation (tokenization)	Using NLTK package which involves inbuilt tokenizer	Easy to implement, as does not require any coding. Faster and more accurate	99.99%
2	Liner Yang et al. [2018]	To implement POS Tagging	Using neural network algorithm	As the algorithm works in layers, it provides high accuracy, but is not time efficient.	99.7%
3	LinHua Gao et al. [2018]	Synonym detection and extraction	Dictionary method	Traditional method. Requires to maintain a dictionary of synonyms wordwise. Provides less accuracy then self-training models.	97.99%
4	Sachin S. Gavankar et al. [2017]	Implementing disease predictions	Eager decision tree.	The dynamic nature of the tree makes it more efficient. Provides high rate of accuracy due to the updating mechanism pre- sent in it	94.5%
5	Connor Shorten et al. [2021]	To Implement Deep learning for covid research	NLP, Computer Vision	Interpretability, Generalization Metrics, Learning from Limited Labeled Data, and Data Privacy	100%
6	Kevin MUGOYE et al. [2019]	Designing an intelligent chatbot system for maternal health information and advice	MAS, RL	explains projected behaviour, and RL (Strengthening Learning), makes learning simpler, are both contained inside the conversation manager. To educate the bot, we utilised RL	98.56%
7	Dipesh Kadariya et al. [2019]	Designing a knowledge-enabled chatbot for Asthama patient	Dialogflow Google Text-T0 Speech (TTS) API	The client-server architecture used by kBot is based on a lightweight frontend chat interface and dialogflow makes it simple to detect asthma-related items	99.49%
8	Dr,Paul Raj et al. [2019]	Designing a medical chatbot application using machine learning Before the patient contacts a doctor, the programme is used to diagnose the ailment and present a list of likely disorders.	Multinomial Naïve Bayes, NLTK	Easy Implementation	98.79%
9	Belfin R V et al. [2019]	Designing a graph based chatbot for Cancer patient	NLTK, Beautiful Soup Python library for(Web Scrapping)	produces a graph using the Neo4j database after implementing all of the stages in the data. Data is kept as edges and nodes in this graph, which effectively link and establish the relationship between diverse data	99.89%
10	Prof.Dr.Rajashekarappa et al.[2019]	chatbot that acts as a virtual medical assistant	Natural Language Understanding (NLU), Natural Language Processing (NLP), and the Multinomial Naive Bayes method	simple and easy to implement	99.8%
11	Ali Bou Nassif et al. [2019]	Graph Based Chatbot for Cancer Patients	Using NLTK	Provides above average accuracy at minimum complexity.	99.9%

12	Dhebys Suryani Hormansyah et al. [2018]	N-gram Accuracy Analysis in the Method of Chatbot Response	Natural Language Processing	Less costly than employing human staff, provides quicker customer service response times and is easy to implement	99.99%
13	Shafquat Hussain et al.[2018]	Emotional Response Generation	Natural Language Processing and Gated Recurrent Unit	GRU improve the memory capacity of a recurrent neural network as well as provide the ease of training a model.	99.98%
14	Divya S et al. [2018]	Speech Recognition	Deep Neural Networks	As the algorithm works in layers, it provides high accuracy, but is not time efficient.	97.35%
15	Mrs. Rashmi Dharwadkar et al. [2018]	Covid-19: Deep Learning Application	Deep Learning	Less costly than employing human staff, provides quicker customer service response times and is easy to implement	99.78%
16	Nudtaporn Rosruen et al.[2018]	Recognize emotions classification using AI methods	Recurrent neural network (RNN), deep learning, and convolutional neural network(CNN)	As the algorithm works in layers, it provides high accuracy, but is not time efficient.	98.56%

5.1 SURVEY ANALYSIS



Graph 1: Analysis on the basis of publication year

This study includes the survey on the research papers between the year 2017 to 2021. As per the survey, three papers are from 2017, five papers from 2018, six research papers i.e highest number of papers are from 2019, two are from 2020 and least number of papers i.e only one is from 2021.

From the below pie chart , it can be noticed that maximum chatbots are for general health purpose i.e almost 47%, followed by 26.7% chatbots are for maternity purpose, and remaining two are for cancer and asthma which is 20% and 6.7% respectively.

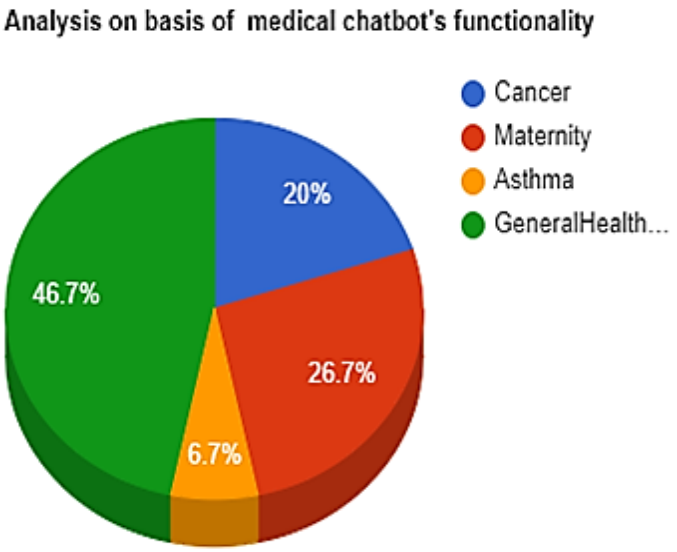
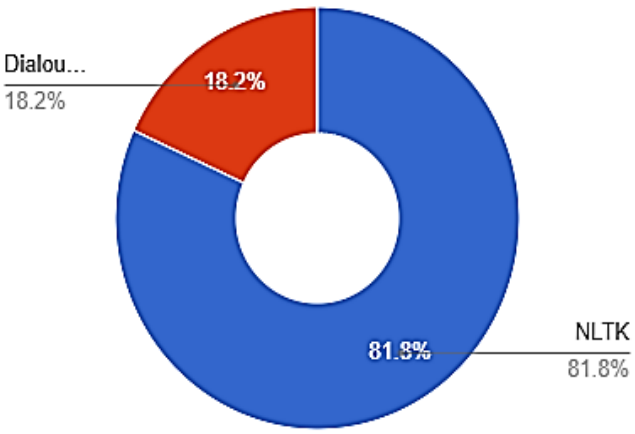


Fig 1: Analysis on basis of medical chatbot's functionality



From the above pie chart, it can be noticed that 81% research papers have used only NLTK toolkit, while only 18% have used dialougeflow toolkit.

Fig 3: Analysis on the basis of Algorithm

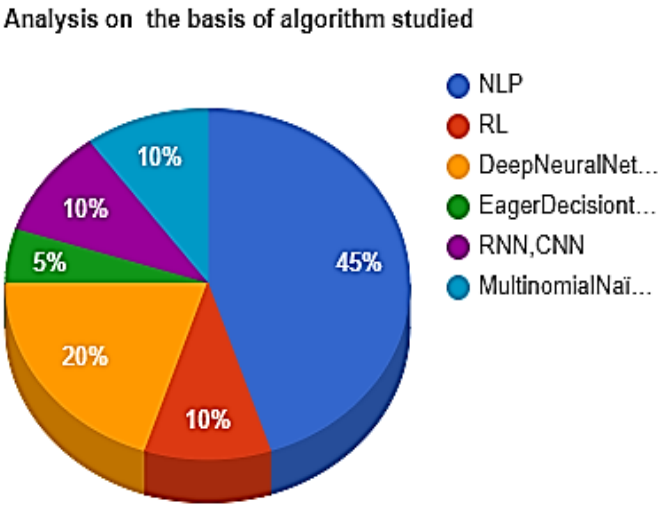


Fig 2: Analysis on the basis of toolkit used

The above pie chart shows the implementation of different algorithms in different research papers Natural Langaugage Processing, Deep Learning, Multinomial Naïve Byae , Eager decision tree, Gated Recurrent Unit, CNN were the most algorithm according to the survey

The pie chart shows the use of algorithim that have been implemented in the studied research papers.As per the survey, NLP is the most used ML algorithm for chatbot.

6. Research Gaps

Chatbots used for customer service in the telecom and marketing industries are scripted chatbots. They assist consumers with predetermined customer service queries.

Traditional monotone chatbots are being studied in order to make them talkative, responsive, and capable of communicating in natural (conversational) language. This necessitates the use of NLP and machine learning algorithms in the system. There are various parameter and scoop of improvement. Such as the domain of the chatbot, the capabilities it seeks to provide, the communication language, the end user, and so on all influence the technique used. Future work can be enhanced by understanding these parameters.

Also for any chatbot to be more easy to use and userfriendly It should be multilingual and for that understanding of the langauge for chatbot must be good so the correct use of NLU algorithm is biggest concern for our proposed system which will be multilingual medical chatbot (Medibot).

7. Conclusion

This study examines the tasks involved in NLU and ML in order to incorporate them into chatbot systems and make them smart. The review of 19 research publications is included in this study. This suggests that there will be a lot more research papers produced in this field in the future. It has been discovered that there are several methods for implementing all of the tasks required in NLU and ML. The proper algorithm to choose is determined by the chatbot's functionality as well as the domain in which the services will be given. In addition, while choosing an algorithm, the data format is critical..

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