



Check-it-Chatbot.

(for Covid-19 and SARS)

by

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Dissertation submitted in partial fulfilment of the requirements for the degree of

M.Sc. in Information Systems with Computing

at

Dublin Business School

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Date : 11-January-2021

Acknowledgement

I would like to take this opportunity to thank and express my deep-hearted gratitude to my project supervisor **Mr Obinna Izima**, who has guided me at every step of this project course with his valuable time, suggestions, sharing his vast knowledge and being friendly at every step by correcting me wherever mistakes were made, being calm, patient and keeping faith with me as well as motivating me.

Abstract

Recently, the use of chatbots has progressed exponentially in diverse areas, including marketing, help networks, schooling, cultural heritage, entertainment and many more. One of the major and substantial aspects of this paper in which the chatbot eases the lives of people is healthcare. Chatbot and health have a history of working well together. The Check-it-chatbot can assist individuals with COVID-19 and SARS as well as many common disease-related queries. As well as help individuals select a language according to their choice (English, Hindi, French, Japanese, Chinese). Query received from users is analyzed and checked in the database for appropriate result and then result then displayed back to the user. There are three levels of Databases inside the Check-it-chat .JSON files as the primary database .TXT files as secondary and Wolframalpha as the third level database. The purpose of the research is to establish an atmosphere where reliable and suitable information and data can be shared between users and the system. It creates a good human-like conversational environment for interaction between the user and the system.

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List Of Abbreviations.

API	Application Programming Interface
AI	Artificial Intelligence
AIML	Artificial Intelligence Markup Language
ALICE	Artificial Linguistic Internet Computer Entity
CDC	Centers for Disease Control and Prevention
CAPTCHA	Completely Automated Public Turing test
CSR	Corporate social responsibility
DB	Database
XML	extensible markup language
FAQ	frequently asked questions
IFCN	International Fact-Checking Network
JSON	JavaScript Object Notation
MIT	Massachusetts Institute of Technology
NLP	Neuro Linguistic Programming Computing
PC	Personal Computer
PY	Python File
Q&A	Question and answer
SCI-FI	Science fiction
SARS	Severe Acute Respiratory Syndrome
SQL	Structured Query Language
TXT	Text File

UI	User Interface
WHO	World Health Organization
YML	Yaml Ain't Markup Language

Chapter 1: Introduction

Technology has seen drastic advancement and an increase in firms moving from retrograde customer support to computerized execution and dealing with customer queries. Providing assistance through technology has become a trend in organizations with the help of Artificial intelligence approach on their computerized tenets. Chatbot is one of the key approaches that is being used widely in AI(Frankenfield, n.d.).

Human-like interaction is now possible with robotized chatbot which will be light on budget while interacting with users. Availability is one of the key advantages when working with chatbot, users from around the world can access chatbot regardless of time and place they belong from. The implementation of chatbot eliminates the cost of human requirement to perform these tasks, that will help the organization to operate in less budget (A. Følstad and P. B. Brandtzaeg, n.d.). This character of chatbot makes organizations engage with tons of users without having to worry about monetary assets to keep resources working all the time. The strangeness of the chatbots claims that various individuals are changing their busy work and life plans. However, they also have important implications in industry, where they could smooth out processes and improve productivity. Chatbots have a long path to discover before they understand their maximum capacity. All things considered, with billions of dollars of yearly speculation and critical human resources focused on their turn of events, chatbots will at last create huge future incentive in both corporate and purchaser settings. (Newman, n.d.)

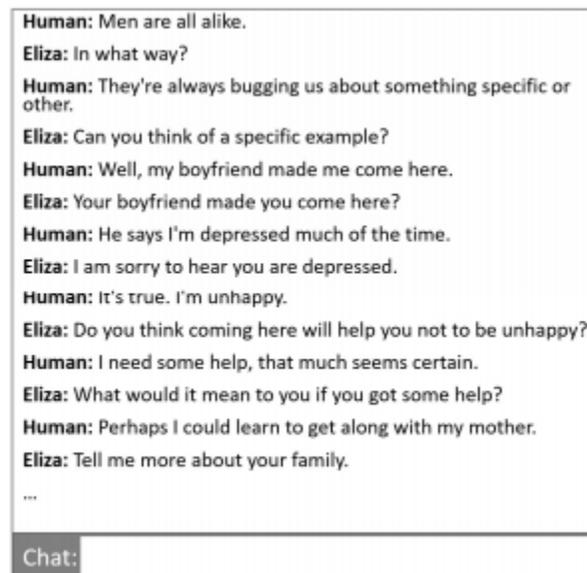
Chatbots use a circle called deep learning, a kind of AI in which a neural association will unravel conversation, knowledge, and unmistakable models and present data through the layers of the

association. The next layer extends to the first layer, etc., for more detailed effects, each time the Artificial Intelligence is faced with a comparative query or problem. (Newman, n.d.)

One keyframe which is considered as the backbone of chatbot technology is AI. AI plays a crucial role in chatbot creation and it helps push the limits of chatbot a little higher every time. A formal meaning of AI is The hypothesis and advancement of computer frameworks ready to perform assignments regularly requiring human intelligence, for example, visual perception, voice or speech recognition, dynamic actions or decision making, and interpretation between languages (Ahmed and Singh, 2015; Bhagwat, 2018).

1.1 Chatbot Origin.

The first-ever chatbot was introduced by MIT in 1966 and they called it 'ELIZA' (Weizenbaum, 1966). ELIZA, the mother of all chatbots, answered some very simple decision tree questions. To offprint conversational format it uses pattern matching and methodology like substitution, this was designed by 'Joseph Weizenbaum'. ELIZA was an NLP-based PC program that offered an experimentation pattern for 21st century Computer researchers and scientists to build appropriate advanced chatbots. In order to verify the functionalities of chatbot 'Turing Test' was used. Tests were based on conversational capabilities against a panel of human judges. Turing test knew no boundaries of testing which made the test rock solid (Warwick and Shah, 2016; "What is Turing Test?,").



Human: Men are all alike.
Eliza: In what way?
Human: They're always bugging us about something specific or other.
Eliza: Can you think of a specific example?
Human: Well, my boyfriend made me come here.
Eliza: Your boyfriend made you come here?
Human: He says I'm depressed much of the time.
Eliza: I am sorry to hear you are depressed.
Human: It's true. I'm unhappy.
Eliza: Do you think coming here will help you not to be unhappy?
Human: I need some help, that much seems certain.
Eliza: What would it mean to you if you got some help?
Human: Perhaps I could learn to get along with my mother.
Eliza: Tell me more about your family.
...
Chat:

Figure 1 A conversation between Eliza and a human (Weizenbaum, 1966)

Next in the game was 'PARRY'. American psychiatrist Kenneth Colby is the person behind the creation of PARRY in 1975 (Colby, 1975). The purpose of PARRY was to imitate a patient with schizophrenia. Complicated assumptions, different attributions are behind PARRY's

system operations and emotional responses are tuned to match the frequency of input. PARRY has to go through the Turing test to get validated. PARRY had better controlled-architecture than ELIZA and had the potential to process a language. PARRY works with a thinking model which could easily recreate emotions of a bot After PARRY came JABBERWACKY, Developer Rollo Carpenter is the reason behind PARRY's creation(Colby, 1975). This system focused more on impersonating natural human conversation with a twist to make it more entertaining. JABBERWACKY has a major role in growing technology. From the time it's been created it has been used in many academic research from its webpage. An AI technique known as 'contextual pattern matching' is used by this system .

Next and one of the most important chatbot technologies was ALICE. It was introduced by Richard Wallace in the year 1995. ALICE which means Artificial Linguistic Internet Computer Entity is a chatbot which is recognized as a universal language processing system. To communicate or to converse it uses heuristic pattern matching algorithm. AIML helps in specifying conversation rules for ALICE, AIML is an XML schema and it covers most of the protocols and responses. Later this program was modified in java in the year 1998 and three years later, in 2001 Wallace marked AIML specification. Since then many developers engaged in working with/on ALICE drafting open-source versions in different programming languages supporting many foreign languages. This made simulation possible of a real person on the internet.

	ELIZA	PARRY	ALICE
Time	1966	1972	1995
Scalability	None	None	Scripts can be customized
Key features	Mimicking human behavior in conversations	Generates emotional (angry) responses	Easy customization of scripts (via AIML)
Accomplishment	First chitchat bot	Passed Turing Test	Won three times of Loebner Prize
Modality	Text only	Text only	Text only
Modeling	Rule-based	Rule-based	Rule-based
domain	Constrained domain	Constrained domain	Constrained domain
Key technical breakthrough	Use of scripts, keyword-based pattern matching, rule-based response	Add personality characteristics into responses.	Use AIML and recursion for pattern matching; Multiple patterns can be mapped into same response.
Key technical limitation	Limited domain of knowledge	Limited domain of knowledge	Size of script can be huge

Figure 2 Summary of initial conversational systems.

Then comes the era of voice command chatbots, some of the very popular applications from top tech firms are, Siri which was developed by Apple for iOS in 2010, ‘Google Now’ developed by Google in 2012, Cortana by Microsoft in 2014, Alexa developed by Amazon in 2014.

1.2 Problem Detailing.

One word which disturbed the whole human routine recently is CORONA also known as COVID-19. Covid is a novel coronavirus disease which was declared as ‘global pandemic’ by the World Health Organization on 11 March 2020. After the declaration, the governments of all countries started preparing for the worst with different precautions to prevent the spread of this

disease (WHO, n.d.). This disease created a huge impact on people's lives by affecting their health and also affecting the world economy. Centres for Disease Control and Prevention (CDC) came up with a preventive measure called social distancing to minimize the impact and to cut down the transmission of the virus (CDC, 2020a). This helped tackle many problems and ensured public safety throughout lockdown and at the same time, they had to suffer and face many problems in their daily life. One major problem is proper access to hospitals for health checkup (“WHO Health COVID-19 WhatsApp,” 2020). Due to covid being contagious many of the hospitals and doctors were reserved to check covid patients. It became hard for patients to contact doctors for health checks. So to overcome the communication bridge, CDC also suggested using Chatbots as they were safe with communicable disease (CDC, 2020b).

Another disease covered in this research is SARS, Severe acute respiratory syndrome (SARS) is a modern infectious disease that has posed an unprecedented danger to international health in the 21st century. The SARS-causing virus is known as SARS-CoV, while the COVID-19-causing virus is known as SARS-CoV-2. First outbreaks of SARS in Hong Kong, Singapore, Vietnam, Taiwan, Canada, and other nations occurred in February and March 2003. As the symptoms for COVID and SARS are almost similar. The virus which was causing SARS and COVID is also same, which is known as coronavirus. Reason behind selecting this virus is that it belongs to the same family as COVID-19.(Hsu et al., 2003)

Chatbots can be accessed anytime and from anywhere allowing the users to get answers round the clock and unlike humans, chatbots can handle many users at once, N number of people

can access the chatbot at the same time without even having any delay in responses. Chatbots help with quick responses and with relevant answers.

1.3 Research Roadmap.

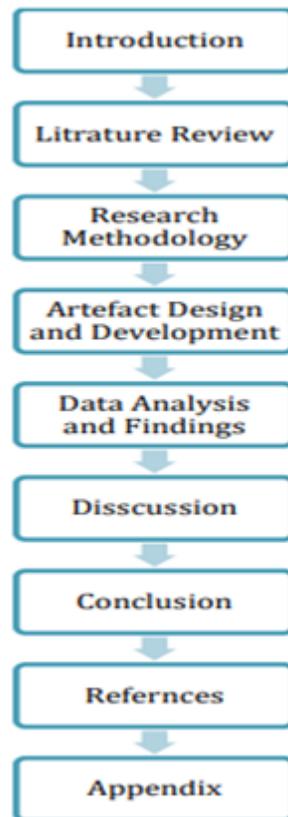


Figure 3 Research RoadMap.

1.4 Research Scope.

This research aims to construct a chatbot which will help people analyze their health symptoms. This chatbot can also be used to get general knowledge about the COVID and SARS and even other small diseases. The chatbot supports major known languages and will be user

friendly to use and which will help the use of the chatbot in large scale reaching out to wide places. The voice-to-text feature is being implemented in this project to make it more handy. Python programming language is used to develop this project. The interaction with chatbot will be of a conversational format, where the conversed data is stored for later use. SQLite and JSON files are used to store the data. To make the result more precise and to make sure the user gets the most out of chatbot 'Google search' is integrated. Google search integration will improve the user experience.

1.5 Research Contributions.

This chatbot archetype is progressed to help users gain knowledge on different diseases and it can be used to check and analyze personal health. This chatbot is built with major global language support, languages like English, Hindi, Chinese, Japanese and French which will help users understand most of the information faultlessly.

Users will interact with chatbot in terms of question and answers, a set of questions will be preloaded for users to proceed with. Users have to start with inserting appropriate numbers of the option they want to proceed with. For creating a huge and strong knowledge base JSON is being used in the system. For interacting and understanding, the system uses an API called chatterbot which also helps in giving relevant responses to the user. Different adapters from chatterbot API are used to select a response such as logic adapters and storage adapters. Google Search option is being implemented in this project. For queries which have no response from the knowledge base, the chatbot will then go to the internet for relevant responses. The response is generated from

encapsulating the top 3 search results and showing it on the chat window. This will keep the user engaged with the chatbot all the files containing data are stored in SQLite Server.

Chapter 2: Literature Review

2.1 Chatbot implementation.

The most important step while implementing a chatbot is to select a meaningful and relevant NLP engine. Depending on the type of interaction with chatbot for example through voice, then we need to implement voice recognition engines or dependencies. For big-scale organizations, they need to take care of many aspects while implementing a chatbot, whether they need a structured implementation or an unstructured one. Every day we associate with many applications such as maps, customer support of a bank and many more. To achieve the functionality of every application which we've mentioned above, requires a conversational user interface which carries connection and dialogue flow between two bodies i.e user and chatbot application. At the start of the chatbot execution, there has been a rapid growth in the use of the most current mechanical standards, retaining libraries assisted by AI procedures, NLP advances, Deep learning approaches for upgrading chatbot implementations. A beginners chatbot application contains a simple 'Hi', 'Hello' characteristics with few preloaded fixed responses. Advanced chatbot applications are used to keep a good reputation and satisfaction with users, like query-specific sessions in online banking, transaction management, orders management, money return policy and cancellation process while dealing with an online order etc. are designed for user-specific queries (Ahmed and Singh, 2015). For a prevalent and advanced level query processing, advanced features are used such as machine learning and its approach, dataset trainer components, logical adaptors, intelligent execution engines and prediction processes.

2.2 Types of chatbot.

As chatbot is relatively a latest booming automation, there is still wrangling on the number of possible chatbot stratifications. Below discussed are some of the latest and important types of chatbots which will give us vast knowledge about chatbots capabilities and what one can achieve implementing them(Arya, 2019). In structured applications most of the functions are scripted, one can plan and write code in the same manner and make the chatbot work as per the script. One drawback using structured is we are restricting/limiting the kind of conversation of a user with the chatbot. In some business environments, structured chatbots are programmed to respond to users frequently asked questions or it is programmed to perform actions where a repetitive action call is required.

2.2.1 Chatbots that learn.

Chatbots can't always totally replace human humans, however smart they may be. A chatbot might look at the problem it is being questioned, rate it on the basis of its ability to respond, and afterwards assign a human assistant to more controversial problems. Deep learning chatbots are chatbots that can improve and grow stronger over time. The technology here isn't as complex as you would imagine, even though it seems fairly sci-fi at first glance. What is specific about machine learning-driven chatbots is that they can understand a natural voice. In relation to understanding a set of predefined instructions. Machine-intelligent chatbots will answer questions and commands the way real humans express them, unlike their programmed counterparts (which we will discuss in just a bit). If you are trying to deliver a human-like experience, this is beneficial (Kumar Shridhar, ; SteelKiwi).

SIMPLE RULE-BASED FLOW

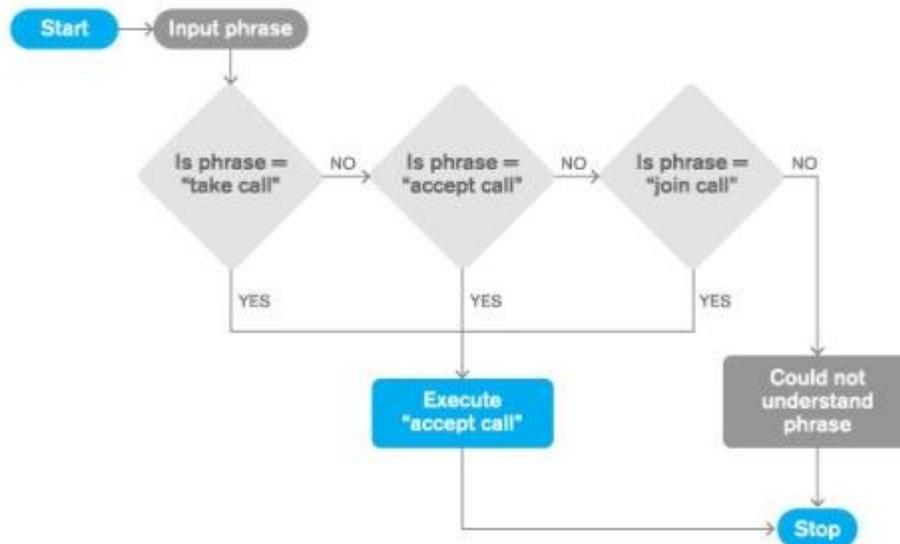


Figure 4 Rule based chatbot design.

2.2.2 Chatbots that do not learn.

Scripted chatbots are quite the go-to solution for a company. They have experience in listening to orders and addressing phrased questions directly. There is quite a series of questions for a programmed chatbot to answer with an appropriate set of answers. This implies that each contact will only follow the progress of the courses determined. It's also the case where clients don't insert something, rather than pick anything out of the specifics and instructions the bot understands. (Kumar Shridhar, A breakdown of different approaches.).

2.2.3 Linguistic Based (Rule-Based Chatbots)

Linguistics, also known by the name of ‘Rules-Based’, gives the edge and flexibility which was lacking in machine learning chatbot. It is achievable to exercise in advance for what the right answer can be and then build automated tests to quantify the quality, consistency and flow. if/then logic is used in rule-based chatbot which helps in building conversational flow(A. Følstad and P. B. Brandtzaeg, n.d.). Conditions on language are built to scan the words, order of the words, meanings, synonyms, phrase format, to make sure that the input questions which make the same meaning are getting the same output. It will be easy for a human to fine-tune some situations if anything goes wrong. One of the drawbacks in using and developing a linguistic chatbot is that they can be rigid and slow while building as they need a huge amount of human resources. Interaction with these types of chatbot is quite simple and well-structured though they use Natural Language Processing. Operations like responding to FAQ’s can be achieved easily through these types of chatbot as their capabilities are basic. Knowingly or unknowingly, we have encountered with Linguistic Based chatbot - either on an e-commerce website, social media or a live chat application. ELIZA is a rule-based chatbot (L. Vaira, et al., n.d.).

2.2.4 AI-Powered.

Compared to rule-based, AI-powered chatbots are more complex, more predictive, data-driven and are more communicational. Task-oriented chatbots are less efficient than these types of chatbot in terms of instructiveness, personalization and in terms of experience(D. Power et al., n.d.). As the time goes and the usage increases the chatbot collects the data and becomes more conscious and grips on understanding natural language and starts applying predictive intelligence

for a personalized user experience. Systems which are conversational and are based on machine learning are impressive when the problem is well understood and are matched to their capabilities(A. M. Rahman, A. Al Mamun, and A. Islam, 2017). The character of this chatbot is it gains knowledge from its past experience. To work even at the underdeveloped stage, these systems need a huge amount of training data and fully qualified human executives. On top of this, a chatbot with machine learning works as a black box. When things go wrong in this model, it is hard to alter, to optimize and improve. The assets needed, got together with the tight extent of circumstances in which quantifiable figurines are truly exceptional, makes basically AI-based chatbots a strange choice for certain endeavors (A. Argal and S. Gupta, A. Modi, P. Pandey, S. Shim, and C. Choo, 2018).

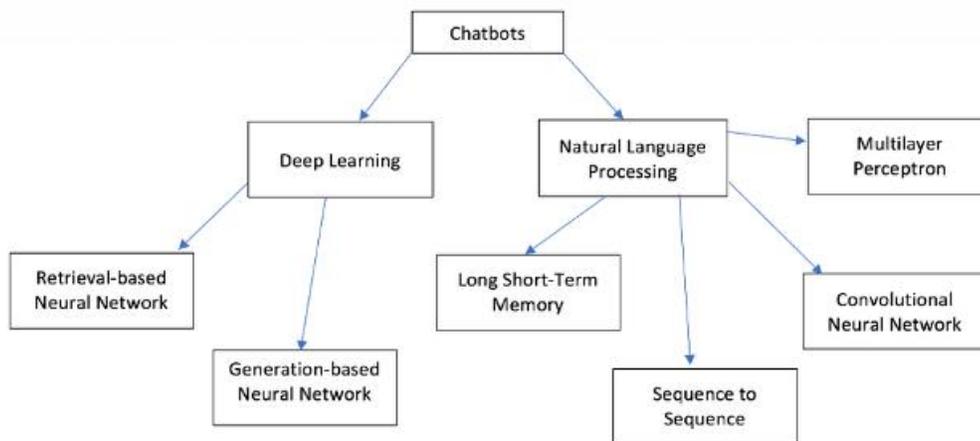


Figure 5 AI powered chatbot.

Artificial Intelligence is based on how any device perceives its environment and takes actions based on the perceived data to achieve the result successfully. It is the study of intelligent agents. The term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem-solving. Artificial Intelligence gives the supreme power to mimic the human way of thinking and behaving to a computer. A chatbot is a PC program that performs a conversation through audible or textual

techniques (additionally alluded to as a Chatbot, chatterbot, Bot, IM bot, intelligent e specialist, or Artificial Conversational Entity). These programs are designed to provide a clone of how a human will chat and thereby it acts as a conversational partner rather than humans. For various practical purposes like customer service or information acquisition, chatbot is being used in the dialogue system(SteelKiwi, n.d.). Mostly chatbots uses natural language processing for interpreting the user input and generating the corresponding response but certain simpler systems searches for the keyword within the text and then provides a reply based on the matching keywords or certain pattern(A. Følstad and P. B. Brandtzaeg, n.d.). Today, chatbots are part of virtual assistants such as Google Assistant, and are accessed via many organizations' apps, websites, and on instant messaging platforms. Non-assistant applications include chatbots used for entertainment purposes, for research, and social bots which promote a particular product, candidate, or issue (J. E. van Engelen and H. H. Hoos, n.d.).

2.2.5 Hybrid Model — The Ultimate Chatbot Experience

Hybrid model is the combination of both linguistic and machine learning which are best in both of their worlds and offers complex conversational AI chatbot results. Hybrid chatbots has more supremacy than both the alternatives. When compared with machine learning methods, Hybrid model processes a conversational system even without data, offers transparency on system operations, enables organizations to understand the application, and also enables a constant quality is being delivered as per the organization standards (Pavel Surmenok, n.d.).

At the same time, AI combinations are taken into account in order to go beyond the domain of linguistic laws to make smart and nuanced inferences in places where it is difficult or even impossible to construct a linguistic approach alone. This allows mathematical algorithms to be integrated alongside linguistic conditioning while a hybrid solution is delivered at a native level, retaining them in the same visual interface. It is challenging, asset-escalated and as much as possible restrictively expensive to design conversational structures using only linguistic or AI techniques. Ventures have the strength, adaptability and speed required to build business-significant AI solutions by implementing a hybrid approach that can have some sort of effects on the consumer interface and the key concern (Ganguly et al., 2015).

2.3 Chatbot in Business perspective.

Chatbots lead many organizations in many perspectives, whether guiding users or learning from users and using the data to give the results back to users, from bank transactions to healthcare support. Contingent upon what task you need a chatbot to finish, you'll find various outcomes. In

any event, there are a few broad benefits that a chatbot can offer to any organization paying minimal attention to its critical core concern (Margaret Rouse, n.d.).

2.3.1 E-commerce and online marketing.

The web-based business sector has benefited from chatbot innovation in various ways. The opportunity to discuss directly with consumers is essential at the stage where you are likely to sell goods and administrations .

- Email Alternatives — Instead of making hundreds out of chilly emails, you can effectively make a chatbot talk to your clients.
- Managing sales filters — Bots will find out which customers have a place to deal with channels through chat. It allows the organization to select the right ways to deal with the conversion.
- Implementing interactivity — Bots owe the goods as well as administrators you provide a portion of cooperation. This will make consumers feel almost like individuals certainly appreciate your determination, people are more willing to buy products that they have only seen and enjoyed.
- Personal level customer relationship building — Adding any characters to chatbots is imaginable. This will turn the way you express to them into a real, literally human communication, probably allowing consumers to place the most of one's profile.
- Solving abandoned cart — Users apply things to the bag and then sometimes never end up buying them. Marketers will submit reminders preceding to chatbots to remind consumers regarding their bag, but since chatbot implementation was launched, the loop has shifted. At

the moment, it is enough for a bot to deliver a "Hey, your basket is waiting strong for ya!" alert to the customers as a friendly update (Bhagwat, 2018).

2.3.2 Travel, hospitality, and tourism.

For the travel, hospitality and tourism markets, chatbots will do a great deal. They have 24/7 data connectivity, allowing clients to reserve journeys and stay quickly while on the go. And it is feasible for companies to use chatbots, too! Customers should not have to answer calls and say the same points again and again and again; consumers can only send a chatbot with their specifications (Bhargava, 2007).

- Engage audiences — Once a chatbot is asked about something by users, it will interpret what they have written to create customized content. For example, when applying for a plane ticket to Los Angeles, users can obtain room availability details at partner hotels, hear about the best restaurants nearby, and so on. Customers are expected to continue coming to the chatbot time and time again with the potential to discover too many useful items at once.
- Anticipate user needs — After knowing enough about a potential client, based on their past inquiries, an intelligent chatbot will provide services. If a user has been traveling for a year to Chicago once a month, the bot will send them room availability details a few days in advance of their normal travel date.
- Give nearby location recommendations — Tell the bots about your accommodation as well as airport's restaurants and shops, and users would be really happy to inquire where to have breakfast or snacks. For airlines, users might inquire about amenities and timings.

- Offer automated services — Without needing to contact someone a bot inside a hotel might let users order meals or room service.
- 24/7 customer service — A customer support chatbot will address them if users have a question or complaint about a hotel or transportation. A consumer should easily be routed to a real person if the technology is unable to present relevant information.

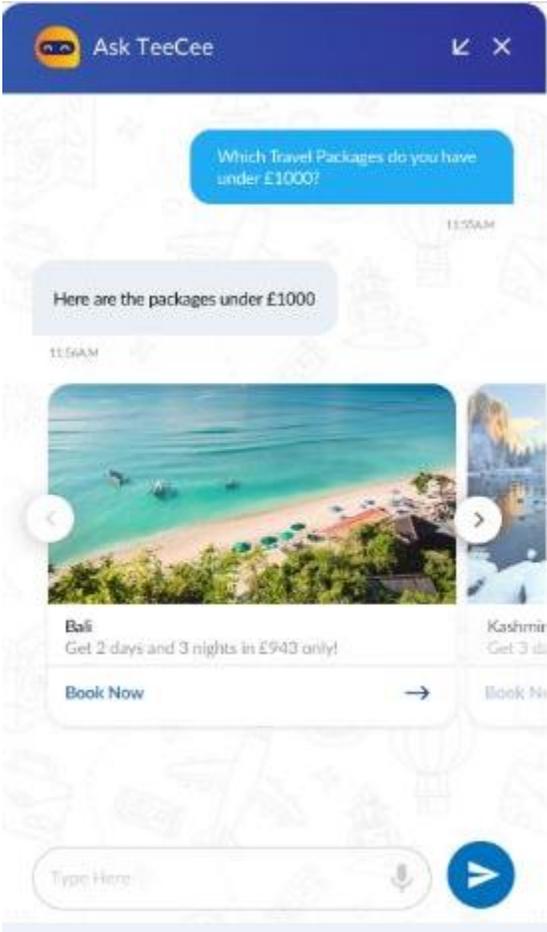


Figure 6 Thomas Cook travel assistance named Teecee.

(Bhargava, 2007; Brandtzaeg and Følstad, 2017; “The Best Examples of AI Chatbots Being Used by Businesses in 2020,” n.d.; Ukpabi et al., 2019)

2.3.3 Healthcare.

None replaces a true specialist when it comes to healthcare. However, there are several times where by encouraging safe living and helping patients find out a variety of crucial issues, chatbot technology may be a true lifesaver. Chatbots will organize clients during a disaster, take them to CPR bit by bit or reveal how to assist someone with diabetes and perform a few different activities. (Mathew et al., 2019).

- Support self-care and self-monitoring — In reality, these type of chatbot does not have to answer questions and share information. It would allow patients to track their exercise and well-being. For example, a patient might collect data of their health (heart health, weight, heartbeat, blood glucose levels, etc.), send them to a chatbot, and then have their data comprehensively evaluated with time. The chatbot may express interest and try to make a medical visit if any calculation is far apart. It can also be great for chatbots to set reminders to take medicine, add health records, workout, stay hydrated, and so on. (Kamita et al., 2019)
- Offer reliable medical information — Googling imaginative symptoms of sickness is turning out to be a joke. In addition, in the case that a chatbot is detected with a set of accurate health records, it could be possible to provide specific clinical exhortation to patients and to include alternatives to their diseases. Get important information from new patients—Do you remember the lengthy survey questions you have to fill out if you come to the office of a new doctor? For a chatbot that could order, log, and then review significant patient information, addressing these questions would be several times easier (J. E. van Engelen and H. H. Hoos, n.d.).

(A. Argal and S. Gupta, A. Modi, P. Pandey, S. Shim, and C. Choo, 2018; Bulla et al., 2020; Kamita et al., 2019; Madhu et al., 2017; Mathew et al., 2019; SteelKiwi, n.d.)

2.3.3 Banking and finance.

A significant number of international banks American Express, PayPal, Bank of America, Mastercard, Visa among others like have already combined chatbots with their services. Any of their financial assistants, such as Eno, Hi Charlie, or Trim, may have been used by you. Among the characteristics that financial facilities with chatbots could introduce are:

- Account alerts and notifications — Whenever suspicious behavior arises on your account to decide if it is you, a chatbot will let you know. It could even remind you of costs, forthcoming payments, and so forth.
- Tips and suggestions on financial management — A chatbot will assist consumers to find the right ways to set aside cash in terms of their previous consumption.. It might, for example, track services and instead point those out they don't need anymore so that they might avoid having to pay for them.
- Customer service — Chatbots will reply the pressing queries of clients all around the clock, still being polite and insightful regardless of whether they are asking or what asked.
- Help with enterprise resource management — Chatbots may also help simplify integrated accounting tasks that are routine.

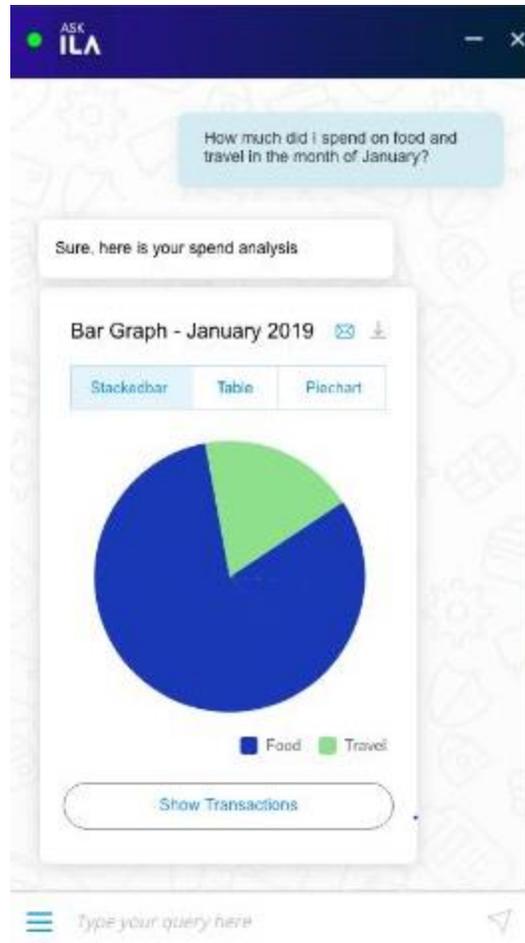


Figure 7 SBI card ILA banking chatbot.

(“Business Application of ChatBots. Chatbots are one of the new... | by Ong Kai Kiat | Chatbots Magazine,” n.d.; Kiat, 2017; Newman, n.d.; SteelKiwi, n.d.)

2.3.4 Customer service.

We move to customer care, last but not least, the field that chatbots have actually done the much more good. Finding a digital assistant who can answer client questions in as much depth as possible is just too easy. Customer support based on Chatbot can be extended to any sector, accomplishing two major tasks:

- Automating FAQs— That is also the case as shoppers continue to answer related questions, but the Q&A tab never has to be audited.. Even then, addressing typical questions is not an easy way for the workers to spend most of their time and it might be a much easier option to have a chatbot reply to them(Kiat, 2017).
- Differentiating between questions that can be answered by the chatbot and questions that should apply to a specific person — Chatbots can't always totally replace human humans, however smart they may be. A chatbot might look at the problem it is being questioned, rate it on the basis of its ability to respond, and afterwards assign a human assistant to more controversial problems (Warwick and Shah, 2016).

(Brandtzaeg and Følstad, 2017; Kiat, 2017; SteelKiwi, .; “The Best Examples of AI Chatbots Being Used by Businesses in 2020,” .)

2.4 Chatbot Testing (Turing Testing).

A Turing Test is a method for the implementation of man-made consciousness (AI) to assess if a machine is equipped to provide a point of view equivalent to a human being. The test is named after Alan Turing, the author of the Turing Test and an English Computer author, cryptanalyst, mathematician and hypothetical theorist.. Turing indicated that if it can imitate human responses under particular circumstances, It can be said that a computer has a man-made conscience. For the key Turing Test, three terminals are needed, one of which is really detached from the other two. A PC operates one terminal, while the other two are overseen by individuals. One of the individuals fills in as the observer during the examination, while the corresponding person and the PC go around as participants. Inside a defined component of expertise using a depicted relation and environment, the questioner addresses the respondents. The observer is then drawn closer after a pre-set duration or number of inquiries to discover which respondent was human and which was a Computer. The exam is regularly rehashed. The Machine is assumed to have computerized logic on the unlikely possibility that the examiner makes the correct assurance in part of the trials or less, in spite of the fact that the examiner regards it as "similarly as human" as the human respondent. (Satu et al., 2015)

2.4.1 Turing Test Limitations.

In reality, since the reach of the questioning has historically had to be limited in order for a computer to display human-like intelligence, the Turing Test has been criticized over the years. A machine could only rank high for several years if the questioner formulated the questions, so they had responses to "Yes" or "No" or pertained to a narrow area of information. When questions were open-ended and involved conversational responses, it was more questionable that the software could effectively mislead the examiner. Furthermore, a program, for example, ELIZA, could pass the Turing Test by manipulating images that it does not fully understand. John Searle argued that this is not regulated by intuition essentially similar to humans. (Weizenbaum, 1966; Colby, 1975, Shieber, 1994; Wallace 2009). To many experts, the question of whether a PC will breeze through a Turing Examination has become irrelevant. Instead of zeroing in on the best way to reassure someone they are talking to a person and not a PC application, the main emphasis should be on the most proficient approach to make a human-machine association more natural and efficient. By utilizing a conversational interface, for example.

2.4.2 Testing Alternatives.

The Turing Test has had a number of variations to render it more relevant. Examples of this kind include:

- Reverse Turing Test- Where a person attempts to tell a system that it's anything but a PC. A CAPTCHA is an example of this.
- Total Turing Test- Where visual skills can be checked by the interviewer as well as the ability to manipulate items (Warwick and Shah, 2016; "What is Turing Test?" n.d.).
- Minimum Intelligent Signal Test- True false questions have been asked.

2.5 Objective.

The main objective of the proposed system is to have the importance of health in life reach out to people and encourage people to follow measures to maintain health by making the chatbot available to all. Chatbot and health have a history of working well together. The chatbot can assist individuals with COVID-19 and SARS as well as many common disease-related knowledge as well as help individuals select a language according to their choice. When individuals are dealing with lots of COVID-19 and SARS inquiries and questions, searching for answers, they transform on whichever knowledge or services are available through the media, relatives and friends, or they attempt to get sufficient information from physicians. In order to receive accurate replies to COVID-19 as well as SARS questions people impose a burden on medical call centers and clinicians. The purpose of the analysis is to establish an atmosphere where reliable and suitable information and data can be obtained by the customer. It creates a good human-like conversational environment for interaction between the user and the system. In this system, the user talks about their health and it is a great way for the users to regulate the healthy lifestyle. An important aspect of this system is that talking with a non-human entity provides a sense of security especially when it comes to mental health as it remains as a confidential meeting with the diagnosis being available only to the user. This system is meant to help and deliver immediate actions where humans cannot reach due to timing or budget as it is readily available and free of cost. Using human help by using online tools, these devices can learn themselves and recover their expertise. Because information is stored in anticipation, this implementation is extremely fundamental. The system implementation uses the question and response protocol (Conversational) in the style of a chatbot in order to respond to user requests. This method is designed to reduce healthcare costs and time for patients, since it is not practical for users to automatically see doctors or experts as requested.

The solution to the question will be answered depending on the user's query and knowledge base. From the sentence, the related keywords are retrieved and introduced to those sentences. Answers are supplied or relevant answers are shown whether the resemblance is identified or significant. An expert view and answers the complicated questions and answers present in the database. Users should directly ask some questions about healthcare online, since the consumer would not spend much time contacting a doctor. The input sentence of the chat pattern is stored in a Dataset and Database. The input sentence from the user query will be synchronized with the information base by the chatbot. Each question is contrasted with the chatbot's database of information. From the given input sentence, the significant keywords are extracted, and the term similarity is found.

Chapter 3: Research methodology.

3.1 Introduction.

In the conceptualization of the scheme, the analysis approach for this artefact is the exchange between abstract concepts and techniques. The algorithms, databases and collections used are abstractions in this frame of reference. Whereas the approaches here apply to the roles of sensitive areas generated and in-depth analysis. To help achieve the right results, special repositories are used (Nwankwo, 2018). In identifying a direction to achieving the purpose of the dissertation, the research approach portion is important (Baghel and Bhuiyan, 2005). A method of study is a comprehensive and structured analysis of a topic that is aimed at addressing it. (2018, Bell, Bryman and Harley). According to Clifford Woody, analysis includes the definition and reclassification of problems, the organization, compilation and assessment of evidence, detailing the hypothesis or proposed solutions, making adjustments and drawing a conclusion. Study can then use the current information available to make a new or initial addition to its progression. The search for knowledge through objective and effective technologies to find an answer to a problem. Study is part of the quest for understanding by appropriate strategies and objectives to find a solution to a dilemma (Multani, n.d.). This master's thesis consists of a chatbot programmed to provide users with data on healthcare. For users finding the best suggestions for themselves the AI device functions like a virtual assistant. It serves as a replacement medical adviser. It is meant to make their work a bit simpler (Kamita et al., 2019; Madhu et al., 2017).

3.2 Research Philosophy.

Research study is a path in which we strive to increase our knowledge in an organized way by studying new information, ideas, strategies, technology, etc. The significance of analysis methods is of critical importance. Research theory is the first layer of the onion, according to Mark Saunders. The overlapping layers of the onion paradigm help to explain the architecture of the approach to analysis compared to a real onion. (Abrahimoğlu and Mert, 2016). The main layer of the onion of experimentation speaks to the concept of insight and information handling. Logical theory speculation reveals how the postulation is performed (Zheng and Zhou, 2011). The ideologies of discovery can differ essentially in the review destinations and in the most grounded approach to advancing those goals (Goddard and Melville, 2004) Both may not be properly equal, but the preference of scientific logic relies on the kind of evidence that is analyzed in the review project.. (From May, 2011). The understanding of the research philosophy being applied will also help to clarify the inferences relating to the methods used (Research Onion-Explanation of the Definition, 2018). User assessment is important in this research, since Customer appraisal is huge in this inquiry, because we are seeking to develop the UI in this review, we need to accumulate customer evaluation by customer checking and evaluation.

3.3 Research Approach.

The approach to research plays a vital role in providing input in the research process. The two main methods are the inductive method and the deductive method. The thesis can be comprehensively defined with the help of an analysis methodology. The researcher used an inductive approach in this study because evidence is evaluated and hypotheses are generated in the inductive approach, and pre-existing hypotheses are analyzed in deductive theory (2011 Olsen). The analysis technique can further be separated into two layers of strategies of inductive and deductive methodology. A deductive methodology heads in the direction of the theory as its

starting point. The inductive approach takes the study problem as the starting point and starts to narrow down the analysis focus. (Gabriel, 2013). Typically, inductive theories rely mainly on historically studied subjects in the same field and look at the whole idea from a different perspective (Gabriel, 2013). Therefore, we will use the inductive approach for the purposes of this analysis to explore the research issue.

3.4 Research Design.

The analysis topics were formulated in comprehensive form, so a test strategy will be required to be planned by the professor, i.e. testing would be carried out in the framework of the conceptual structure. The aim of the research design is to, with minimal effort, resources and time, collect similar data. A template of what the study would do in the report is included in the test design, i.e. by writing the experiment and its organizational consequences for the final outcomes examination. (In 2017, Leavy).

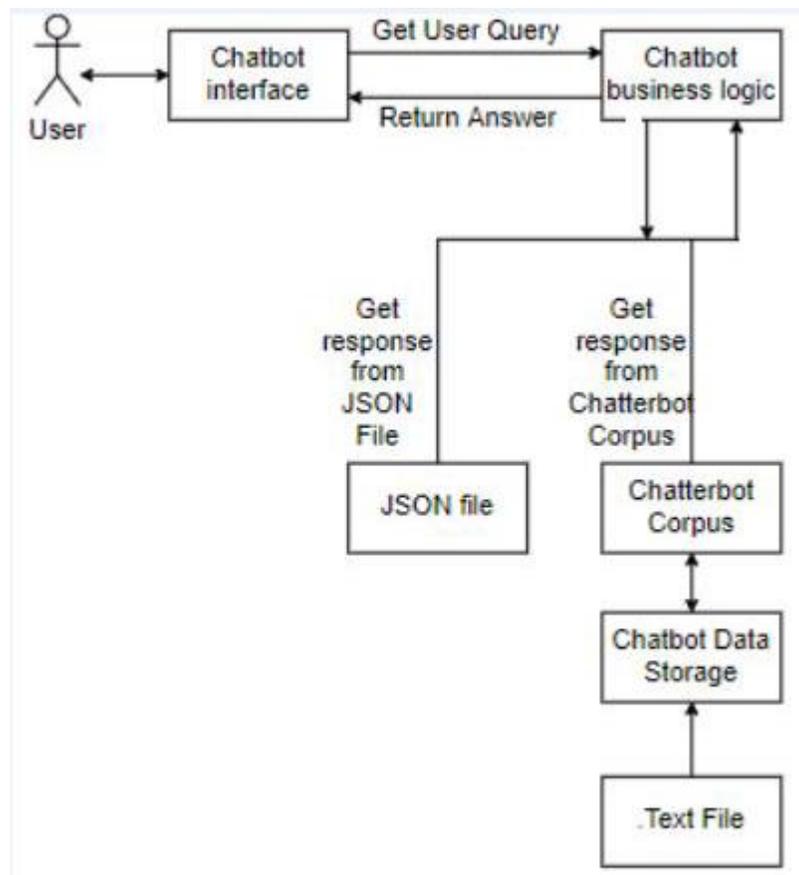


Figure 8 Research Block Diagram.

3.5 Research Method.

It is possible to approach research study in two different methods, i.e. qualitative method and quantitative method. As it involves the creation of data in a qualitative form that can be carefully applied to quantitative analysis, the prior approach has been hierarchical and stagnant. In this research, qualitative technology is used. Examination of beliefs, behaviors and impression is concerned with a qualitative approach. The techniques of centre collection interviews, projective approaches and in-depth interviews are used in the qualitative approach. (Oliver, 2010)

3.6 Sampling.

It is mandatory for the researcher to concentrate on the persons who possess hands-on experience with the laptop and smartphone knowledge to achieve proper data. For this study, people who are knowledgeable of the usage of phones and laptops are chosen after user testing to gain useful input. By doing such, the data collected will be more precise and suitable for the application (Saunders et al., 2019).

3.7 Data Collection Method.

With all the means at the discretion of the researcher, there are different ways to obtain the right data. Either by survey or by experiment, the key data may be obtained. For data analysis, qualitative methods are used in this study (Bell et al., 2018). The qualitative approach uses the interview process to collect data equivalent to study subjects where research-related problems are not known. Interviews provide the interviewer with the understanding of persons and proper direction and aid in the advancement of the study.

3.8 Data Collection Tool.

The investigator will be preparing questions for the interview to obtain evidence. The questionnaire consists of questions relevant to the researcher's subject, i.e. Chatbot's main variables, such as precision, performance, accessibility, etc. include the analysis of the thesis. An interview is established in a systematic fashion (Chime et al., 2018).

3.9 Data Analysis Technique.

For the study of data in science, researchers need a method. The investigator used a thematic way to evaluate qualitative data in this analysis. The data will be simplified using this approach to improve the quality of the study report. Thematic research incorporates the information gained with the aid of client testing and investigates the outcomes of the interview (Guest et al., 2011). Usage of the feedback is necessary to clarify the study thoroughly. (Wilson, 2014).

3.10 Ethical Consideration.

The claimant can need the investigator's permission and the evidence collected from the interview is primary. The analyst must closely examine the ethical consequences of the information obtained. Respondents will sign a declaration of agreement. The personal data of the researchers are not included in the study (Miller et al., 2012).

Chapter 4: Artefact Design and Development.

4.1 Artefact Introduction.

A graphical representation of the test device is the artifact architecture. The device seen here in the following diagrams represents real parts of the constructed prototype. To recreate the function of the system, all the diagrams were closely replicated. The primary purpose of the artifact design chapter is to provide a deeper understanding of the prototype for the consumer.4.2 Artefact Design.

21st century began with the technical race that joins the international community race to participate in algorithm & deep learning-based Artificial Intelligence and Automation, will indeed be branded as the dawn of the digital industry. As a result of this new breed of AI & automation, chatbots are one of the well-known and commonly adapted applications created. Large usage of chatbot technologies includes internet media that advance programmed responses, customer service groups that substitute CSR staff with mechanized chatbots, and therapeutic chatbots that help patients identify ways to understand their well-being. The Coronavirus story, from one point of view, ends up being an overwhelming storm on the earth all in all, while, again, it sets up better approaches for talking to individuals and clinical administrations, such as clinical guide chatbots. One of the commonly used chatbots: The International Fact-Checking Network (IFCN) produced and dispatched using WhatsApp Company APIs to get details from the most current WHO dataset reported a large number of individual discussions to get data on the most recent truth tests, tips on battling falsehood, near reality checker offices, and above everything, the language preserves the highlight to get the details in your local language. The study involvement of chatbots has opened

up opportunities to work on particular areas to address real-life challenges instead of working on a general-purpose chatbot. For this reason, the nature of this research report is decided by the development of the COVID-SARS-assistance chatbot (Dahiya, 2017).

Module.	Technology.
Front End / User Interface	HTML, CSS, JavaScript
Backend	SQLite
Programming Language.	Python 3.8.5 Flask. 1.1.2
Libraries.	WolframAlpha , NLTK, Flask, Chatterbot, google,

4.3 Architecture.

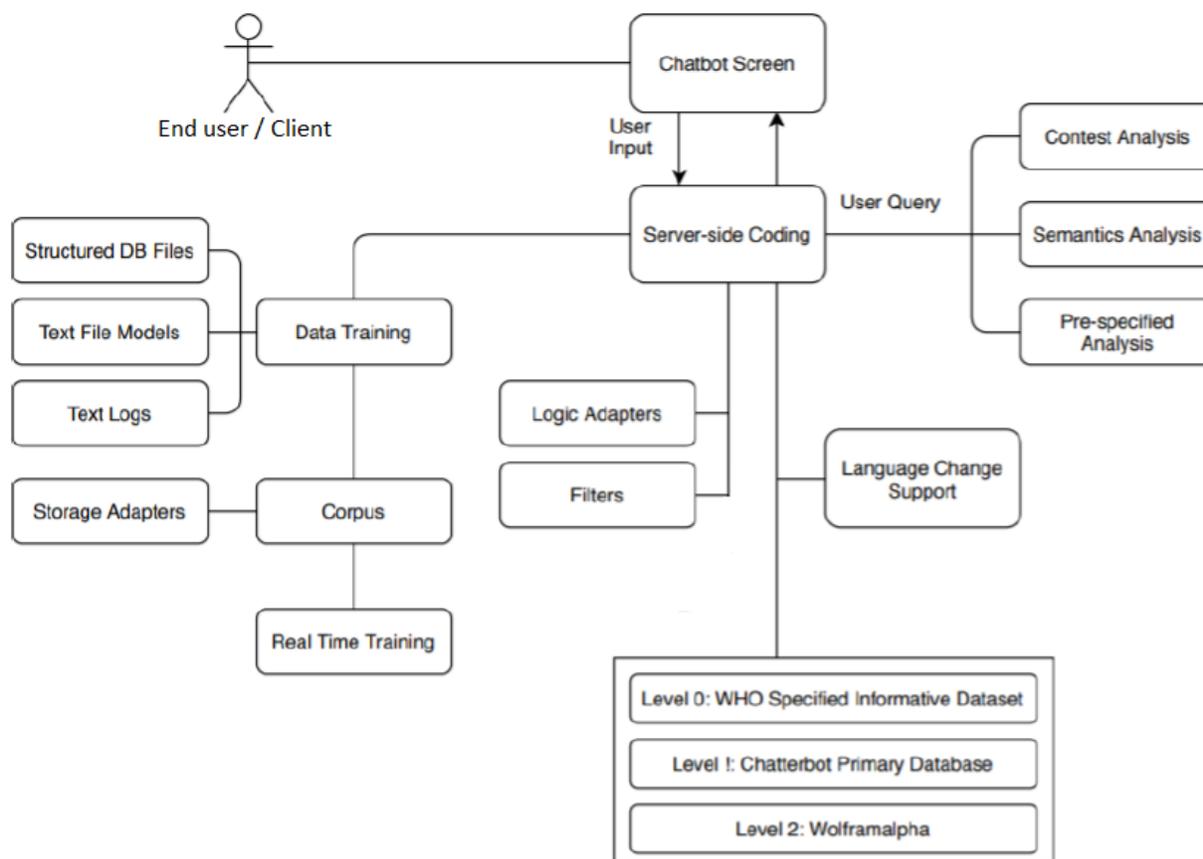


Figure 9 Research Architecture.

4.4 Artefact Roles.

Chatterbot: Chatterbot is a modular library of several choices that are scalable in different database files to allow data training and storage. To store training data as well as real-time communications, we used the Sqlite3 database for the localhost installation. Several open-source databases have been researched based on the particulars of eligible data models, but among some

basic sample conversations to be taught to the chatterbot, a new and recent dataset released by the WHO has been accessed and used owing to the restricted supply of contact data relevant to COVID and SARS assistance and mainly due to confidentiality concerns. Data related to training were discussion sessions, peer to peer (person-to-person & person-to-bot) chat and instructive material focused to COVID and SARS assistance. In the form of .Csv, .TXT, .XML, .YML file formats, illustrative messages, Q&A and point-to point conversational sources are collected. The Chatterbot library provided by Python is explored in greater detail in order to provide real-time conversation recorders to store conversations that make space for potential variants of questions and possible responses inside the database file. Owing to the limited resources available on the localhost computer, the more the database is trained, the more the size of the database file becomes, and the more it began to take time to get precise answers to a question. In other words, it's not incorrect to say that if the database is full of qualified conversations in the current configuration, consistency is simple to obtain at the expense of output lag. Also, if replaced with SQL DB, the Sqlite3 database that we will try in server deployment will cover the output lag if the database file is larger in size.(Malmgren and Åhammar, n.d.)

WolframAlpha Search: Check-it-chatbot offers a reference register to help translate from the original archive the request analyzer and logical adapters to search for a compatible secondary database output composed of generic qualifying outcomes from various fields, such as medical assistance,. Using 'itertools' API help to act as a secondary information base for the COVID SARS assistance chatbot, WolframAlpha is introduced as the secondary database. (“Wolfram_Alpha_A_New_Kind_of_Science” . Dimiceli et al., 2010)

Language support: The Check-it-chatbot support chatbot supports 5 languages, including English, Hindi, Chinese, Japanese, and French, for language support. The Google Translate API is used on a real-time basis to translate a dialogue into a selected language. It is restricted to 5 languages only, as per the initial support.

Response confidence: A quality computed as a reply to the user question / input from the user received data from the front-end variable that is unique to each intended response returned. Market logic for forwarding and receiving responses is secured in the code with the assistance of Chatterbot Logical Adapters. Trust evaluation of the required response relies on the limit of the logical connector to anticipate the reaction, provided the latest blending structure in the critical knowledge base, e.g. Chatterbot Corpus in a .db record that may be in one of the corresponding stores assisted: sqlite3, MySQL, or MongoDB. A score that is compared to a predefined score bracket is determined for each response expected by the Logical adapter to a user feedback, If the response confidence value is higher or identical to the appropriate one, the result is sent to the chatbot screen, otherwise the search for new responses starts again.. The method proceeds to look for answers from the predefined WHO and CDC supported COVID-SARS-related answers, the main database, the secondary database, and finally the google search to find a response to fulfil the confidence score needed for the response.

4.5 Research construction.

File Structure : User question answers are looked for from data sources, i.e. database of Chatterbot , Wolframalpha. Chatterbot corpus counsellor used to prepare databases is imported as an internal library to help prepare .YML records in the Chatterbot archive, although.TXT documents, .JSON documents and.CSV documents provide additional valid help in planning the Chatterbot corpus, e.g. the critical information base.

Data Flow: The data flow consists of three search stages, in which The customer-side app question is analyzed and translated to Level 1, i.e. Primary database In order to find the answer that fits the already hardcoded confidence level value, if not found, the query is sent to second level database, to search the results appropriate to confidence level, secondary repository. If the answer satisfied, such as responses that satisfy the standard of confidence, is looked at at one or the other level, it is returned to the customer-side application as a chatbot response.

```
chatbot.py x Summer (ELLLO 111).txt x School Life (ELLLO 87).txt x entry_points.txt x
31 def train_bot():
32     trainer = ListTrainer(bot)
33     trainer.train('chatterbot.corpus')
34
35     # training from JSON files
36     convArray = []
37     with open('./Dataset/WHO_data.json', 'r', encoding="utf-8") as json_file:
38         data = json.load(json_file)
39         for p in data:
40             convArray.append(p['Context'])
41             convArray.append(p['Answer'])
42     trainer.train(convArray)
43
44     # training from text files
45     path = 'textfiles/'
46     for filename in os.listdir(path):
47         for filename in glob.glob(os.path.join(path, '*.txt')):
48             print("fileName : ", filename)
49             conv = open(filename, 'r').readlines()
50             trainer = ListTrainer(bot)
51             trainer.train(conv)
52
```

Figure 10 Chatterbot-Corpus-Trainer.

4.6 Research Design

Particularly for the front-end UI, developing a chatbot application requires a proper understanding of your product's target market. In our case, The key aim was to add as many features as possible to complete the functional and functional version of the chatbot app, and to do so, the development and architecture process was separated into four modules.

1. Front-end User Interface Execution.

2. Back-end Execution

- Various assisted chatbot data for addressing inquiries relevant to the latest statistics and information.
- Chatterbot Corpus, that is, the main information base.
- Chatterbot Logical Adapters to anticipate reply
- Wolframalpha, that is, a secondary repository.

3. connection of backend program with front-end user interface

4. Language translation support (by implementing Google translate API)

The design phase was not that important, except for the decision to pick the collection of technologies to incorporate the COVID and SARS chatbot application's front-end and server-side coding. Although numerous freely available databases have been studied, a bit special to COVID and SARS assistance has been found, which is why the customization of the chatbot has been

assisted. Various extensions like .JSON, .TXT, .CSV, .AIML, and .YML file-formats training support improved The ability of the Chatterbot to prepare the corpus to discern details, mainly trades in various document styles, enhanced the aim of the main data assortment. In addition, by using the WolframAlpha Chatbot System as an optional database.

Chatterbot: A system with a powerful Python library which has advanced support for the implementation of a chatbot framework is known as Chatterbot, Help is required for database adapters, conceptual adapters, training corpus, reaction forecasting system, real-time training and assistance for additional plugins if thoroughly examined. By default, Chatterbot supports Django for the deployment of the backend, but we used Flask instead of Django. When integrating the Checkit-chatbot program, the following modules are used:

Storage Adapters: They are being used to contain information in the database that is known to be the key information base, i.e. user inputs and expected outputs. It has applications for the following models of databases:

- Lightweight Database SQLite3
 - SQL Database
 - MongoDB

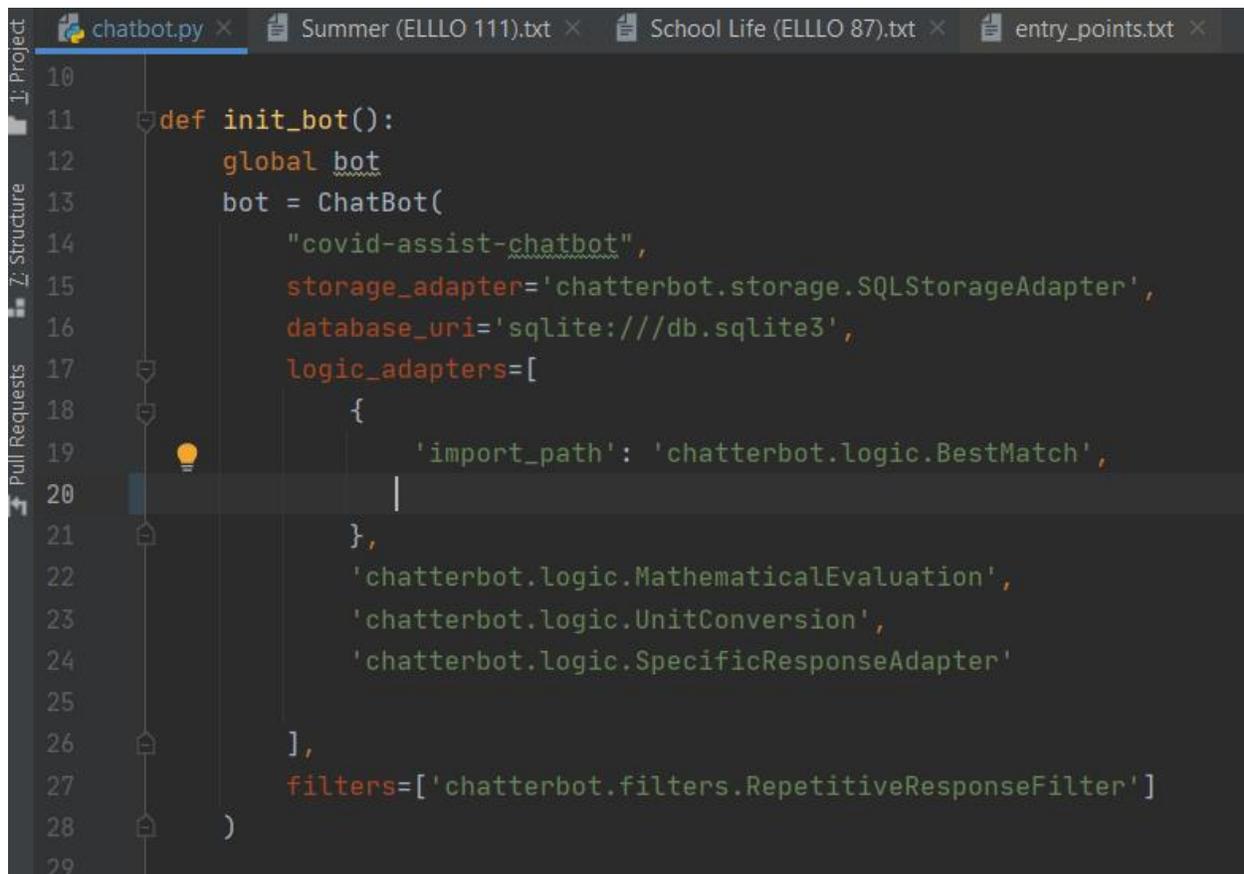
Logical Adapters: They are used to determine the basic answer to a question and have sub-operations provided by the following components:

Best Match Logical Converter: This Plugin supports the similarities to predict the participant's query answer based on the best match claims.

Mathematical Evaluation Adapter: First, This logical adapter identifies when the client requests a statistical test, and then reads the feed of the client, it executes a statistical equation to return the performance of the test as a result.

Time Logic Adapter: Next, this smart converter knows when the client input demands the current time and then returns the current time as the reaction output.

Special Response Adapter: Allows a specific response to be applied to a specific case to immediately return the predefined response instead of routing it to logical adapters.



```
10
11 def init_bot():
12     global bot
13     bot = ChatBot(
14         "covid-assist-chatbot",
15         storage_adapter='chatterbot.storage.SQLiteStorageAdapter',
16         database_uri='sqlite:///db.sqlite3',
17         logic_adapters=[
18             {
19                 'import_path': 'chatterbot.logic.BestMatch',
20             },
21             'chatterbot.logic.MathematicalEvaluation',
22             'chatterbot.logic.UnitConversion',
23             'chatterbot.logic.SpecificResponseAdapter'
24         ],
25         filters=['chatterbot.filters.RepetitiveResponseFilter']
26     )
27
28
29
```

Figure 11 Adapters.

Trainer: The Data Model Training Corpus Trainer and List Trainer sub-modules are supported by this same Chatterbot Trainer Framework, with additional support for .Xml, .TXT, .CSV, .AIML, and .YML training file formats.

Filters: Based on their language, filters are used to review requests to transfer to separate disk adapters. Filters reduce processing time by checking the amount of words that do not supplement the input from the consumer terminology.

Real-Time Training: The Chatterbot corpus trainer has a creative Real-time Data Training capability collected by the Storage Adapter from user encounters stored in the chatbot database.

WolframAlpha API: The WolframAlpha search API is used as the secondary chatbot database to locate an acceptable user question response. Upon completion of the enrollment level, a full information structure should be completed on the WolframAlpha login page to approve the use of the API to access the API token used to support WolframAlpha using the Restful API to act as an auxiliary information base for the chatbot program supporting COVID and SARS.

4.7 Server Deployment.

When attempted over the localhost environment, a dedicated IP address is built over a devoted coordinating environment to fulfill the requirement of worker agreement. However, when operating over localhost, conditions and outside libraries were added to run over Windows OS, Linux OS was implemented in the ongoing environment and individual conditions were introduced to run the chatbot program. The Checki-it-chatbot program is designed with the Flask app to operate over the IP address supplied by the development host after installation configuration and dependencies have been completed. The specifics of the dedicated hosting environment purchased to create the Checki-it-chatbot assist chatbot can be seen in the snap shot below.

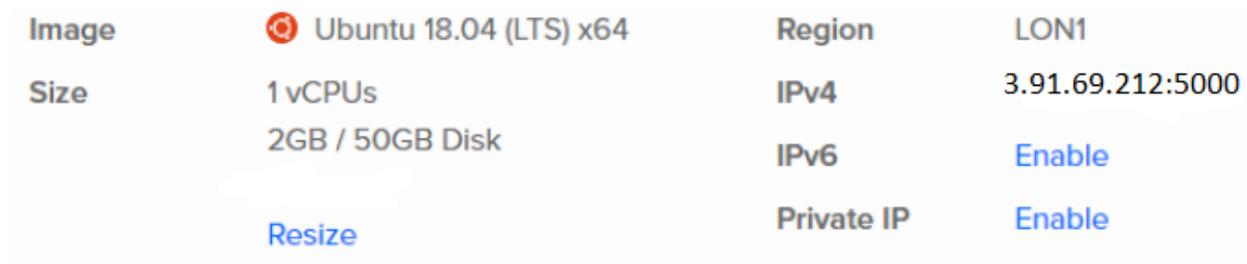
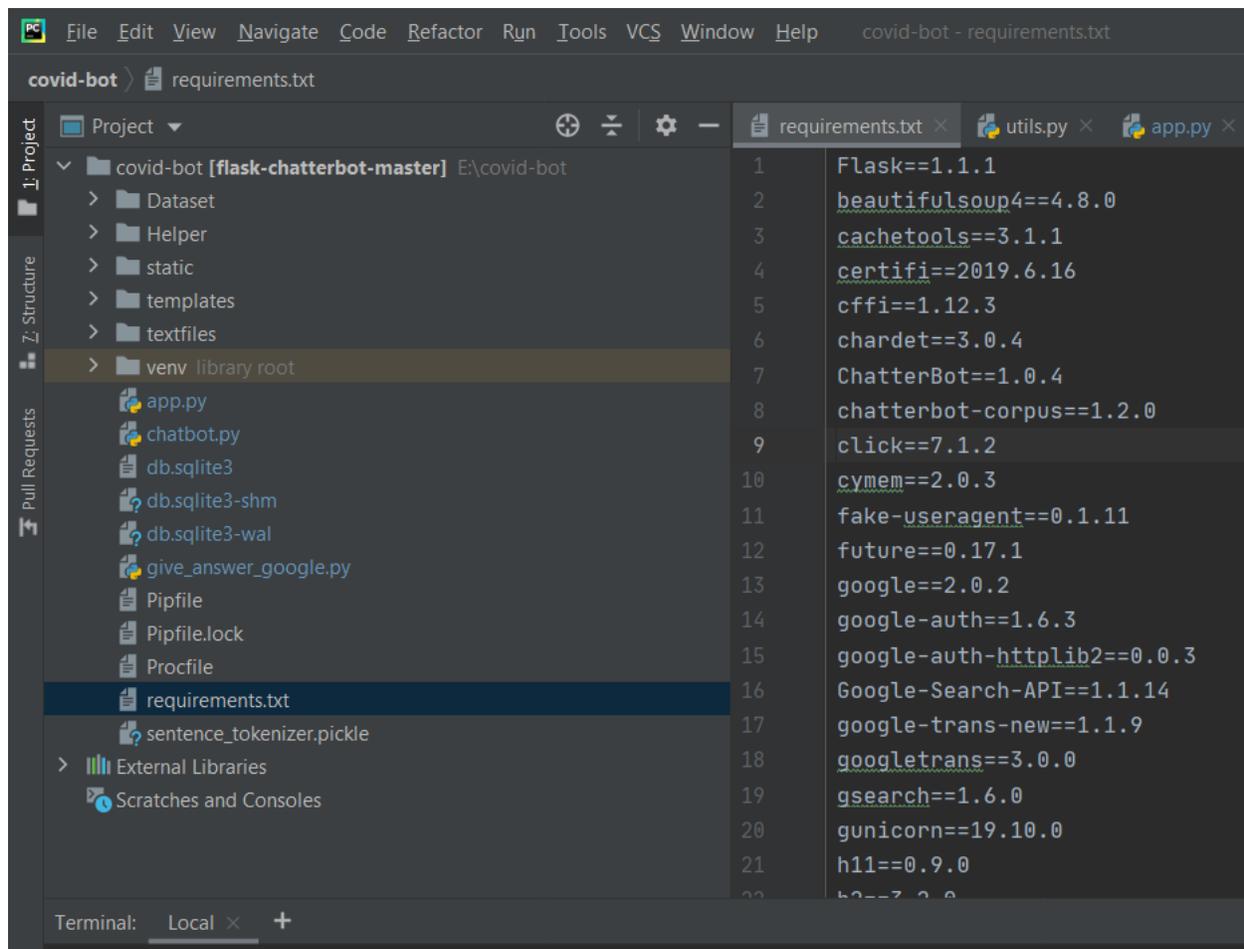


Image	 Ubuntu 18.04 (LTS) x64	Region	LON1
Size	1 vCPUs 2GB / 50GB Disk	IPv4	3.91.69.212:5000
	Resize	IPv6	Enable
		Private IP	Enable

Figure 12 Instance setup

Export requirements.txt from local ide to match the environment on server.



The screenshot shows an IDE window titled 'covid-bot - requirements.txt'. The left sidebar displays a project structure for 'covid-bot [flask-chatterbot-master]' with folders like Dataset, Helper, static, templates, textfiles, and venv library root. The 'requirements.txt' file is selected in the 'Pull Requests' view. The main editor area shows the following content:

```
1 Flask==1.1.1
2 beautifulsoup4==4.8.0
3 cachetools==3.1.1
4 certifi==2019.6.16
5 cffi==1.12.3
6 chardet==3.0.4
7 ChatterBot==1.0.4
8 chatterbot-corpus==1.2.0
9 click==7.1.2
10 cymem==2.0.3
11 fake-useragent==0.1.11
12 future==0.17.1
13 google==2.0.2
14 google-auth==1.6.3
15 google-auth-httpplib2==0.0.3
16 Google-Search-API==1.1.14
17 google-trans-new==1.1.9
18 googletrans==3.0.0
19 gsearch==1.6.0
20 gunicorn==19.10.0
21 h11==0.9.0
22
```

Figure 13 Requirements.txt file

Next step is to transfer project files from local host to server, for this particular project I have used github platform.

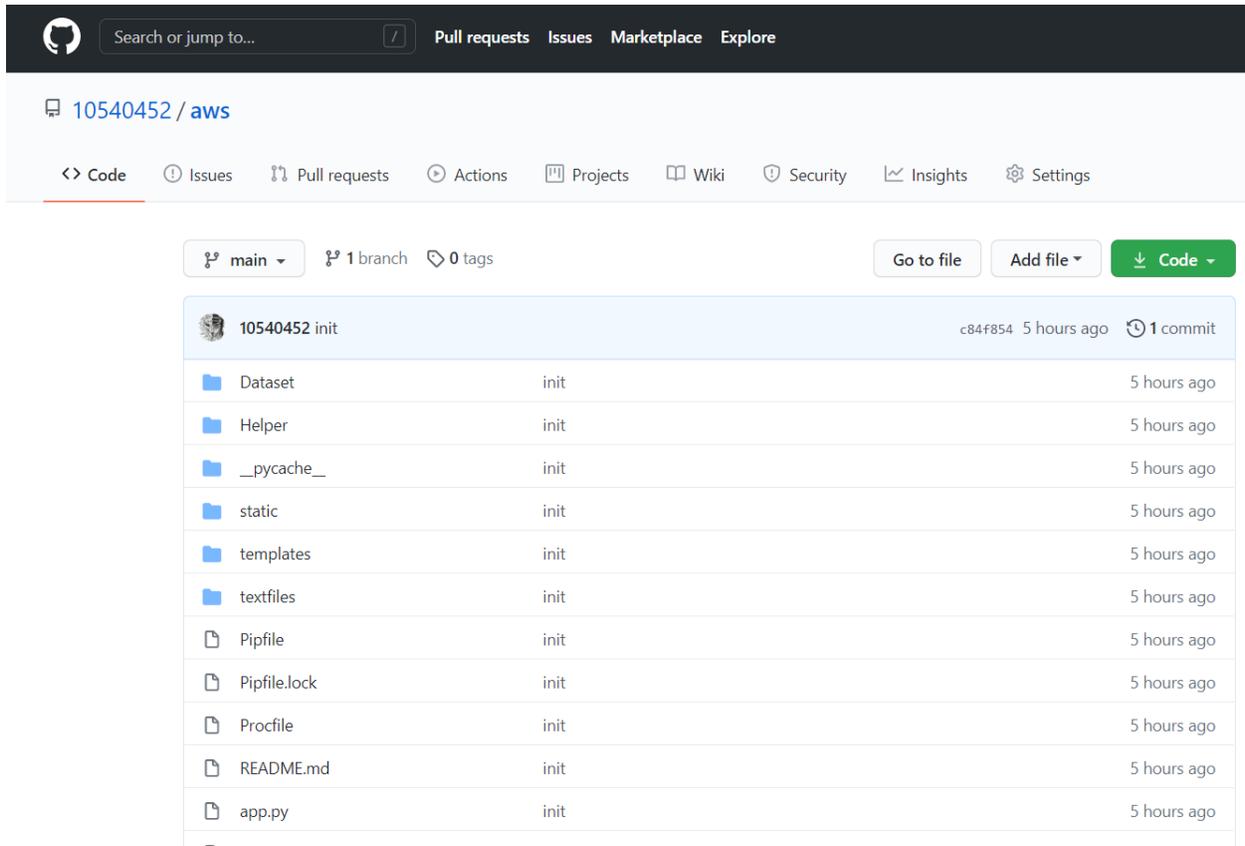


Figure 14 Github repository.

Check it chatbot is now running in the browser window and has been hosted on the given IP address along with port

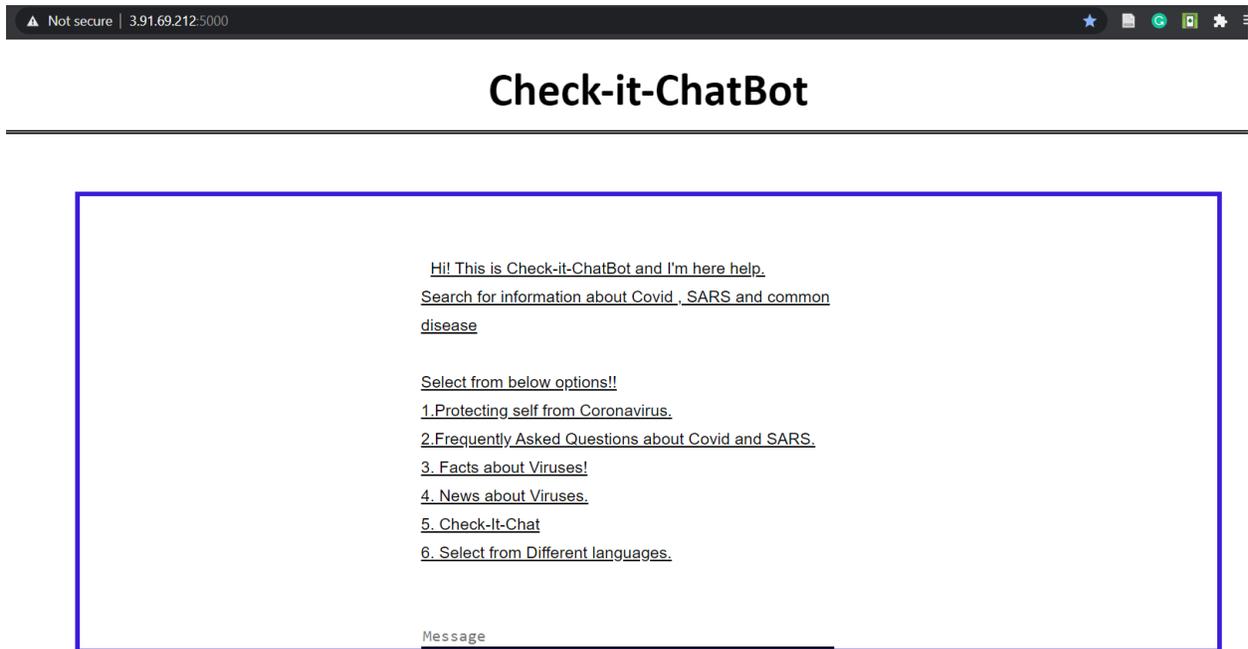


Figure 15 Hosted App.

Chapter 5: Data Analysis

Theme 1: Accuracy of information available through various sources.

1. How confident are you about the information you have regarding covid-19 and SARS virus?

R1: I am not very confident about the information that I possess regarding covid-19 and the SARS virus because the information that I have is collected from multiple sources which I do not feel are very authentic and there's also ambiguity of data because of which I have doubts in my mind.

R2: the only information that I have regarding covid-19 that I believe is true is the number of cases and recovery rate other than that I have serious doubts regarding a lot of topics concerning covid-19 like the treatment, remedies, preventive measures, symptoms and how it spreads. Talking about SARS virus I have no clue and have no data regarding the same.

R3: I have been reading a lot about covid-19 on social media platforms and messages that I get on WhatsApp however the data that I have collected as of now is not very inconsistent and it has caused doubts in my mind. For SARS virus I know that it had occurred before covid-19 but other than that I am not aware about anything regarding the virus.

R4: I do have some level of confidence in the information that I possess regarding the covid-19 and the SARS virus as I have some friends and family working in the HSE. However, I have no knowledge about the new strain of the covid-19 and the vaccination that is available for the people.

R5: I have a lot of confidence that I possess enough knowledge regarding covid-19 and the SARS virus since I have been only following the government HSE website and the WHO website and I feel that they are authentic sources of information.

R6: I have zero confidence in the information that I possess regarding covid-19 and the SARS virus as the data that I got from various sources like social media platforms and WhatsApp forwarded messages were very confusing and contradictory to each other.

Conclusion: We can conclude, in view of detailed reactions, that most respondents are mindful of the circumstance of COVID-19 and SARS in Ireland. nonetheless, the certainty level of a couple of respondents is not exceptionally high because of vulnerability in information available from various instruments. Practically 50% of the respondents had next to no knowledge on Ireland's COVID-19 circumstance.

Theme 2: Knowledge about chatbot system which provides information about COVID-19 and SARS:

Q2: Have you heard about a chatbot that can provide information regarding covid-19 and SARS virus?

R1: No, I have not heard about a chatbot that can give information regarding covid-19. I generally read newspapers and HSE websites to get information regarding the same.

R2: I Am Aware About the Chatbot Technology But I Have Not Come Across Any Chatbot That Can Give Information Specific To COVID-19 and SARS.

R3: I am aware about the HSE chat bot that is used to determine whether I have covid-19 after checking my symptoms however if I want more information, I don't think so it's of use to me.

R4: No, I Haven't Heard About Any Chat Bot Giving Information About Covid-19. I Generally Get All the Information Regarding Covid-19 Through Friends And Family.

R5: I have not come across any such chatbots that can give me information regarding covid-19.

R6: I have come across a lot of chatbots, but I haven't heard about any chat bot giving information regarding covid-19 and SARS.

Conclusion: We can infer that most participants really aren't knowledgeable of chatbot technology for the provision of COVID-19 data as per the answers.

Theme 3: Evaluating user experience:

Q3: On a scale from 1 to 5 one being bad and 5 being good how would you like to read the user interface of the chatbot.

R1: I would rate it a 5 as I found that the user interface was very user-friendly and interactive. The options given at the start of the chat were very easy to navigate through and I got responses easily.

R2: The chatbot was very easy to use and i got my answers accurately and really fast so I feel that I would rate it a 5.

R3: I would rate it a 5 as I like the way the answers were presented to my questions and the quickness of the responses.

R4: I would rate it a 5 as I was really impressed by the structure of the conversation. The simplicity and precision information were really great.

R5: I would rate it a 4 as I had problems while reading long answers due to restriction of size of the chat window.

R6: I would rate it at 5 as I was really impressed by the fact that the conversations.

Conclusion: It can be assumed that the information given by the chatbot is very accurate, well structured, and easily accessible based on the responses received.

Theme 4: Quality of data provided by chatbot.

Q4. On a scale of 1 to 5 where 1 is bad and 5 is good, how would you rate the accuracy of responses of the chatbot?

R1: I would rate it at 5 as I feel that the information provided to me was very accurate and to the point.

R2: I would rate it 5 as I got correct responses to the questions that I asked, and the information was provided in a manner that was very easy to read and understand.

R3: I would rate it five as a chat bot was able to provide me correct information about covid-19 as well as the SARS virus.

R4: I think it would be a 5 rating as the information that I got was related to the questions that I asked about covid-19 as well as the SARS virus.

R5: I would give it a rating of 5 as the responses seemed very accurate and very much to the point of discussion.

R6: For me it's a five rating as I was really surprised by the fact that I got accurate responses to all my questions regarding covid-19 and the SARS virus.

Conclusion: It can be assumed that experience from the chatbot is very smooth, query driven, and provides intended results, on the responses received.

Theme 5: Features of Chatbot

Q5. What feature of the chatbot did you like the most?

R1: according to me the best feature of the chatbot was the language feature as I feel that it enables the chatbot to cater to the needs of lot of people who do not speak or write in English. I have not come across any chat bot that gives so many language options to the user to communicate.

R2: for me, the best feature was the list of questions that were displayed at the start as I do not have to write a lot of questions to get my doubts cleared. It was easy to just type the number and get information.

R3: I think the best feature of the child board was the interactive UI. It was a great experience typing and questions and getting answers to my questions through a chat window so easily and quickly.

R4: the feature of the chatbot that impressed me a lot was the accuracy of data and quickness of responses to my questions. Data provided to me was very well structured and very easy to understand.

R5: it must be the language feature. it enables the user to communicate with the chatbot in so many languages and I have not come across any such chatbots that has this functionality.

R6: the feature that impressed me the most was the list view you of predefined questions that are already in the chat window and ability to get information in multiple languages.

Conclusion: It can be inferred from the above answers that the consistency and comprehensiveness of data, multiple language support and chatbot design were the characteristics that appealed to the sample audience.

Theme 6: User point of view about chatbot as a medium of providing knowledge about COVID-19 and SARS

Q6: what do you think about the chatbot as a medium of information provider for Covid-19 and SARS virus?

R1: after using the chat bot I feel that it is a good concept of providing information regarding covid-19 and the SARS virus.

R2: I really like the idea of the Chatbot providing information to me regarding covid-19 and SARS virus as it was easy to get answers to my questions. I could use it whenever and wherever I wanted, and I did not have to get into long queues or wait on calls for an HSE personal to answer my queries.

R3: I think it is a great idea as the chat bot gives freedom to the user to ask any questions that he or she might have, and the information provided is to the point.

R4: I think it is a brilliant idea as the chatbot eliminates the need of the person to actually go to a hospital or a clinic to get his or her doubts cleared, and it can in turn help to reduce public gathering at such places. by providing accurate information I think the chat bot can avoid the sense of panic that builds in the minds of people who believe in false news that is spread through social media platforms.

R5: I think it is a need of the hour to introduce such a Chatbot to the people as it might help them to be safe and well informed about the deadly viruses.

R6: I think it's a really innovative idea as it enables a person to get access to information regarding the deadly viruses and the comfort of sitting at home. Also, I think the chatbot provides a person with a safe environment and privacy to ask questions without hesitation.

Conclusion: From the above answers we can conclude that the chatbot is definitely a friendly and powerful tool to be used in the times of pandemic.

Theme 7: Future Scope

Q7. What features would you like to see in the chatbot in future?

R1: firstly, I was really impressed after using the child but however I feel that if there was an option to get information regarding the test centers and directly book an appointment using the chatbot it would be really great.

R2: I feel that if there was a feature of showing pictures along with the responses of the chatbot it would be really easy for small children to use it as well.

R3: the feature that I would like to see in the chatbot is that it would ask for my symptoms and determine whether I have a covid-19 or not.

R4: the chatbot was really great to use however if there was an option of getting more information regarding test center's around me and booking an appointment with them for diagnosis it would be really a complete solution for fighting against covid-19 according to me.

R5: it would enhance the user experience if there were some pictures that were shown along with the responses and some video links were also provided for the person to better understand about covid-19 and the SARS virus.

R6: for me the feature that I would like to see in the chatbot is speech to text which would eliminate my need to type in questions.

Conclusion : As per the feedback we can infer that the chatbot should reply with appropriate images for better understanding , one feedback is the chatbot should be able to do health analysis, and it should recommend some pretext to make the chatbot more appealing and keep users engaged.

Chapter 6: Conclusion

6.1 Conclusion.

The aim of the thesis is to integrate a chatbot that helps raise awareness of COVID-19 and SARS and educate people. Previous technology used to deploy the chatbot is reliable. Using python and JSON files is the most powerful way to build a stable chatbot interface., as per the facts listed in the literature review. Analysis has supported research concerns with credible help. This study provides an innovative approach to help raise awareness of COVID-19 symptoms, prevent misunderstanding, take precautions, provide facts and myths, produce infection-restricting behaviors, and even help mitigate pandemic mental health burden. With the assistance of interviews promoting this study, the key data has been compiled. After reviewing the data collected, the researcher will assume that the chatbot has been rated very highly on the basis of user experience. In terms of usability, it was found functional and simple by all the respondents. The chatbot is very accurate, well formatted and readily accessible due to the nature of the information delivered. The investigator also concluded that the features that appealed to the sample audience were the accuracy and comprehensiveness of results, multiple language support and chatbot interface.

6.2. Future Scope

With the aid of the input provided from the interviews, the potential direction of the research study can be concluded. It can be inferred after data is evaluated that additional functions can be incorporated in the system. For improved data interpretation, features such as graphical and pictorial representation may be used. Connect information of doctors and labs carrying out COVID-19 tests as it can assist in reserving an appointment. Conduct covid tests by using symptoms data and previous health history. Recommend best practices for a healthy life.

6.3. Limitation of the Research

There is a limitation to getting to information models to prepare a chatbot. Attributable to restricted areas, the utilization of an open information base is disabled. As chatbot is learned to provide answers to the questions that are explicit in the SARS and explicitly in COVID-19 region, it is challenging to engage in long interaction with the users.

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Appendix.

Appendix 1: Interview Questionnaire.

Q1. How confident are you about the information you have regarding covid-19 and SARS virus?

Q2: Have you heard about a chatbot that can provide information regarding covid-19 and SARS virus?

Q3: On a scale from 1 to 5 one being bad and 5 being good how would you like to read the user interface of the chatbot.

Q4. On a scale of 1 to 5 where 1 is bad and 5 is good, how would you rate the accuracy of responses of the chatbot?

Q5. What feature of the chatbot did you like the most?

Q6: What do you think about the chatbot as a medium of information provider for Covid-19 and SARS virus?

Q7: What features would you like to see in the chatbot in future?

Appendix 2: Codes for Participants

Respondents	Codes
PP	R1
JE	R2
SS	R3
SI	R4
RS	R5
RK	R6