Healthcare Recommendation Chat Bot

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ABSTRACT

This report contains all the details about the project Health recommendation. Now a days AI are replacing many jobs that are difficult for a human to manage and I believe Health recommendation also falls under the same. Health recommendation requires to monitor the patient 24x7, which is quite difficult for a human. We already have various devices that measure the heart rate, sleep, and exercises. These data will be useful when user is interacting with our health recommendation. This project will create an recommendation that will give advice and prescription to the user about their health. User can ask small query that do not require extreme expertise of the doctor. Good health can be achieved by maintaining good behaviors such as good health, night sleep, enough exercise and good nutrition. However the competitive environment nowadays prevent such good environment. Our recommendation will be there to answer the queries about the users cause of irritation and ill health problem. recommendation will also provide necessary prescription and suggestion of doctor relevant to the cause. Virtual recommendations take care of patients' needs as well as maintain their health records. The demand for AI is increasing rapidly in Health factors to maintain the big records. Our Virtual recommendation helps you by a user interface by which you talk it with your disease so that it understands your disease by your symptoms and provide you medicine for a specific disease, maintain your health record and perfect diet by machine learning algorithms also if you want it makes your appointment with the doctor your specific area by which you contact with your doctor. NLP makes an interface by which virtual recommendations work on human data. Health recommendation will provide you 24x7 service and gives you expert recommendation on your problem to make you feel happy.

Graphical Abstract
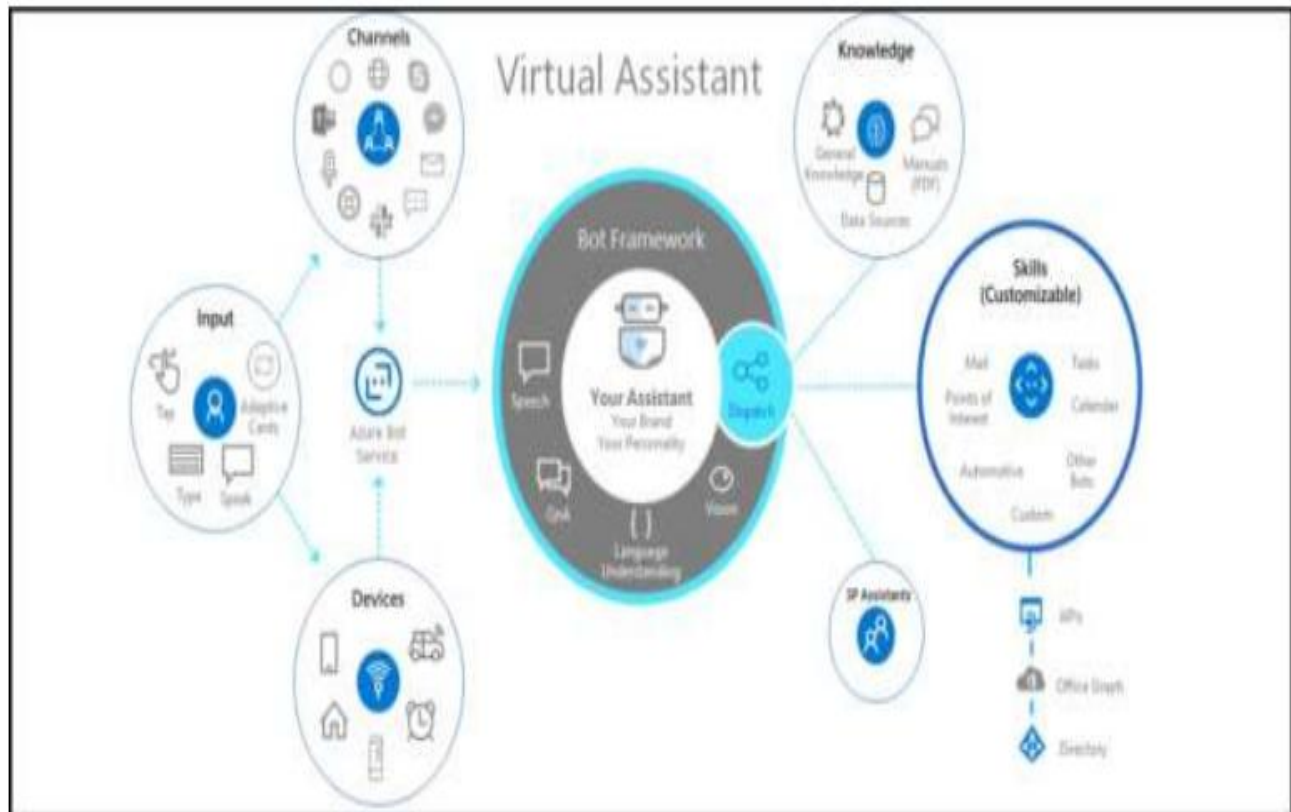
ABBREVIATIONS

AI   ARTIFICIAL INTELLIGENCE

ML   MACHINE LEARNING

NLP   NATURAL LANGUAGE PROCESSING

AAMA   ASSOCIATION OF MEDICAL ASSISTANCE

UI   USER INTERFACE

XML   EXTENSIBLE MARKUP LANGUAGE

DFD   DATA FLOW DIAGRAMS

IDE   INTEGRATED DEVELOPMENT ENVIRONMENT

EI   EMOTIONAL INTELLIGENCE

WHO   WORLD HEALTH ORGANIZATION

USA   UNITED STATES OF AMERICA

AIDS   ACQUIRED IMMUNE DEFICIENCY SYNDROME

HIV   HUMAN IMMUNODEFICIENCY VIRUS

CHAPTER - 1

INTRODUCTION

1.1 Client Identification/ Need of relevant contemporary issue

Let us start with the simple definition of the topic. recommendation mean a person who helps somebody in a more important position. If we talk about health recommendations, he/she is a person who helps in monitoring the patient condition for the doctor. In this project this health recommendation will be a computer software that will monitor the various critical data of the patient that are required in order to prescribe any medicine. We can see with the recent incident of COVID-19 , that the ratio of doctor and patient completely outmatch. There are less doctor and more patient, so to check patient individually and prescribe them medicine is very difficult task.
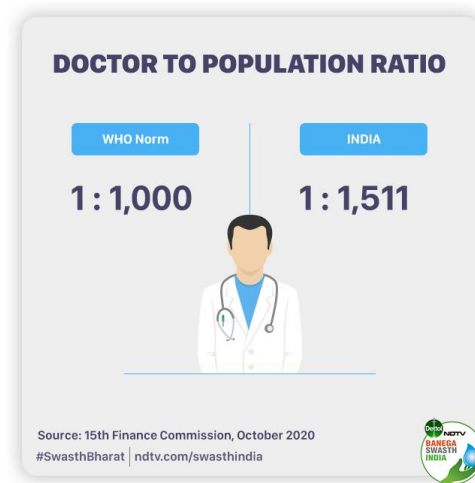
Fig. 1.1: Doctor to Population ratio

Brookings.com also talked about the same problem back in 2020. Health recommendation are very crucial in health sector and to match 1:1 ratio is almost impossible. In fig no 1.1 we can see the actual ratio of the doctor to patient and assume the pressure that doctor go through treating them. This is bad for both patient and doctors profession. In order for a person to maintain a healthy life style his/her health recommendation must be there in the time of need, they must learn his/her needs, and who spends most of the time with person. This is impossible to pull out in today's crowed world.

1.2 Identification of Problem

In this growing world, rapid population growth, continuously increasing demand, and trendy development has given birth to several diseases that required regular tracking. People now a days want to live a healthy and quality life, for that they need to eat right, sleep right, and exercise right. To ensure the inclusion of only "substantial" scientific work in this review, we only considered international peer-reviewed publications (journal articles and transactions) with completed research work. For reasons of quality, poster sessions, editorials, interviews, commentaries and RIP papers were not included. After reviewing 190 articles included in top journals and conferences, 110 articles were identified as relevant within the medical chat bot domain (as they considerably address the medical chatbot theme). The identification was based on a manual decision by three reviewers at a reliability of 91.8%. Telecommunication is the most used technology all over the world in current age and still establishing a long way. This technology has made things to do in an easy and fast manner. Now enhancements in technology have made our thoughts to drag fields of life into advance technology. From last few years, alphabet 'e' is being used with almost everything i.e., e-mail, e-learning, e-commerce, e-banking and e-services. The proposal of 'e-health' is still new and asks for more development. Medical is the field that is emerging continuously to make health facilities more affective and facilitating. Telemedicine (Khalid, Akbar, Kumar, Tariq, & Farooq, 2008) is the need of current age to provide health facilities in the remote areas where medical experts, doctors and physicians are not available. Telemedicine uses telecommunication technology to provide medical treatment and services. Telemedicine connects patients with doctors where distance is a critical factor and exchanges the information of diagnosis, treatment and other health care activities. Some people adapts quickly out of internet few needs recommendations to manage through these. In domains such as health, where accuracy is essential, it is preferable not to leave the dialogue totally free, but to constrain it through alternative methods of interaction in order to reduce ambiguity on the input. Consequently, our intention is not to develop a system akin to Amazon Alexa, Apple's Siri, Microsoft Cortana, or Google recommendation, in which free text is predominantly used. On the contrary, we want to develop a system that can deal with ambiguities effectively, and that can respond to

the end user's need in as few dialogue steps as possible. People also have small queries related to health issues that are minor for doctor but people seek doctor advice which make health sector crowded all the time. Most of the people have diabetic, cholesterol and blood pressure. These are the disease that needs continuous monitoring which are lacked by many patients.

1.3 Identification of Tasks

This is a useful and important project that can impact huge range of people. So in-order to achieve the quality a lot of need to be done and taken care of. Various task that can be done to achieve this project are:

- Design the optimal path way
- Choose the modern and minimalistic UI.
- Combine the intelligence of both Human and AI.
- Learn new library and implement the program.
- Testing, Report Generation, Front-end and back-end development will also be done.

1.4 Timeline

Fig: 1.2: Timeline of report

Figure 1.2 shows the timeline followed by this project over the course of two months starting from 1 October, 2022 to 5 November, 2022.

1.5 Organization of the Report

This report will explain the detail process of how we built this program. The report will consist of background study and literature review of already existing model, so that to add new feature in our model to make it unique. There will be various pictorial demonstration of how things are happening in the background, how codes and functions are actually working. We will add the future use case and improvement/update description as well. All the problem we faced and the way we tackled will also be mentioned in the conclusion of the report. The following chapters will give an elaborate description of the project.

- Chapter 2 of this report describes the various literature surveyed, hence give an idea of the recent trends and development in the field. This chapter also propose solutions to solve the problems identified in chapter 1, goals and objectives this project wish to achieve.

- Chapter 3 describes the design constraints we would have. In the same chapter data flow diagram, flowchart will give a visual description of the project details.

- Chapter 4 gives the results obtained, testing methods adopted.

- Chapter 5 gives conclusion and future work that can be pursued to improve the heart disease prediction system.

CHAPTER - 2

LITERATURE SURVEY

Health care is one of the major field where we have seen huge transformation in previous year. Medical science are continuously doing research and development using AI to create an automated system that can identify the problem and give back the suggestion or solution. In today's world we can see almost everyone is suffered from some kind of disease, healthcare systems face growing demand for their services, rising costs and a workforce that is struggling to meet the needs of its patients. In order to extract relevant research from the published literature, a systematic literature search capturing medical chatbot-related work from the beginning of 1966 until 12/12/2019 was undertaken. Three meta-databases (i.e., IEEE, ACM, SpringerLink/(sub-)discipline "medicine & public health" and "Information Systems Applications (incl. Internet)" and the AIS basket of eight journals were searched resulting in 227 articles that met the inclusion criteria (abstract or title or keywords contains "chatbot" AND "health"). Taking a real world example we can see lots of rich people getting sudden heart attack and dying. Also we have some live examples of apple watch saving people around the globe floating in internet. This shows how AI can help manage your health needs, requirement and also saves your life. Looking back at the history we can see previous attempts on AI supported medical recommendation getting better and better every day.

2.1 Timeline of the reported problem

1. In 1934, Dr. M. Mandal founded the first school offering training specifically for recommendations to work in doctors' offices. By 1955, program standards were needed, and the American Association of Medical recommendations (AAMA) was established to standardize practice and offer accreditation. As most of the existing scientific work on chat bots is concerned with technical developments, there is a research gap on the behavioral influence of chat bots . For example, Pereira and Díaz have examined which chat bot enablers are of particular interest in the health domain from a behavior change perspective. This resulted in the finding that reports related to the broader sociological

implications brought about by chat bots are needed. We also propose MentalEase, a mobile application which uses NLP techniques to provide not only conversational aid but also a toolbox of helpful features to keep mental health in place. By integrating mental health assessment tools into the chatbot interface, along with regular therapy it can help patients deal with mild anxiety and depression. This can also overcome certain barriers in mental health, such as waiting lists and geographical problems that hinder attendance at face-to-face counselling appointments.A chatbot can be described as a computer program capable of providing smart responses to user inputs by understanding natural language using one or more NLP techniques. In this study, we discuss the application of NLP in psychotherapy and also a general analysis of existing systems was performed by comparing the responses given by the chatbot against a set of predefined user inputs pertaining to queries related to wellbeing and mental health.

2. In 1978, the U.S. Department of Health, Education and Welfare formally recognized Medical Assisting as an allied health profession.

3. International Journal of Advanced Research in Computer and Communication Engineering ISO 3297:2007 Certified Vol. 6, Issue 4, April 2017 Over the last few years, Chatbots have played a prominent role as human-computer interfaces. Chatbots are generallycomposed of three modules: the user interface, an interpreter, and a knowledge base. Laven [6] defines Chatbot as a program that attempts to simulate typed conversation, with the aim of at least temporarily fooling the human into thinking they were talking to another person. Basically, chatbot is a conversational agent that can interact with user in a given subject using the natural language. Many chatbots have been deployed on the internet for the purpose of education, customer service site, guidance, entertainment. Existing famous chatbots are ALICE [2], SimSimi and Cleverbot. Artificial Intelligence Markup Language (AIML) is derived from extensible Markup language (XML) which is used to build up a conversational agent artificially. The AIML based chatbots are famous because they are light weighted, easy to configure as well as at minimum cost. AIML has class of data objects called AIML object which describes behaviour of computer programs. In our paper, we have used program-o [1] which is an open source AIML engine written in PHP. It is an interpreter for the AIML scripts of the chatbot. It uses MySQL database to store the chatbot details. Also,

we are storing all the AIML scripts to the database. When user sends message to the chatbot program, then according to matched reply from the AIML, the answer is formulated and send back to the user. It can bedirectly installed on a local server under the GNU General Public License. The chatbots that have been deployed on the internet uses text, voice as well as sentiments as the input. In this paper, we have used the text and voice as user input. Text I/O is relatively effective as user can review for the input so that it can be rechecked if there are any mistakes. However, giving text input consumes time. So, the solution is to introducing voice interface with the speech recognition technology. By these methods, this chatbot application is very able to make conversation with the user. In this paper, we have introduced a chatbot application in android which is able to interact with users. This chatbot can answer for queries in the textual as well as in voice form of user input. For this purpose, AIML with program-o has been used. The chatbot can answer only those questions which he has the answer in its dataset. So, to increase the knowledge of the chatbot, we can add the APIs of Wikipedia, Weather Forecasting Department, Sports, News, Government Services and a lot more. In such cases, the user will be able to talk and interact with the chatbot in any domain. Using the APIs like Weather, Sports, News and Government Services, the chatbot will be able to answer the questions outside of its dataset and which are currently happening in the real world.

4. In 1961, the AAMA established a certifying board for new medical recommendations. Certification for MAs was slow to spread, but over the next decade more and more state organizations would adopt some kind of certification for MAs. By 1976, the AAMA also accepted international members.

5. 2007 4th International Symposium on Applied Computational Intelligence and Informatics . Health has a strong impact upon all activities and human experts must have the ability to decide, in any circumstances, what is the illness level of a patient, which is the adequate treatment and which will be the evolution of the patient during the treatment. But medical decision making may be a very difficult activity. There are a lot of applications in artificial intelligence domain that try to help human experts offering solutions for a problem. This

paper describes an expert system developed in order to make some predictions regarding the hepatitis infection.

6. 11073-20601-2014/Cor 1-2015 - IEEE Health informatics--Personal health device communication Part 20601: Application profile--Optimized Exchange Protocol - Corrigendum 1. Within the context of the ISO/IEEE 11073 family of standards for device communication, this standard defines a common framework for making an abstract model of personal health data available in transport-independent transfer syntax required to establish logical connections between systems and to provide presentation capabilities and services needed to perform communication tasks. The protocol is optimized to personal health usage requirements and leverages commonly used methods and tools wherever possible. This corrigendum removes the ambiguities and corrects the wrong nomenclature codes and qualifier status that have been identified in IEEE Std 11073-20601-2014 to improve implementation of the standard in an interoperable fashion.

7. Natural language processing in mental health applications using non-clinical texts 2017 People write to communicate with others. In addition to describing simple factual information, people also use writing to express their activities, and convey their feelings, mental states, hopes and desires. Recipients then use this written information from emails and other forms of social media texts to make inferences, such as what someone else is feeling, which in turn influences interpersonal communication.

8. International Journal of Innovative Research in Computer Science & Technology (IJIRCST) Volume-6, Issue-3, May-2018 . For using software applications, user interfaces that can be used includes command line, graphical user interface (GUI), menu driven, form-based, natural language, etc. The mainstream user interfaces include GUI and web-based, but occasionally the need for an alternative user interface arises. A chatbot based conversational user interface fits into this space.

9. A Medical ChatBot International Journal of Computer Trends and Technology (IJCTT) – Volume 60 Issue 1- June 2018 . The main purpose of the scheme is to build the language gap between the user and health providers by giving immediate replies to the Questions

asked by the user. Today's people are more likely addicted to internet but they are not concern about their personal health. They avoid to go in hospital for small problem which may become a major disease in future. Establishing question answer forums is becoming a simple way to answer those queries rather than browsing through the list of potentially relevant document from the web.

10. Abbe, A., Grouin, C., Zweigenbaum, P., and Falissard, B. 2015. Text mining applications in psychiatry: a systematic literature review. International Journal of Methods in Psychiatric Research 25(2): 86–100. The expansion of biomedical literature is creating the need for efficient tools to keep pace with increasing volumes of information. Text mining (TM) approaches are becoming essential to facilitate the automated extraction of useful biomedical information from unstructured text. We reviewed the applications of TM in psychiatry, and explored its advantages and limitations. A systematic review of the literature was carried out using the CINAHL, Medline, EMBASE, PsycINFO and Cochrane databases. In this review, 1103 papers were screened, and 38 were included as applications of TM in psychiatric research. Using TM and content analysis, we identified four major areas of application: (1) Psychopathology (i.e. observational studies focusing on mental illnesses) (2) the Patient perspective (i.e. patients' thoughts and opinions), (3) Medical records (i.e. safety issues, quality of care and description of treatments), and (4) Medical literature (i.e. identification of new scientific information in the literature). The information sources were qualitative studies, Internet postings, medical records and biomedical literature. Our work demonstrates that TM can contribute to complex research tasks in psychiatry. We discuss the benefits, limits, and further applications of this tool in the future. Copyright © 2015 John Wiley & Sons, Ltd.

11. Barak, A., Boneh, O., and Dolev-Cohen, M. 2010. Factors underlying participants' gains in online support groups. In A. Blachnio, A. Przepiorka and T. Rowinski (eds.), ´ Internet in psychological research, Warsaw, Poland: Cardinal Stefan Wyszynski University Press, ´ pp. 13–47. Online support groups vary widely in both goals and structures owing to the rapid development of social networking services. Several studies have shown the potential effectiveness of online support groups, such as reducing psychological distress (eg, depression) among individuals with mental health problems. However, online support

groups often do not aim at effectiveness regarding distress relief–related outcomes. This study aims to examine whether the use frequency of online support group platform functions (U2plus) is associated with lower stigma and higher consumer activation. A total of 350 U2plus users participated in a web-based survey. They were asked what therapy they had received in the past and how often they logged on to it, used each of its functions, and completed the following questionnaires: the Patient Health Questionnaire-9, the Devaluation-Discrimination Scale, and the General Help-Seeking Questionnaire. Regarding the therapy received, 88% (308/350) of participants had taken medication for mental health problems, and 66.6% (233/350) had received psychotherapy or mental health counseling. Regarding use frequency, 21.7% (74/341) of the participants signed in to U2plus and used its functions more than once a week. The use frequency of U2plus functions was not correlated with perceived stigma, but the use frequency of some functions was weakly correlated with help-seeking intentions from formal sources (eg, doctors and psychologists). However, multiple regression analyses revealed that the use frequency of those functions did not uniquely predict help-seeking intentions. It was suggested that online support groups may serve as an alternative treatment option for those who are already undergoing pharmacological treatment and are willing to seek help from whatever source they deem helpful.

12. An Intelligent Behaviour Shown by chatbot system International Journal of new Technology and Research (IJNTR) ISSN: 2454-4116, Volumne-3 Issue-4, April 2017 Pages 52-54 Chatbots are software agents used to interact between a computer and a human in natural language. Just as people use language for human communication, chatbots use natural language to communicate with human users. The main aim of their creation was to resemble a human being in the way they perform said interaction, trying to make user think that they are writing to a human. In this paper, we analyse some existing chatbot systems namely ELIZA and ALICE and then concludes that it is easier to build bots using ALICE because of its simple pattern matching techniques that building one for ELIZA since it is based on rules. Finally, we discuss our proposed system. In particular, the proposed system is the implementation of ALICE chatbot system as a domain specific chatterbox which is a student information system that helps users in various queries related to students and universities.
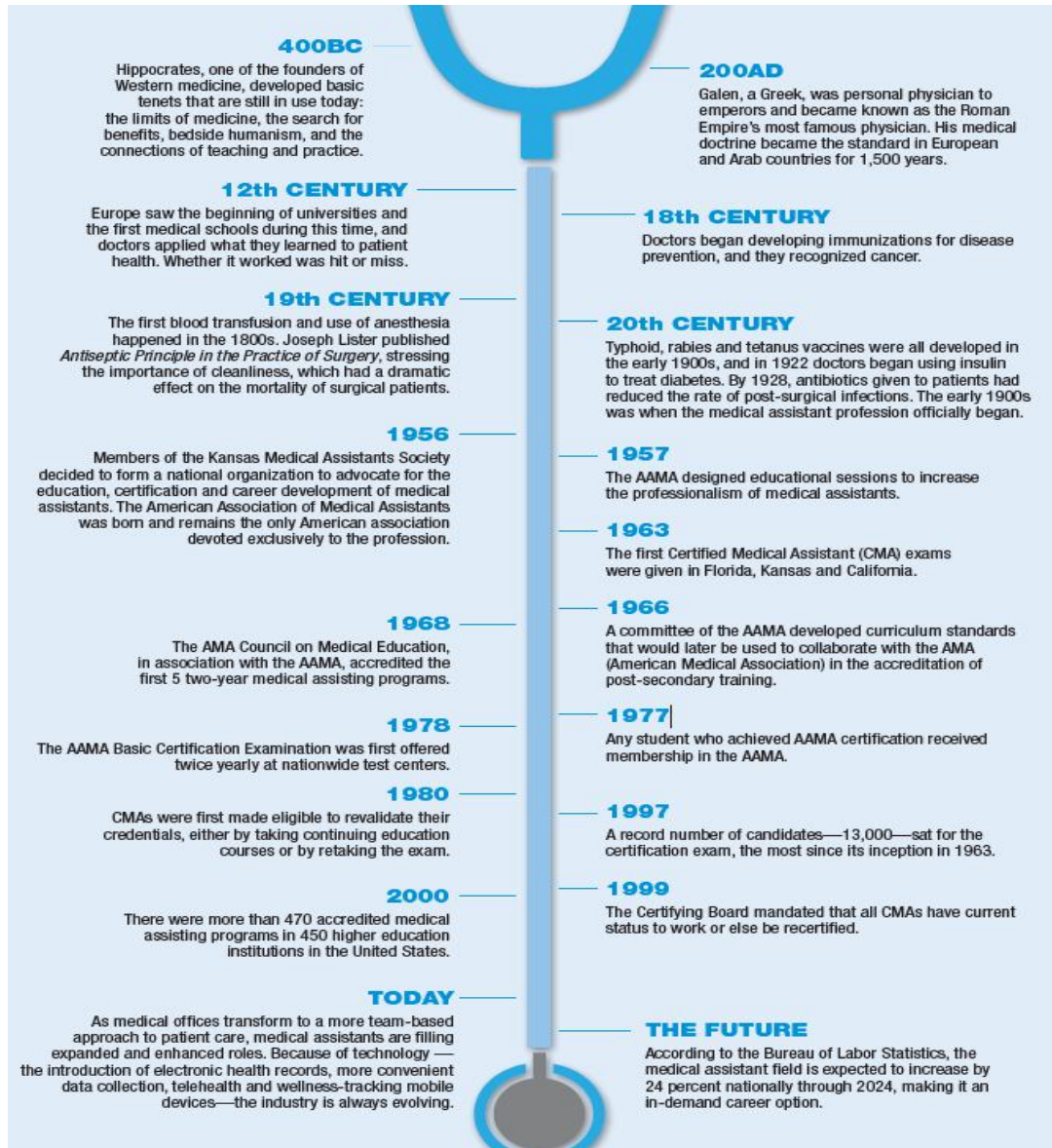
13. International Journal of Innovative Research in Computer Science & Technology (IJIRCST) Volume-6, Issue-3, May-2018 For using software applications, user interfaces that can be used includes command line, graphical user interface (GUI), menu driven, form-based, natural language, etc. The mainstream user interfaces include GUI and web-based, but occasionally the need for an alternative user interface arises. A chatbot based conversational user interface fits into this space. The chatbot is a class of bots that have existed in the chat platforms. The user can interact with them via graphical interfaces or widgets, and the trend is in this direction. They generally provide a stateful service i.e. the application saves data of each session. On a college's website, one often doesn't know where to search for some kind of information. It becomes difficult to extract information for a person who is not a student or employee there. The solution to these comes up with a college inquiry chat bot, a fast, standard and informative widget to enhance college website's user experience and provide effective information to the user. Chat bots are an intelligent system being developed using artificial intelligence (AI) and natural language processing (NLP) algorithms. It has an effective user interface and answers the queries related to examination cell, admission, academics, users' attendance and grade point average, placement cell and other miscellaneous activities.

14. International Journal of Computer Sciences and Engineering Open Access Review Paper Volume-5, Issue-5 E-ISSN: 2347-2693 In today's world computers play an important role in our society? Computers give us information; they entertain us and help us in lots of manners. A chatbot is a program designed to counterfeit a smart communication on a text or spoken ground. But this paper is based on the text only chatbot. Chatbot recognize the user input as well as by using pattern matching, access information to provide a predefined acknowledgment. For example, if the user is providing the bot a sentence like "What is your name?" The chatbot is most likely to reply something like "My name is Chatbot." or the chatbot replies as "You can call me Chatbot." based on the sentence given by the user. When the input is bringing into being in the database, a response from a predefined pattern is given to the user. A Chatbot is implemented using pattern comparing, in which the order of the sentence is recognized and a saved response pattern is acclimatize to the exclusive variables of the sentence. They cannot register and respond to complex questions, and are unable to perform compound activities [1]. Chatbot is relatively a new technology. The application of

a Chatbot can be seen in various fields in the future. This paper covers the techniques used to design and implement a Chatbot. Comparisons are made, findings are discussed and conclusion is drawn at the end [2]. A chatbot is one of the simple ways to transport data from a computer without having to think for proper keywords to look up in a search or browse several web pages to collect information; users can easily type their query in natural language and retrieve information. In this paper, information about the design, implementation of the chatbot has been presented. From the survey above, it can be said that the development and improvement of chatbot design grow at an unpredictable rate due to variety of methods and approaches used to design a chatbot. Chatbot is a great tool for quick interaction with the user. They help us by providing entertainment, saving time and answering the questions that are hard to find. The Chatbot must be simple and conversational. Since there are many designs and approaches for creating a chatbot, it can be at odds with commercial considerations. Researchers need to interact and must agree on a common approach for designing a Chatbot. In this project, we looked into how Chatbots are developed and the applications of Chatbots in various fields. In addition comparison has been made with other Chatbots. General purpose Chatbot must be simple, user friendly, must be easily understood and the knowledge base must be compact. Although some of the commercial products have recently emerged, improvements must be made to find a common approach for designing a Chatbot.

15. J. Jia, "The Study of the Application of a Keywords-based Chatbot System on the Teaching of Foreign Languages", Report of University of Augsburg, Augsburg, , pp.1-36, 2003. Since Joseph Weizenbaum nearly forty years ago programmed his ELIZA, the early natural language dialog system between human and machine, to work as a psychiatrist (Weizenbaum 1965), many similar programs have been made in this field of artificial intelligence. For example, ALICEBOT (http://www.alicebot.org), using the similar technique as in the ELIZA, i.e., the pattern matching mechanism, has won twice (2000, 2001) the annual Loebner Prize (http://www.loebner.net/Prizef/loebner-prize.html) which declares to "advance AI and serve as a tool to measure the state of the art" (Loebner). The human-computer dialog systems have also been applied in many fields such as sale recommendation, information retrieval, question answering on a given domain, etc. But how about using this system as a chatting partner of those who learn this natural language as a foreign language?
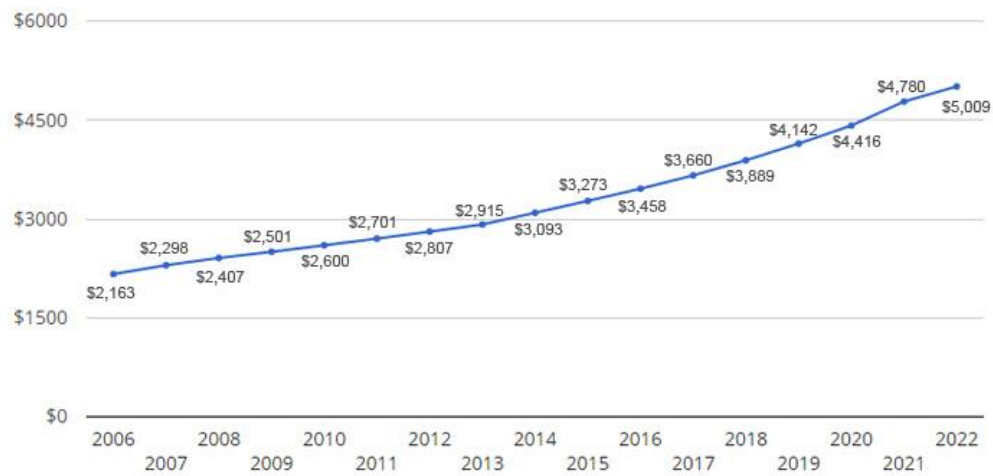
ALICEBOT is an open source project under GNU (http://www.gnu.org), and therefore can be freely downloaded and installed as a HTTP Server to supply the chatting service for non commercial use. Thus it gives us the chance to conduct the following experiment. A Medical ChatBot International Journal of Computer Trends and Technology (IJCTT) – Volume 60 Issue 1- June 2018 The main purpose of the scheme is to build the language gap between the user and health providers by giving immediate replies to the Questions asked by the user. Today's people are more likely addicted to internet but they are not concern about their personal health. They avoid to go in hospital for small problem which may become a major disease in future. Establishing question answer forums is becoming a simple way to answer those queries rather than browsing through the list of potentially relevant document from the web. Many of the existing systems have some limitation such as There is no instant response given to the patients they have to wait for experts acknowledgement for a long time. Some of the processes may charge amount to perform live chat or telephony communication with doctors online[7]. This system allows computer to communication between human to computer by using natural language processing (NLP). There are three analyses which understand natural language i.e. identification of main linguistic relations is completed to parse subject into object of the sentences. After that description of the texts is done. The semantic interpretation uses knowledge of word meaning Chatbot is an Entity which imitate human discussion in its particular accepted set-up together with a text or vocal language with techniques such as Natural Language Processing (NLP). The aim of this system is to replicate a person's discussion. The development of chatbot application canbe done with making a user interface to send input and receive response. It is a system that interact with user by keeping the track of the state of interaction and recollecting the preceding commands to give functionality. The medical chat-bots can be developed by using artificial algorithms that scrutinize user's queries and recognize it and give reply to related query. A big disease can start from small problems such as headache which feels normal but it may beginning of big disease such as brain tumor .most of the disease can be identified by common symptoms so the disease can be predicted if the patient body is analyzed periodically.

400BC

Hippocrates, one of the founders of Western medicine, developed basic tenets that are still in use today: the limits of medicine, the search for benefits, bedside humanism, and the connections of teaching and practice.

200AD

Galen, a Greek, was personal physician to emperors and became known as the Roman Empire's most famous physician. His medical doctrine became the standard in European and Arab countries for 1,500 years.

12th CENTURY

Europe saw the beginning of universities and the first medical schools during this time, and doctors applied what they learned to patient health. Whether it worked was hit or miss.

18th CENTURY

Doctors began developing immunizations for disease prevention, and they recognized cancer.

19th CENTURY

The first blood transfusion and use of anesthesia happened in the 1800s. Joseph Lister published *Antiseptic Principle in the Practice of Surgery*, stressing the importance of cleanliness, which had a dramatic effect on the mortality of surgical patients.

20th CENTURY

Typhoid, rabies and tetanus vaccines were all developed in the early 1900s, and in 1922 doctors began using insulin to treat diabetes. By 1928, antibiotics given to patients had reduced the rate of post-surgical infections. The early 1900s was when the medical assistant profession officially began.

1956

Members of the Kansas Medical Assistants Society decided to form a national organization to advocate for the education, certification and career development of medical assistants. The American Association of Medical Assistants was born and remains the only American association devoted exclusively to the profession.

1957

The AAMA designed educational sessions to increase the professionalism of medical assistants.

1963

The first Certified Medical Assistant (CMA) exams were given in Florida, Kansas and California.

1966

A committee of the AAMA developed curriculum standards that would later be used to collaborate with the AMA (American Medical Association) in the accreditation of post-secondary training.

1968

The AMA Council on Medical Education, in association with the AAMA, accredited the first 5 two-year medical assisting programs.

1977

Any student who achieved AAMA certification received membership in the AAMA.

1978

The AAMA Basic Certification Examination was first offered twice yearly at nationwide test centers.

1980

CMAs were first made eligible to revalidate their credentials, either by taking continuing education courses or by retaking the exam.

1997

A record number of candidates—13,000—sat for the certification exam, the most since its inception in 1963.

2000

There were more than 470 accredited medical assisting programs in 450 higher education institutions in the United States.

1999

The Certifying Board mandated that all CMAs have current status to work or else be recertified.

TODAY

As medical offices transform to a more team-based approach to patient care, medical assistants are filling expanded and enhanced roles. Because of technology — the introduction of electronic health records, more convenient data collection, telehealth and wellness-tracking mobile devices—the industry is always evolving.

THE FUTURE

According to the Bureau of Labor Statistics, the medical assistant field is expected to increase by 24 percent nationally through 2024, making it an in-demand career option.

Fig: 2.1: Timeline of Medical Assisting

As we can clearly see from fig 2.1 today, medical assisting is a rapidly growing profession, and it's better defined than ever before. Medical recommendations, instead of being people who follow around a physician or do unorganized support work for a hospital, are now trained professionals who often have specific specializations. There have always been

medical recommendations of some sort, but today we finally have a name and a defined role for what always has been and always will be an essential part of healthcare.

Fig: 2.2: Healthcare spending since 2006 to 2022

So, does the fact that there are fewer graduates and placement rates are still not great overall mean there is less demand for medical recommendations? Really the question should be is the healthcare market growing in a way that will mean more demand for medical recommendations in the future?

In answer to that, all estimates predict healthcare expenditures to rise and the healthcare industry is forecast to grow to a $5 trillion sector of the economy by 2022 and to grow faster than any other sector. One of the costs of health expenditure is labor, within which is medical assisting. . Figure 2.2 shows the increasing amount of money being spend on healthcare .We can see a drastic increase in healthcare spendings.

Because the salary for medical recommendation is low while the work they do is high also in some places like India and Nepal the respect they deserve is not given which is why the 1:1000 ratio is currently 1:1500, it means that we have 1 health recommendation is available for 1500 patient however as per WHO guidelines 1 health recommendation is required for 1000 patient. This evident from the fact that the need for health recommendation is more than ever and growing every day. Thus to bridge the gap and fulfill the need of human recommendation, we came up with the idea of this AI based health recommendation project.

2.2 Proposed Solution

There were various solution mentioned throughout the years of research has developed Health recommendation for various diseases like heart diseases, Cancer treatment and Blood tests. Few of the good recommendation are:

- Buoy Health which is an AI based symptom and cure checker that uses algorithms to diagnose and treat illness. Here's how it works: a chatbot listens to a patient's symptoms and health concerns, then guides that patient to the correct care based on its diagnosis.

- We have one for Cancer named Freenome which uses AI in screenings, diagnostic tests and blood work to test for cancer. By deploying AI at general screenings, Freenome aims to detect cancer in its earliest stages and subsequently develop new treatments.

- Iterative Health applies AI to gastroenterology to improve disease diagnosis and treatment. The company's AI Recruitment service uses computational algorithms to automate the process of identifying patients who are eligible to be potential candidates for inflammatory bowel disease clinical trials.

- VirtuSense uses AI sensors to track a patient's movements so that providers and caregivers can be notified of potential falls. The company's products include VSTAlert, which can predict when a patient intends to stand up and alert appropriate medical staff, and VST Balance, which employs AI and machine vision to analyze a person's risk of falling within the next year.

We have seen a lot of solution that are really amazing and works good when it comes to give good suggestion however the problem with these are that these are not for every one. To use these you need to have certain amount of understanding and knowledge. So we are creating a similar recommendation that is working on a basic problems like fever, stomach ache, viral, typhod, disorder and many more. Which are some problem that people face in their daily life and are not aware of the seriousness and treatment of such thing. So what they need to do is just press a button and ask the recommendation I have fever and the recommendation will either give the advice herself of take you to the question related web pages.

2.3 Problem Defination

In this growing world, rapid population growth, continuously increasing demand, and trendy Development has given birth to several diseases that required regular tracking. Generative chatbots are chatbots which generate a response to the user input not based upon a predefined set of answers. The response is generated from the corpus data which is large in volume. Such chatbots use models like Seq-to-Seq Model (Nuruzzaman, Hussain, 2019). Certain chatbots are built upon BERT. BERT means Bidirectional Encoder Representations from Transformations. It is a language model technique developed by Google. It can help in better understanding the context of the words given as an input to the chatbot (van Aken, Betty, et al., 2019). Rasa is a platform for the creation of industrial-grade chatbots which are powered by AI, and other implementations include chatbots based on the RASA framework. Developers use it to create chatbots and recommendations. Action-oriented, FAQ-type chatbots, chatbots answering questions, applying business logic, and performing actions based on specified logic are typical implementations built on RASA. Talking specifically about mental health chatbots, several implementations of mental health chatbots are available commercially, they include Wysa and Woebot. They are available in the form of android and IOS applications. Wysa is an AI-based virtual therapist, who engages the user in a friendly dialogue using a blend of Cognitive behavioural therapy and mental health practices. Commercially available on Android phones and IOS systems as an application, Wysa protects the conversational data of the user by using encrypted chats and allows the user to use a concealed identity (van Aken, Betty, et al., 2019). Another commercial implementation of a virtual therapist for mental wellbeing is Woebot, which is also available in the form of an iPhone and Android application. It prompts the user to log in, unlike Wysa, and then initiates a short user survey where it tries to understand the user. It also practices Cognitive Behavioral Therapy, an approach to treatment which helps in improving mental state. The app provides regular check-ins for the user, short pre-filled options, and a gamified experience (van Aken, Betty, et al., 2019). For the comparison between Wysa and Woebot carefully chosen set of questions are asked to both their responses are noted in Table.

As the human population progress towards the industrialization and technological advancement it attracted a lot of new diseases. For example: Due to world war the Hiroshima & Nagasaki got bombed by USA lead to mutation and still causing genetic disorder in newborn. Over exploitation of the natural resources lead to land, air and soil pollution which in return contaminated our food which caused many disease spread like nausea, diarrhea, heart diseases and asthma.
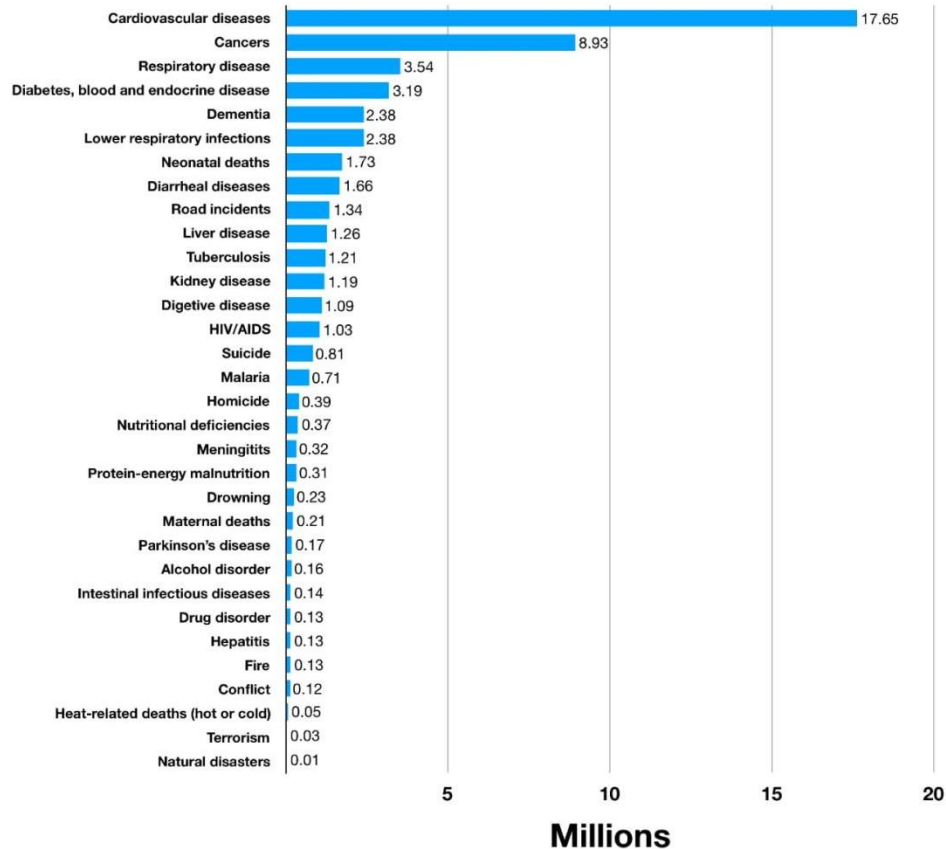
Fig: 2.3: Annual Number of Deaths by cause

According to the statistical data from WHO, one third population worldwide died from heart disease alone. Heart disease is found to be the leading cause of death in developing countries by 2010. In Figure 2.3 we can see that how the world is impacted by diseases and is responsible for a large amount of deaths worldwide.

People now a days want to live a healthy and quality life, for that they need to eat right, sleep right, and exercise right. Some people adapts quickly out of internet few needs recommendations to manage through these. People also have small queries related to health

issues that are minor for doctor but people seek doctor advice which make health sector crowded all the time. Most of the people have diabetic, cholesterol and blood pressure. These are the disease that needs continuous monitoring which are lacked by many patients.

Fig: 2.4: Distribution of Health workers by level of Health Expenditure and burden of Disease.

Today, medical assisting is a rapidly growing profession, and it's better defined than ever before. Medical recommendations, instead of being people who follow around a physician or do unorganized support work for a hospital, are now trained professionals who often have specific specializations. There have always been medical recommendations of some sort, but today we finally have a name and a defined role for what always has been and always will be an essential part of healthcare. In figure 2.4 we show the distribution of health worker distribution for a particular disease. There have always been medical recommendations of some sort, but today we finally have a name and a defined role for what always has been and always will be an essential part of healthcare.

2.3.1 Feature Identified

Here is the list of features that have been used in previous developed health recommendation and gave outstanding result and showed advance thinking process behind every query.

1. Clinical Features
2. Cholesterol
3. Diabetes
4. Smog

5. HIV & AIDS

6. Panic attack

7. Mental Illness

8. Depression

2.3.2 Technique Used

Following are the technique were commonly found across the all available health recommendation.

1. Speech to Text(STT) and Text to Speech (TTS)

2. Computer Vision

3. Noise Control

4. Speech Compression

5. Natural Language Processing (NLP)

6. Natural Language Understanding (NLU)

7. Natural Language Generation (NLG)

8. Deep Learning

9. Emotional Intelligence (EI)

2.3.3 Evaluation Parameters

A number of technique are used to test the accuracy of the system like various manual and automated testing are done by tester as well as the client before the official lunch of the system.

1. Unit testing

2. Stress testing

3. Performance testing

4. Functional testing

5. Non-functional testing

6. Black Box testing3

7. White Box testing

2.4 Bibliometric Analysis

The terminology used to define technological changes in healthcare and medicine has changed from medicine technology (1940s–1970s), to healthcare technology (1980s), to health technology (1990s–present). In this era of technology revolution, new health technologies continue to emerge. Virtual reality, wearable health detection, implantable sensors, and 3D printing are widely applied in the health industry. The application of these technologies can promote great changes and thoroughly improve the capability of the whole healthcare system. n Data, we focus exclusively on textual data (as opposed to physiological signals, activity, etc.) that has been analyzed for mental health applications.

We also focus on texts that have been written by users (e.g. mostly consumers, occasionally patients) rather than doctors or researchers. There is a significant amount of research focused on using NLP to process clinical notes, medical records and academic research papers, but they do not contribute to the focus of this review (user-generated texts) – for a review see Abbe et al. (Reference Abbe, Grouin, Zweigenbaum and Falissard2015).
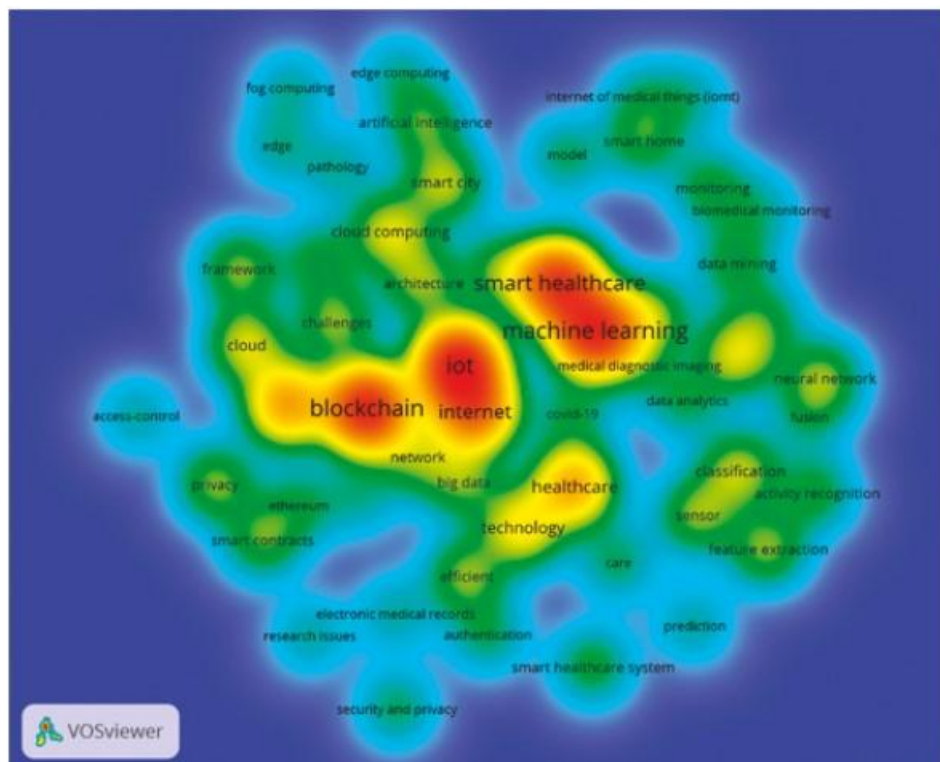
Fig 2.5 Bibliography Graph

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Figure 2.5 shows the bibliometric analysis of research in modern history around worldwide.

Initial search terms included the name of data sources often used in NLP projects (Twitter, Facebook, etc.) AND Mental Health AND NLP (written as Facebook + 'mental health' + 'NLP'). Google Scholar generally sorts papers by the number of citations so papers with few or no citations might have been missed. Links were followed and if found appropriate, added to a database. We run searches for (Facebook OR Twitter) AND (Mental Health) AND (NLP) in PubMed, but did not get any results. The search for Mental Health AND NLP gave 35 results. The references in highly relevant papers were scanned for title and authors that seemed relevant. This process was followed for each of the three areas (i.e. stages) by one of the authors. In later iterations, all authors were involved.

Bibliometrics refers to the method of applying mathematical statistics to quantitatively analyze the temporal and spatial distribution properties of scientific documents in a specific field, which can realize the scientific transformation of documents from data to knowledge. In bibliometrics, there are two main procedures: performance analysis and science mapping. Performance analysis is based on bibliographic data to assess the impact of groups of scientific actors (countries, institutions, and researchers) and their activities. Science mapping aims to show the knowledge structure, dynamic evolution, and trends in the research field, which can provide spatial representation through physical proximity and relative position to show the relationships between disciplines, fields, papers, or authors. The most commonly used analytical methods of bibliometrics are documents co-citation and co-word analysis. Documents co-citation refers to mapping the knowledge structure of the research field through the commonly cited paired documents. Co-word analysis is a kind of content-analysis technology, which directly deals with the term set shared by documents and maps relevant documents through the interaction of key terms. The results of co-citation or co-word analysis can be used for a variety of purposes, such as identifying current research hotspots and frontiers and analyzing the evolution and trend of knowledge structure.

The VOSviewer software developed by Leiden University in the Netherlands can realize the mining of literature authors, journals, countries, and other information through bibliometrics, and can also carry out visual analysis by constructing citation networks and co-occurrence

networks. This software has advantages in the accuracy of information mining, network density, and cluster visualization. In this paper, VOSviewer software was used to mine the information of authors, journals, and institutions of health technology literature, as well as to analyze the map of the core author group, key points of published journals, and the cooperative network of institutions.

Citespace software developed by Professor Chen Chaomei has been widely used to identify research topics and research frontiers, and has become a popular tool in bibliometrics research. In this paper, the "TOP N" algorithm of Citespace software was used to extract the top 30 high-frequency keywords in each time slice, and the co-occurrence map and co-occurrence matrix of high-frequency health technology keywords from 1990 to 2020 were generated. Then, Callon's clustering rules and a strategic coordinate graph analysis method were combined to identify the core research topics and emerging research topics of health technology. Then, the Burst Detection function of Citespace was used to extract the burst keywords to identify the research frontiers in the field of health technology.

In the process of identifying emerging research topics, it is necessary to establish strategic coordinates by taking the attention index of research topics as the horizontal axis and the novelty index as the vertical axis. According to the novelty and attention of each research topic, as well as its distribution in the four quadrants, the emerging research topics could be identified.

Some scholars adopted qualitative methods to review some health technology research others applied bibliometric methods to review some health technology systems and the application of emerging technologies in the health sector. However, these studies only focus on a specific piece of technology or application. The lack of a comprehensive picture of the current status in the field of health technology research makes researchers' overall understanding limited.

A total of 364 faculty met inclusion criteria. Between 1972 and 2019, 895 peer-reviewed articles were published; 603 were published in the last 10 years. Approximately half the study cohort (n = 172) published at least one peer-reviewed article that met inclusion criteria (range 1-89; median = 2). Overall, productivity remained steady over the last 10 years (range 0-59; median = 2). Faculty at the professor and associate level had a median h-index

of 2.00 and recommendations had a median h-index of 1.00. PhD-prepared faculty published more articles and had higher h-indices than faculty with other types of degrees.

The results provide bench-marking data that can be used for promotion and professional development. More faculty must publish and increase the citation rate of their publications if we are to improve the reputation of the PA educator literature.

2.5 Review Summary

As the review progressed, it was agreed by the Steering Group, and approved by the HSE, that a full literature review would be undertaken. Review relevant national and international peer reviewed evidence and policy literature (including 'grey literature') in relation to health care recommendations' role and function and their educational preparation. Some resources, such as conference proceedings and literature reviews were useful to bootstrap our literature search. These include the First Workshop on Computational Linguistics and Clinical Psychology (Resnik, Resnik and Mitchell Reference Resnik, Resnik and Mitchell2014) held within the annual meeting of the American Association on Computational Linguistics, the leading NLP conference.

- The papers published in the proceedings from this conference highlight the breath of current topics being considered: depression, Alzheimer's, autism, violence and aphasia. For the purposes of this scoping paper, we have taken a narrower, and standard definition of mental illness: disorders that affect cognition, mood and behaviors, including depression, anxiety disorders, eating disorders and addictive behaviors. Analyze the education preparation of health care recommendations nationally and internationally. Outline the role and the function of health care recommendations in all care settings in Ireland, and internationally, including but not limited to; the UK, Netherlands, Australia, Scandinavia, New Zealand, USA and Canada. The review was aimed to provide a taxonomy of how NLP has been used in mental health applications and potential future opportunities for its integration into online mental health tools. This application domain is highly interdisciplinary, with the technical aspects of building systems and the mental health challenges of helping those who most need it. A common problem is that the research literature in one area is often not known to

researchers in the other which makes collaboration difficult. In fact, often these collaborations can be hindered by differences in the language, terminology and methodology. psychology and psychotherapic applications is rapidly growing. Identifying the processing of raw healthcare data of heart information will help in the long term saving of human lives and early detection of abnormalities in heart conditions. Machine learning techniques were used in this work to process raw data and provide a new and novel discernment towards heart disease. Heart disease prediction is challenging and very important in the medical field. However, the mortality rate can be drastically controlled if the disease is detected at the early stages and preventative measures are adopted as soon as possible. Further

- extension of this study is highly desirable to direct the investigations to real-world datasets instead of just theoretical approaches and simulations. The proposed hybrid HRFLM approach is used combining the characteristics of Random Forest (RF) and Linear Method (LM). HRFLM proved to be quite accurate in the prediction of heart disease. The future course of this research can be performed with diverse mixtures of machine learning techniques to better prediction techniques. Furthermore, new feature selection methods can be developed to get a broader perception of the significant features to increase the performance of heart disease prediction. [22]

- The purpose of this work was to compare algorithms with different performance measures using machine learning. All data were pre-processed and used for test prediction. Each algorithm worked better in some situations and worse in others. KNearest Neighbour K-NN, and Random Forest RF and Artificial Neural Network MLP are the models likely to work best in the data set used in this study. Experimental results show that the optimization hybrid approach increase the predictive accuracy of medical data sets. The proposed methods are compared to supervised algorithms based on existing approximate sets and classification accuracy measurements are used to evaluate the performance of the proposed approaches.

- Therefore, the analysis section clearly demonstrated the effectiveness of hybrid PSO and ACO approaches to disease diagnosis compared to other existing approaches. The proposed optimized model by FCBF, PSO and ACO achieve an accuracy score of 99.65% with KNN and 99.6% with RF. This paper can be the first step in learning in the diagnosis of heart disease with automatic learning and it can be extended for future research. There are several limitations to this study mainly the author's knowledge base, secondly, the tools used in this

study such as the processing power of the computer and thirdly the time limit available for the study. This type of study requires state-of-the-art resources and expertise in the respective fields.

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- By analysing the experimental results, it is concluded that J48 tree technique turned out to be best classifier for heart disease prediction because it contains more accuracy and least total time to build. We can clearly see that highest accuracy belongs to J48 algorithm with reduced error pruning followed by LMT and Random Forest algorithm respectively. Also observed that applying reduced error pruning to J48 results in higher performance while without pruning, it results in lower Performance. The best algorithm J48 based on UCI data has the highest accuracy i.e. 56.76% and the total time to build model is 0.04 seconds while LMT algorithm has the lowest accuracy i.e 55.77% and the total time to build model is 0.39 seconds.

- The Health recommendation using Machine learning algorithm, viz. MLP provides its users with a prediction result that gives the state of a user leading to CAD. Due to the recent advancements in technology, the machine learning algorithms are evolved a lot and hence we use Multi Layered Perceptron (MLP) in the proposed system because of its efficiency and accuracy. Also, the algorithm gives the nearby reliable output based on the input provided by the users. If the number of people using the system increases, then the awareness about their current heart status will be known and the rate of people dying due to heart diseases will reduce eventually.The application of cutting-edge Natural language technologies in combination with psychotherapy can lead to tools which can to a great extent fill the holes in the delivery of mental care. However, they need to be tested and tried on a large scale and viable outcomes should be documented before approving any clinical use.

- The various Natural Language technologies were discussed at length. Current applications of Natural Language Processing in mental care delivery was examined and It was established. Following our assessment that most of the existing scientific work on chat bots is concerned with technical developments, we reviewed existing substantial scientific work concerning medical chat bots included in top peer-reviewed journals and conferences related to the behavior change perspective and built up a comprehensive literature review.

2.6 Goals/Objectives

The project was first chosen because it has a lot of potential where AI can really shine. Then after a lot of research and reading we got to know that there are already exists larger number of application and software that can predict cancer, internal damage and analyze the human vitals also they are smart enough to give the suggestion to the user about their physical as well as mental health. After looking and going all of those we finally decided to make an recommendation that can work on general requirement of the users like small diseases for which we can easily pes-cribe the medicine and no serious damage would be done to user. The some goal of our project are:

- To make an recommendation that can easily understand the native language of the user and give feedback and suggestion in their own language to have better communication and understandings. This recommendation would be very simple to use same as Google recommendation, Siri and Alexa with minimum buttons and more talking like patient is chatting with doctor.

- In Future we would like to include this to more social media platform as we can so that one can share about their health problem to their loved ones and also because of the popularity of the social media app will lead to self-awareness campion of this project.

- As we are making this project so that people can use this to take care of themselves and ask about minor problem we would also like to integrate this to the various smart phones watches using IOT so that we can also take the reading of SPO2, heart rate and BP to give them accurate solution.

  Apart from these we have some short term objectives that we would like to achieve as soon as possible because we think that these are the most crucial and important features to be introduced and launched in this project.

- For the time being this is just a chat bot however in coming year or two we would like to make it an app which can be used in both hands free mode or you can do everything manually using UI where you can book and appointment with doctor if you are not satisfied.

- We are also planning to include a phone service system which will call doctor on the spot to get the suggestion more clearly, because we have considered the India as the market to launch so we personally believe that people would not be satisfied with the solution provided by the AI so this feature will help us to get the reach to maximum users.

- Booking appointment and meetings can also be done thorough the app. Also we can integrate various online medical shop like NetMeds so that you can easily order the basic medicine online and the prescription would also be made by our AI health recommendation.

  These are our few goals and objective. To build it fully a lot of data resources are required and many doctors recommendation and approvals are required. The testing part is the most crucial part as it will be working on a real world with some real people in need. All this are considered these are our final goals and objectives.

CHAPTER - 3

DESIGN FLOW/PROCESS

3.1 Evaluation & Selection of Specifications Features

As we have seen in our previous chapter that a lot of application and web pages are there who can predicts disease and gives suggestion or simply gives you the name of disease that you are suffered from. We have also seen some features that are quite useful and tried to implement it into our project like we have the following features found in previous build chatbot and health recommendation:

- Emotion Analyzer

- Document Scanner

- Intelligent Chat and sentiment analysis

- Web APIs for smart and accurate suggestion

- MRI, CT scan reader.

  The above mention feature are impressive and can help recommendation predict the solution more accurately. However in our project we have included:

- Text to speech and speech to text converter

- Web API for smart search

- Speech Recognition

- Easy customization.

- Quick chatbot training.

- Easy omni-channel deployment.

- Integration with 3rd-party apps.

- Interactive flow builder.

- Multilingual capabilities.

- Easy live chat.

- Security & privacy.

  With these features we can create our project that can smartly give the near to accurate solution ot the user which will also be backed by the various real world data feed to the system. As we wanted to make a human like interaction with our health recommendation so we gave some human touch to our project by keeping it simple and close to ground. Chatbots are systems that are able to converse and interact with human users using spoken, written, and visual languages. Chatbots have the potential to be useful tools for individuals with mental disorders, especially those who are reluctant to seek mental health advice due to stigmatization. While numerous studies have been conducted about using chatbots for mental health, there is a need to systematically bring this evidence together in order to inform mental health providers and potential users about the main features of chatbots and their potential uses, and to inform future research about the main gaps of the previous literature.

3.2 Design Constraints

Every project comes with some design constraint that cannot be implemented with out a flaw. While designing the software, software designer gives his best to make software attractive and eye catching. However while building make a software attractive and functional doesn't seem to go parallel. Here are some of our design constraints that we discovered.

- System should be able to withstand 1000 request daily since on an average there could be a 1000 request in a medium sized organization. Accuracy of the system should be at least 90% since anything less than this will make the system useless. Interface should be user friendly to ensure that even a no voice user can easily use it.
- System should be deployable in any type of environment such as windows, linux since diverse range of computers are used all over the world. System services should be available

online also incase clients computer doesnot support or donot have minimum system requirements to run the applicaiton.

- Overall size of the software should not go beyond 1 GB to make sure the applications doesnot consume too much of RAM. One of the target is to make sure the application can be deployed in modest type of systems also so that all can benefit from this. System should be able to work in a 4 GB RAM as average computers are of 4GB only.

- No personal details of the patients to be recorded and stored in any manner, other data should be well hidden from regular employees and should be accessible upon request only since we value and respect our customer's privacy.

3.3 Analysis and Features finalization subject to constraints

This is the main part of process while creating this project as we have to cut down some features to meet the dead line also because of technical difficulty we have trimmed our project to fulfill the minimum requirement of the user.

- We kept the speech to text and vice versa as a feature as we wanted to go full hands free in this one for the convinence of the user. Also we kept the speak in regional language features as speech recognition will recognize the language and then translate it for its easy use and then translate it back to user in same regional language.

- Deep learning discovers the intricate structure in large data sets by using a backpropagation algorithm operating on multiple levels of abstraction.4 It is aimed at increasing the capacity of supervised and unsupervised learning algorithms for solving complex real-world problems by adding multiple processing layers based on artificial neural networks, including "hidden layers" that play a key role in breaking down the problem to be analyzed. Deep learning has brought breakthroughs in domains that rely heavily on feature detection and big data (eg, Go game, computer vision, speech recognition, NLP, drug discovery, and genomics).

- Machine learning has been applied to many data types (such as images, speech, videos, and text) on complex tasks that involve massive data, producing results that are comparable to and sometimes superior to human experts in terms of both accuracy and efficiency. It has shown the potential to provide data-driven, evidence-based clinical intelligence for

advancing medical diagnosis, treatment decisions, biomedical research, and service delivery across the full spectrum of healthcare.

- Even though ML has achieved great successes in areas where medical imaging and big data are involved, ML is not an all-purpose solution. For tasks that require common sense reasoning or domain-specific knowledge, or situations that are outside of the ML training data set, ML is less applicable. This is because ML relies on computational power and massive data to identify superficial patterns and correlations. As such, it does not reveal the causal relations or clear understanding of the phenomenon under study.

- Consequently, it is difficult to explain the results of ML and fix the specific known errors produced by the ML algorithms. The Cardiovascular Lifetime Risk Pooling Project showed that adults with all-optimal risk factor levels (similar to having ideal cardiovascular health factor levels of cholesterol, blood sugar, and BP, as well as not smoking) have substantially longer overall and COVID-free survival than those who have poor levels of ≥ 1 of these cardiovascular health factor metrics. Short-term exposure to water pipe smoking is associated with a significant increase in SBP and heart rate compared with nonsmoking control subjects but long-term effects remain unclear.

- According to NHANES 2007 to 2012, 17% of US adults with DM met the criteria for major depression or subsyndromal symptomatic depression. This represents 3.7 million US adults with these conditions. Chest pain type (typical angina, atypical angina, non-angina pain, asymptomatic), Trestbps (resting blood pressure in mm Hg), cholesterol (serum cholesterol in mg/dl), fasting blood sugar < 120 mg/dl (true or false), resting electrocardiographic results (normal, having ST-T wave abnormality, showing probable or definite left ventricular hypertrophy by Estes' criteria), max heart rate, exercise induced angina (true or false), oldpeak (ST depression induced by exercise relative to rest), slope (up, flat, down), number of vessels colored by fluoroscopy (0-3), thal (normal, fixed defect, reversible defect), and class (healthy, with disease).

  Gender plays an important role when it comes to disease prediction. Men and women shows different signs of heart attack. Not all type of chest pain are indicative of a disease, but it would be interesting to learn if its really a sign of any specific type of disease. Blood pressure is most prevalent in both sexes and number cause of hypertension. So its influence on heart related disease is very interesting to study. Machine learning represents the

dominant approach in AI, and it is responsible for most of the recent advancements in the field. Typically, ML refers to a system that trains a predictive model by identifying patterns of data from input, then uses such a model to make useful predictions from new, never-before-seen data. Machine learning algorithms can automatically learn and improve from experience without being explicitly programmed, and such "learnability" represents a key feature of AI. Machine learning is widely used in other types of AI technologies, such as NLP, voice technology, and robotics. Health leaders need to become familiar with the main ML algorithms as they are the foundation for understanding the potential and limitations of various types of AI technologies. Briefly speaking, the most common ML algorithms are supervised learning, unsupervised learning, Reinforcement Learning (RL), and deep learning.

Supervised learning uses a data set as input and some known, labelled outcomes as output, then identifies patterns that correlate the outcomes with input for making predictions. In this approach, the algorithm needs to know the conclusions it should come up with from a given data set. With enough data and correctly labelled answers, the algorithm eventually learns to make predictions from input data it has never seen before.

Supervised learning has been widely applied to healthcare, providing data-driven clinical decision support for mapping input variables into discrete categories (eg, using medical imaging to diagnose cancer tumor, its subtypes, and severity) and predictive analytics within a continuous output (eg, using Electronic Health Record [EHR] data to make predictions about the recurrences, prognosis, and mortality of a disease).

Unsupervised learning is used to discover the structure of data and make predictions based on input alone. This learning algorithm is more applicable to situations in which the outcomes are unknown or the labelling of data is too costly. It is mostly used in an exploratory way for clustering, anomaly detection, and pattern recognition in a variety of data types. In healthcare, unsupervised learning is particularly useful for predicting individual disease risks using genetic biomarkers or for designing personalized treatments based on genomic variations. As unsupervised learning can automatically "learn" without human's labelling of outcomes, it is closer to "true AI" in some sense.

However, without human teaching, unsupervised learning is more prone to errors because it may use trivial features of the data to make predictions. So, in practice, supervised and

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unsupervised learning are often used in combination by making use of a large amount of unlabelled data for training with only a small proportion of data labelled. This is called semi-supervised learning which takes the advantages of both learning algorithms.

Reinforcement learning is a more autonomous learning algorithm that allows a computer agent to take actions and interact with the environment using rewards and errors as the feedback to guide training. This can be seen as the ultimate self-learning approach because the agent learns from its own experience without either data or labelling; it produces very good results for sequential decision-making tasks or tasks that are well defined with clear rules and outcomes, such as abstract strategy board games like Go. It is also used successfully in self-driving cars and robotics. In healthcare, it can be used in situations in which an agent needs to continuously interact with the environment and adjust its actions based on the feedback from the environment, for example, for optimizing treatment designs and robotic-assisted surgery.

3.4 Design Flow

The designed bot can handle user requests and identify message patterns with an artificial intelligence markup language (AIML). AIML is an XML-based markup dialect to create natural language software agents and gives the real human interactive experience to users. Depending on user responses, AIML logic retrieves symptomatic keywords to assess the existing user medical conditions. Ultimately, we aim to make sure the user feels like they are having a conversation with a health specialist. As we can see in figure. 5 this is the proposed architecture for our AI-Powered Health Chatbot, and we will give further explain for every component in the next upcoming papers. First of all, the end user interacts with the chatbot through a client platform. It's important to be user friendly and give an excellent UX. Each time, the user is having a request, it's routed to the NLP Engine using the appropriate API's, in the NLP Engine, and with NLU, the chatbot understands the request and format the data into understandable form that can be understanded by the Core Engine. Once the Core Engine receives the formatted data, it searches using Deep Learning Algorithms, the appropriate response and send it back to the NLP Engine. The NLP Engine receives the request response in formatted format, which cannot be understood by the end user, this is why, and using NLG, the NLP Engine rephrase it the way the user can understand it. And

once again it's transmitted to the user using the appropriate API's. The functionality of chat bot is defined in two ways: request analysis or return response. At first, chat bot evaluates the severity of the virus through feedback from a predefined questionnaire. Simultaneously, if the user fails to acknowledge precise answers, the bot will fail to provide the correct response. In its response return, after the evaluation of a patient's condition, the chat bot provides an obvious response in the form of either generic text or text retrieved from the knowledge base response.
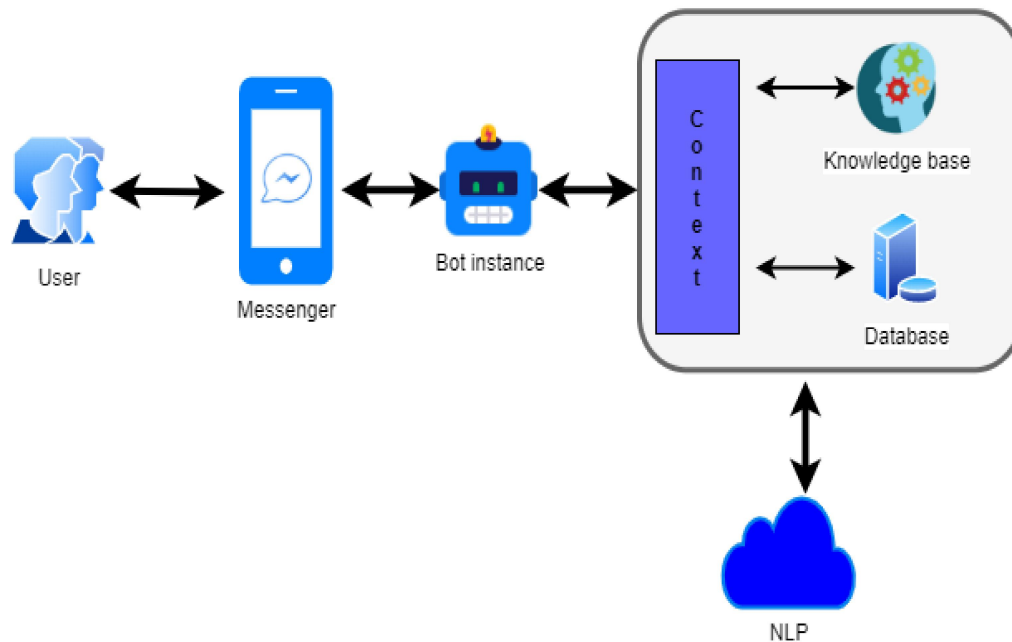
Fig: 3.1: Design framework of Health recommendation chat bot.

A render question could help chatbot precisely understand the user's request. To achieve the intended response, the fusion of AI technology with natural language programming (NLP) has been done, because NLP is a helpful technology to draw the relationship between natural language understanding and decides complementary response outcomes. The knowledge base is focused on user message response during the initiation of conversation—it should be natural at responding with a suitable back-end logic.

The idea behind this is to identify preliminary symptoms of nCOV-19 from the user location. A systematic search of seven databases and Google Scholar was conducted to identify studies published in English peer-reviewed journals from 2003 to 2013 and reporting on the

effectiveness and implementation of advanced allied health recommendation (A/AHA) roles. Reference lists were also screened to identify additional studies, and the authors' personal collections of studies were searched. Studies were allocated to the National Health and Medical Research Council hierarchy of evidence, and appraisal of higher-level studies (III-1 and above) conducted using the Centre for Evidence Based Medicine Systematic Review Critical Appraisal Sheet for included systematic reviews or the PEDro scale for level II and III-1 studies. Data regarding country, A/AHA title, disciplines, competencies, tasks, level of autonomy, clients, training, and issues regarding the implementation of these roles were extracted, as were outcomes used and key findings for studies investigating their effectiveness. Fifty-three studies were included, and most because they reported background information rather than investigating A/AHA roles, this representing low-level information.

A/AHAs work in a range of disciplines, with a variety of client groups, and in a number of different settings. Little was reported regarding the training available for A/AHAs. There is evidence that highly qualified health care providers are increasingly allocating tasks to other practitioners in order to allow management of patients with more complex conditions and needs.3,4 The boundaries between groups of health professionals are shifting, for example, between doctors and physiotherapists in orthopedic clinics. Specially trained physiotherapists work in an extended role by being involved with the assessment and management of referrals from orthopedic surgeons.5 This concept of extended scope practice combines "role enhancement" and "role substitution". Role enhancement is defined as increasing the depth of the job by extending the roles or skills of a particular group of workers.

Four studies investigated the effectiveness of these roles, finding that they were generally well accepted by clients, and provided more therapy time. Issues in integrating these new roles into existing health systems were also reported.Thereafter, it will display whether the user is likely to be infected or not. Where the findings of a study informed the review questions (ie, not solely background information) the study design was identified, and assigned to the National Health and Medical Research Council (NHMRC) hierarchy of evidence After the user initiating the chat session, the bot engine starts questioning the person regarding symptomatic information. Once it has all of the necessary details, it finds

the virus severity percentage that the user experienced and acts accordingly, by either making contact with health specialists or provides information regarding immediate preventive measures. It depicts the systematic functionality of the proposed chatbot application.
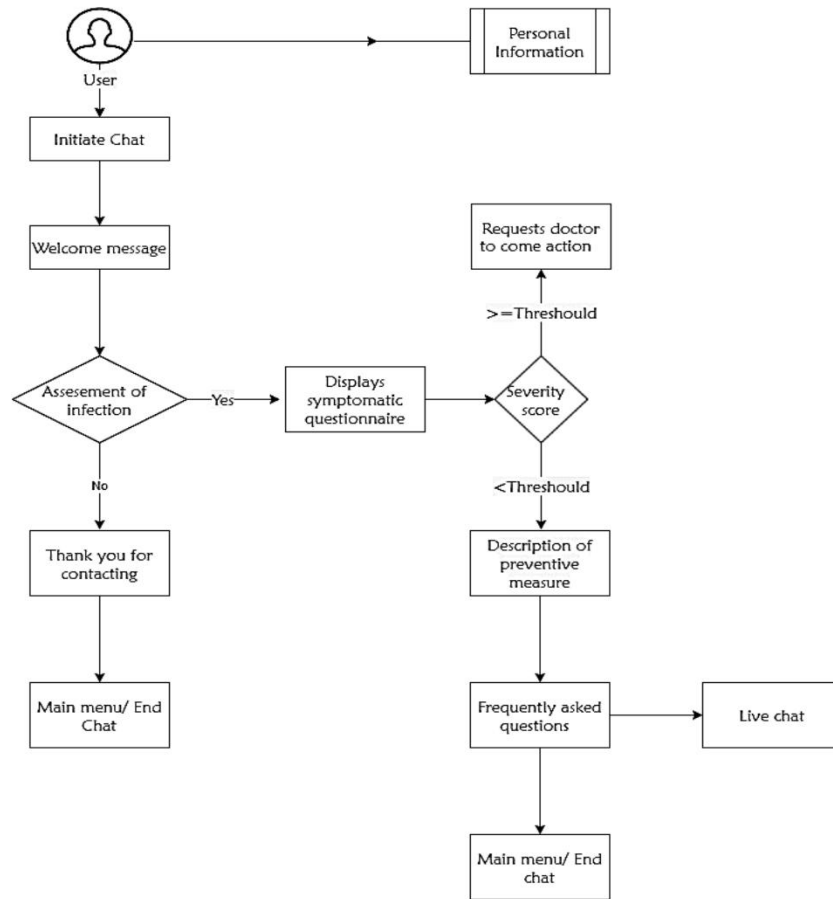

Fig: 3.2: Working functionality of the developed chat bot.

Figure 3.2 shows the approach to develop a working chat-bot with the help of available technologies. This is mostly based on the idea where user has to type in to interact with the bot.A graphical tool used to describe and analyze the moment of data through a system manual or automated including the process, stores of data, and delays in the system. Data Flow Diagrams are the central tool and the basis from which other components are developed. The transformation of data from input to output, through processes, may be described logically and independently of the physical components associated with the system. The DFD is also know as a data flow graph or a bubble chart. Input to output

transformation in a system takes place because of process function. The symbols of a process are rectangular with rounded corners, oval, rectangle or a circle. The process is named a short sentence, in one word or a phrase to express its essence. Data flow describes the information transferring between different parts of the systems. The arrow symbol is the symbol of data flow. A relatable name should be given to the flow to determine the information which is being moved.

Data flow also represents material along with information that is being moved. Material shifts are modeled in systems that are not merely informative. A given flow should only transfer a single type of information. The direction of flow is represented by the arrow which can also be bi-directional. The data is stored in the warehouse for later use. Two horizontal lines represent the symbol of the store. The warehouse is simply not restricted to being a data file rather it can be anything like a folder with documents, an optical disc, a filing cabinet. The data warehouse can be viewed independent of its implementation. When the data flow from the warehouse it is considered as data reading and when data flows to the warehouse it is called data entry or data updation. The Terminator is an external entity that stands outside of the system and communicates with the system.
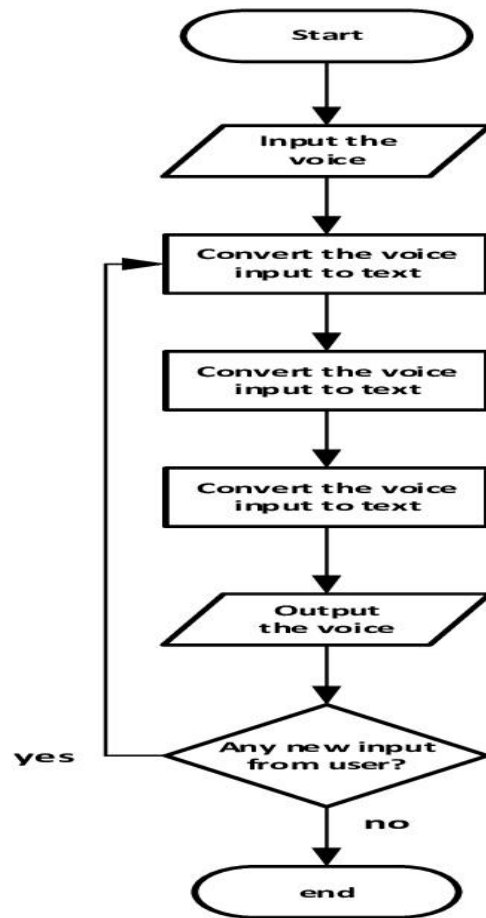
Fig 3.3 Flow Chart of Health recommendation Chat Bot

Figure 3.3 shows another approach to develop a chat-bot which has similar functionalities with respect to approach shown in figure 3.2 but with a slight difference in the way user interact with the bot.It can be, for example, organizations like banks, groups of people like customers or different departments of the same organization, which is not a part of the model system and is an external entity. Modeled systems also communicate with terminator. DFD uses hierarchy to maintain transparency thus multilevel DFD's can be created. Levels of DFD are as follows: 0-level DFD, 1-level DFD, 2-level DFD. Top-down decomposition, also called leveling, is a technique used to show more detail in lower-level DFDs. Leveling is done by drawing a series of increasingly detailed diagrams until the desired degree of detail is reached. As shown in the Figure, DFD Leveling is first displaying the targeted system as a single process, and then showing more detail until all processes are functional primitives. When performing top-down decomposition to a DFD to lower level DFDs, the

inputs and outputs must be conserved between levels of DFDs. For example, level n & n+1 must have the same inputs and outputs.

A context diagram gives an overview and it is the highest level in a data flow diagram, containing only one process representing the entire system. It should be split into major processes which give greater detail and each major process may further split to give more detail. Processes in diagram 0 (with a whole number) can be exploded further to represent details of the processing activities. Example below shows the next level ((Diagram 1) of process explosion. Although the following level 1 DFD only has three processes, there are quite a few input and input from the processes to the external entities and that could end up to be a few cross lines among them in the diagram; to avoid this problem, we could use (master and auxiliary view) multiple views of the same external entity in the DFD.

DFDs are the model of the proposed system. They clearly should show the requirements on which the new system should be built. Later during design activity this is taken as the basis for drawing the system's structure charts. The Basic Notation used to create a DFD's are as follows:

1. Dataflow: Data move in a specific direction from an origin to a   destination.
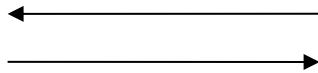
2. Process: People, procedures, or devices that use or produce (Transform) Data. The physical component is not identified.
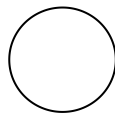
3. Source: External sources or destination of data, which may be People, programs, organizations or other entities.
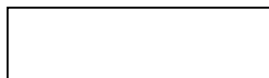
4. Data Store: Here data are stored or referenced by a process in the System.

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination. Data flowcharts can range from simple, even hand-drawn process overviews, to in-depth, multi-level DFDs that dig progressively deeper into how the data is handled. They can be used to analyze an existing system or model a new one.

Like all the best diagrams and charts, a DFD can often visually "say" things that would be hard to explain in words, and they work for both technical and nontechnical audiences, from developer to CEO. That's why DFDs remain so popular after all these years. While they work well for data flow software and systems, they are less applicable nowadays to visualizing interactive, real-time or database-oriented software or systems.

A data flow diagram can divided into progressively more detail by using levels and layers, zeroing in on a particular piece. DFD levels are numbered 0, 1 or 2, and occasionally go to even Level 3 or beyond. The necessary level of detail depends on the scope of what you are trying to accomplish.

1. DFD Level 0 is also called a Context Diagram. It's a basic overview of the whole system or process being analyzed or modeled. It's designed to be an at-a-glance view, showing the system as a single high-level process, with its relationship to external entities. It should be easily understood by a wide audience, including stakeholders, business analysts, data analysts and developers.
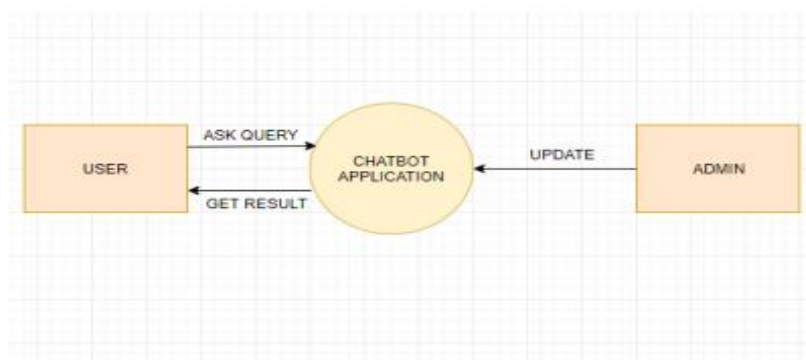
2. DFD Level 1 provides a more detailed breakout of pieces of the Context Level Diagram. You will highlight the main functions carried out by the system, as you break down the high-level process of the Context Diagram into its subprocesses.
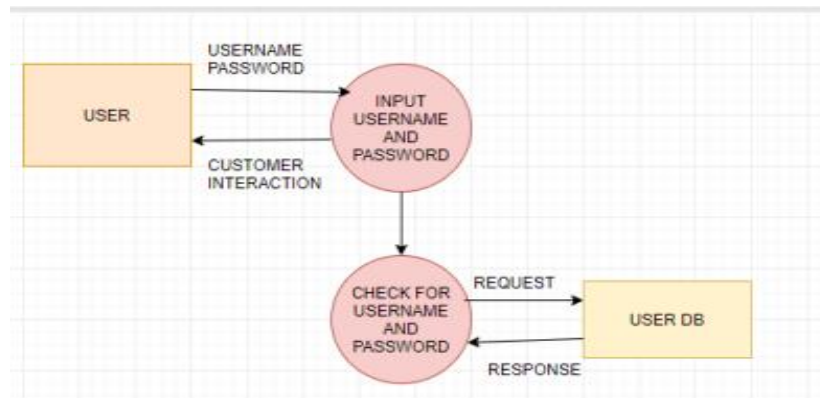
Fig. 3.5: Enhanced level 1 data flow diaram

3. DFD Level 2 then goes one step deeper into parts of Level 1. It may require more text to reach the necessary level of detail about the system's functioning.
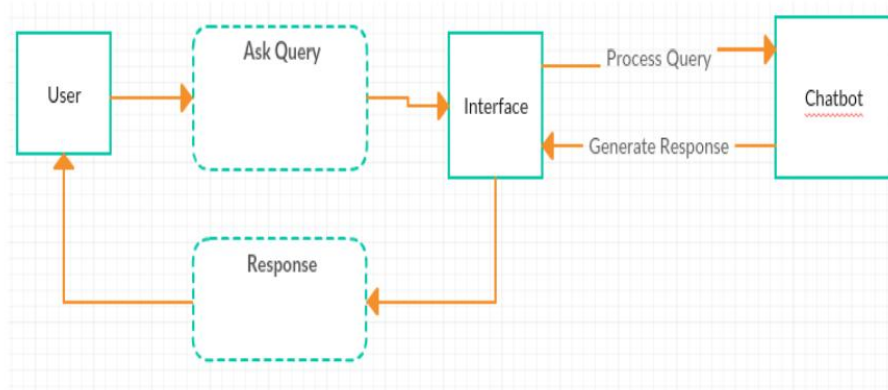

Fig. 3.6 : Level 2 dfd

3.5 Design Selection

Based on above two different approach shown in Figure 3.2 and figure 3.3, we think approach shown in figure 3.3 is more suitable and has been the choice for the design followed in this project. This approach has been chosen because of how easy this is with respect to first approach as most of the user is still in phase of learning how to interact with

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the system. And also in countries like India where most of it's Population do not know how to read and write simple English thus it acts as a limitation for a large section of people in our society. Contrary to this point, most of the people are able to read, write and understand regional languages like Hindi, Bengali, Tamil, Marathi etc. Thus interaction through voice commands gives them a better understanding of our interface and provide us with best experiences.

3.5.1 Sensors working in a Chat-Bot

This idea arose, and motivation comes after seeing Bebot. Japan's Narita airport, the first AI-powered airport is due to Bebot. In these type of bots, the advanced AI technology is used and help users in many ways. Some examples are: by providing road directions, by giving recommendations based on your previous local search or suggest you a local restaurant, or tells you about some local monument or attractions. Bebot type software can secondly learn from customers' preferences based on previous conversations and chat history. Hence it is becoming popular rapidly in clueless travelers. Now chat bots are replacing human enquiry part in various domains. [12] Chatbots simplify our job by providing out of context information, streamline information, avoid repetitive work and dialogues, and most importantly, no one needs to learn how to use a chatbot. Chatbots are peculiar, and on the rise, as they are accessible anytime, can handle multiple queries from multiple devices and answer simultaneously, they can be flexible in where they are used. And the main reason it will rise in industry is due to its cost-effectiveness. A bot can reduce customer service employees.In the era pf emerging technologies, the robots, chat-bots and sensors are evolving with the speed of light. For various uses, the organizations prefer Chat-bots to deal with customers as customer service representative. In this manner, Chat-bots are doing information acquisition. In this paper, the idea of creating the chat-bot are discussed and explains how an interactive system handles user queries and make a pseudo user dialogue.
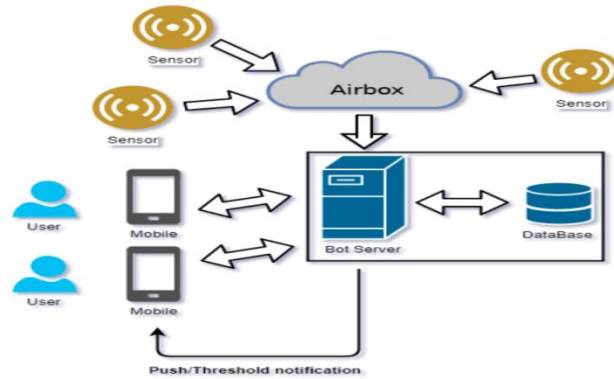
Fig:3.7: System overview of IoT Chat-Bot system

Figure 3.4 shows detailed version of how a chat bot works behind the curtain as well as how both user and bot interact with each other.

3.6 Implementation Plan

3.6.1 Pseudocode.

Step 1: Ask name and nickname.

Step 2: How are you

Step 3: Problem analysis

Step 4: Random question on random topic

Step 5: Response based on polarity and subjectivity.
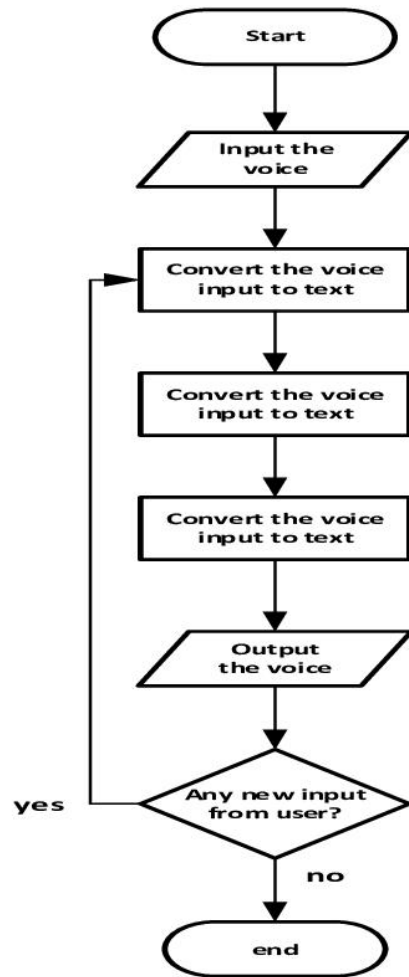
Step 6: Say goodbye, give random reason

3.6.2 Flowchart

Fig 3.8 Flow chart

CHAPTER - 4
RESULTANALYSIS AND VALIDATION

4.1 Implementation of design using Modern Engineering tools in analysis.

Chat bots are intelligent conversational systems that are able to process human language. A Chat bot can process the user input using the NLP tool, and then associate the input with intent, in order to produce an output. [16] There are two types of Chat bots, which are: Rule-based Chat bots: They are programmed to reply to specific questions that are predefined at the beginning. In this type of Chat bots, users are restricted to limited input options. AI Chat bots: They are programmed to interact with users as a real human, and they have the ability to keep track of context and word dictionary. In addition, this type of Chat bots requires many logic implementations. Moreover, they can be classified into three different categories, which are deep learning Chat bots, end-to-end systems and sequence-to-sequence models.

4.2 Testing

Software testing is a critical element of software quality assurance and represents the ultimate reviews of specification, design and coding. Testing represents an interesting anomaly for the software. During earlier definition and development phases, it was attempted to build software from an abstract concept to a tangible implementation. No system is error free because it is so till the next error crops up during any phase of the development or usage of the product. A sincere effort however needs to be put to bring out a product that is satisfactory.

For our project we found out that the unit testing was suitable so we went for it for that we have to install some package that can test our python program. We have than created 6 unique testes that will be ran automatically by the tester. We have set the parameter to be tested and given input to the program and ran the test which gave us the output below.
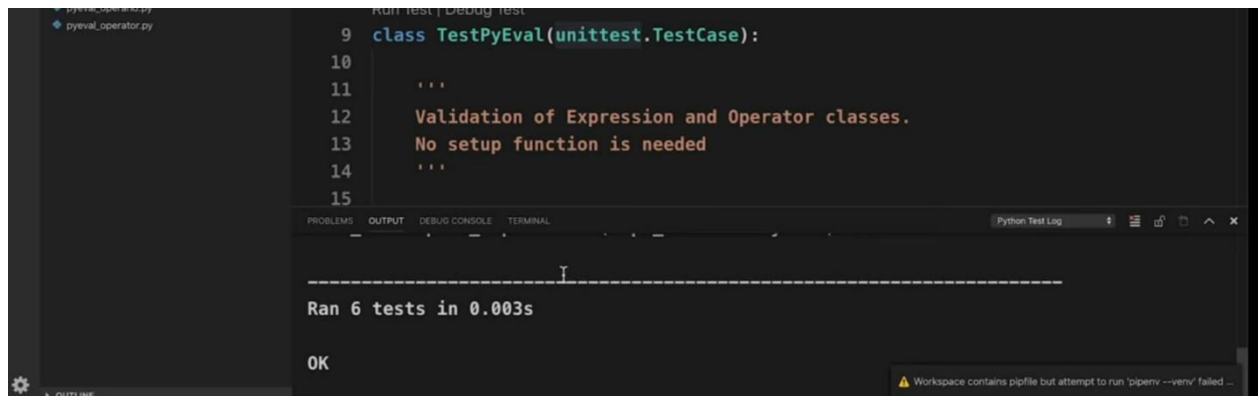
Fig 4.1 No of test cases

We can see in fig 4.1 that the testing software ran 6 testcases on our program and tested our software.
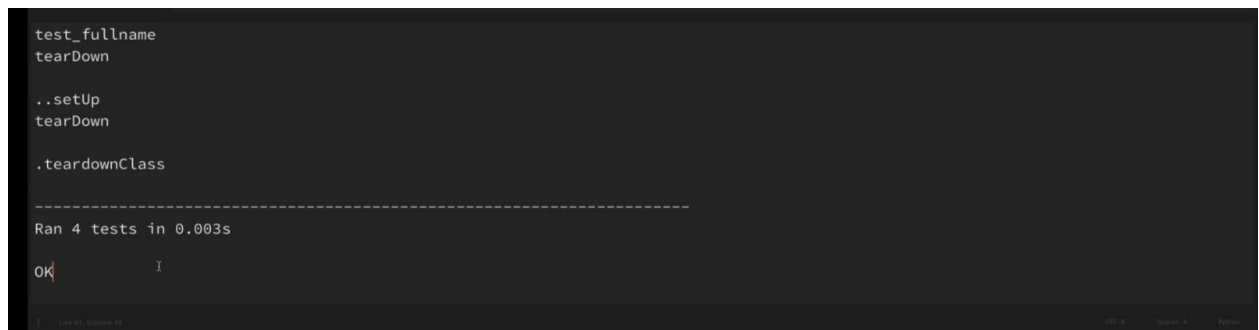
Fig 4.2 Runtime of testcases

Fig 4.2 Gives us the glimple of the time complexity and time required to ran 4 test cases in our program. Few can argue against the need for quality control when developing software. Late delivery or software defects can damage a brand's reputation — leading to frustrated and lost customers. In extreme cases, a bug or defect can degrade interconnected systems or cause serious malfunctions. Consider Nissan having to recall over 1 million cars due to a software defect in the airbag sensor detectors. Or a software bug that caused the failure of a USD 1.2 billion military satellite launch. The numbers speak for themselves. Software failures in the US cost the economy USD 1.1 trillion in assets in 2016. What's more, they impacted 4.4 billion customers. Though testing itself costs money, companies can save millions per year in development and support if they have a good testing technique and QA processes in place. Early software testing uncovers problems before a product goes to market.

Software testing arrived alongside the development of software, which had its beginnings just after the second world war. Computer scientist Tom Kilburn is credited with writing the first piece of software, which debuted on June 21, 1948, at the University of Manchester in England. It performed mathematical calculations using machine code instructions.

Debugging was the main testing method at the time and remained so for the next two decades. By the 1980s, development teams looked beyond isolating and fixing software bugs to testing applications in real-world settings. It set the stage for a broader view of testing, which encompassed a quality assurance process that was part of the software development life cycle.

"In the 1990s, there was a transition from testing to a more comprehensive process called quality assurance, which covers the entire software development cycle and affects the processes of planning, design, creation and execution of test cases, support for existing test cases and test environments," says Alexander Yaroshko in his post on the uTest developer site.

"Testing had reached a qualitatively new level, which led to the further development of methodologies, the emergence of powerful tools for managing the testing process and test automation tools."

Fig 4.3: Approach of Software testing

The testing phase involves the testing of development system using various data. Preparation of the test data plays a vital role in system testing. After preparing the test data, the system under study was tested using those data. While testing the system, by using the test data, errors were found and corrected by using the following testing steps and corrections were also noted for future use. Thus, a series of testing is performed on the proposed system before the system is ready for implementation.

The various types of testing done on the system are:

- Integration testing
- Validation testing
- Unit testing
- Continuous testing
- Output testing
- User Acceptance testing

Unit testing:

Unit testing focuses on verification effort on the smallest unit of software design module. Using the unit test plans prepared in the design phase of the system development as a guide, important control paths are tested to uncover errors with in the boundary of the modules. The interfaces of the modules are tested to ensure proper flow of information into and out of the modules under consideration boundary conditions were checked. All independent paths were exercised to ensure that all statements in the module have been executed at least once and all error-handling paths were tested.

Each unit is thoroughly tested to check if it might fail in any possible situation. This testing is carried during the programming state itself. At the end of this testing phase each module is found to be have an adverse effect working satisfactorily, as regard to the expected output from the module.
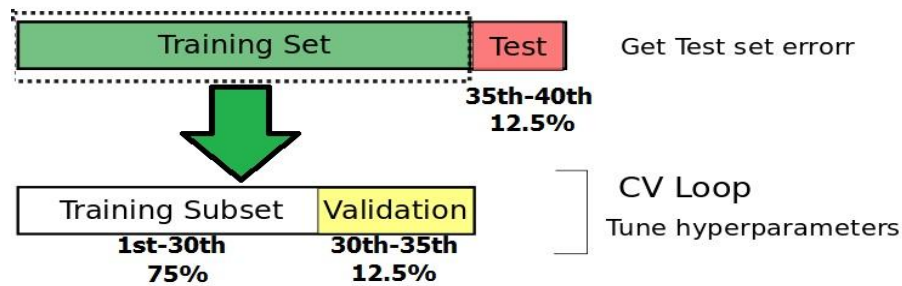
Fig: 4.4: Unit Testing using data set

Continuous testing:

Software testing has traditionally been separated from the rest of development. It is often conducted later in the software development life cycle after the product build or execution stage. A tester may only have a small window to test the code – sometimes just before the application goes to market. If defects are found, there may be little time for recoding or retesting. It is not uncommon to release software on time, but with bugs and fixes needed. Or a testing team may fix errors but miss a release date. Doing test activities earlier in the cycle helps keep the testing effort at the forefront rather than as an afterthought to development. Earlier software tests also mean that defects are less expensive to resolve.

Many development teams now use a methodology known as continuous testing. It is part of a DevOps approach – where development and operations collaborate over the entire product life cycle. The aim is to accelerate software delivery while balancing cost, quality and risk. With this testing technique, teams don't need to wait for the software to be built before testing starts. They can run tests much earlier in the cycle to discover defects sooner, when they are easier to fix.

Integration Testing:

Data can be lost across an interface, one module can on another; sub-functions when combined may not produce the desired major function: global data structures can present problems. Integration testing is a systematic technique for the program structure while at the same time concluding tests to uncover errors associated with interface. All modules are combined in this testing step. Then the entire program is tested as a whole. Each of the

module is integrated and tested separately and later all modules are tested together for sometime to ensure the system as a whole works well without any errors.

Validation Testing:

At the culmination of the integration testing, the software is completely assembled as a package, interfacing errors have been uncovered and corrected, and a final series of software validation testing began. Here we test if the system functions in a manner that can be reasonably expected by the customer. The system is tested against the system requirement specification.

Output Testing:

After performing validation testing, the next phase is output testing of the proposed system, since no system can be useful if it does not produce the desired output in the specified format. The output generated or displayed by the system under consideration is tested by asking the user about the format required by them, here, the output format is considered in two ways: One is on the screen and the other is on the printed form. Beta testing is carried output by the client, and minor errors that have been discovered by the client are rectified to improve the user friendliness of the system.

Object-Oriented Testing:

The overall objectives of the object-oriented testing – to find the maximum number of errors with a minimum amount effort – is identical to the objective of conventional software testing. But the strategy and tactics for OO testing differ significantly. The view of testing broadens to include the review of both the analysis and design model. In addition, the focus of testing moves away from the procedural component and toward the class.

Because the OO analysis and design models and the resulting source code are semantically coupled, testing begins during these engineering activities. For this reason, a review of CRC, object relationships, and object behavior models can be viewed as first stage testing. As a result of this first stage testing, we encountered few problems in OOA done at analysis time. We have gone back and remodeled with new errorless classes and their relationships. The documented model is the revised model of earlier analysis model. Once OOP has been accomplished, unit testing is applied for each class. Class testing uses a variety of methods:

fault-based, random, and partition test methods. Each of those methods integrates the set of classes that collaborate to respond to one input or event. exercises the operations encapsulated by the class. Test sequences are designed to ensure that relevant operations are exercised. The state of the class, represented by the values of its attributes, is examined to determine if errors exist. Integration test can be accomplished using a thread-based or use-based strategy. Thread-based strategy Use-based testing constructs the system in layers, beginning with those classes that do not make use of server classes. Integration test case design methods can also make use of random and partition tests. In addition, scenario based testing and the tests derived from behavioral models can be used to test a class and its collaborators. A test sequence tracks the flow of operations across class collaborations. OO system validation testing is black box oriented and can be accomplished by applying the same black box methods known for conventional software. However scenario based testing dominates the validation of OO systems, making the use case a primarily driver for validation testing.

4.3 System Configuration

4.3.1 Hardware Requirement:

Processor: Any processor

Ram: Min 4GB

Hard Disk: Min 100GB

4.3.2 Software Requirement

Operating System: Windows 7 or above.

Technology: Python 3.9

IDE: VS Code

4.4 Performance Analysis

| Accuracy Scores	Naive Bayes			Logistic Regression			Multilayer Perceptron			Random Forest		
	Top1	*Top3*	*Top5*	*Top1*	*Top3*	*Top5*	*Top1*	*Top3*	*Top5*	*Top1*	*Top3*	*Top5*
k = 100	0.598	0.851	0.927	0.588	0.843	0.922	0.546	0.819	0.907	0.467	0.761	0.873
k = 1000	0.614	*0.87*	*0.942*	0.601	0.86	0.935	0.599	0.856	0.931	0.56	0.836	0.921
k = 2500	*0.616*	*0.87*	0.941	0.603	0.86	0.933	0.604	0.86	0.934	0.583	0.849	0.928
k = 5000	0.615	0.869	0.941	0.603	0.858	0.933	0.605	0.862	0.936	0.597	0.856	0.932

Fig 4.5: Accuracy Report of the chat bot.

From the above report we can clearly see the underlined cell which shows the best score across the row and column which concludes that Naïve Bayes is the best algorithm to go for this project.

4.5 Result

Nowadays transactional chat bots and AI system for web application are used for easy usage and quick solutions. But what if in this trend, chat bots fail to meet user expectations. To exemplify, in a food application, a customer's billing gets stuck in between and he leads to Bot for assistance. In this scenario, if the bot does not get a response in fraction of seconds, it might trigger his/her rage. There comes the need of performance testing. It is not just to measure whether chat bot can sustain its output among a large number of concurrent users, but it's also important to measure response time for an individual user. Following our assessment that most of the existing scientific work on chat bots is concerned with technical developments, we reviewed existing substantial scientific work concerning medical chat bots included in top peer-reviewed journals and conferences related to the behavior change perspective and built up a comprehensive literature review. The review was structured following the UNIBOT flowchart by Patel et al. Ajzen's theory of planned behavior and the trans theoretical model by Prochaska and Di Clemente to guide future research, and identified the problems of acceptance of medical chat bots in society and the use of chat bots to change harmful behavior as the primary technological-/psychological-oriented research challenge Chat bot is primarily used to smoothen user experience. Hence, to ameliorate its user experience becomes vital for any organization.

Basically, we open network socket to directly connect chat client that will then connect to node-server which will control APIs, NLP-engine and other backend utilities. Further, using data driven automation we can add a simple data-provider that contains user request (queries) which user may enter in a transactional chatbot. Now using the same framework, we can get connection time and response time using connection socket and measure same over chat-client. It sounds easy, but what if in chatbot response is not a simple message, but a component like radio-button, dropdown, textbox, etc.

4.5.1 Output screenshots
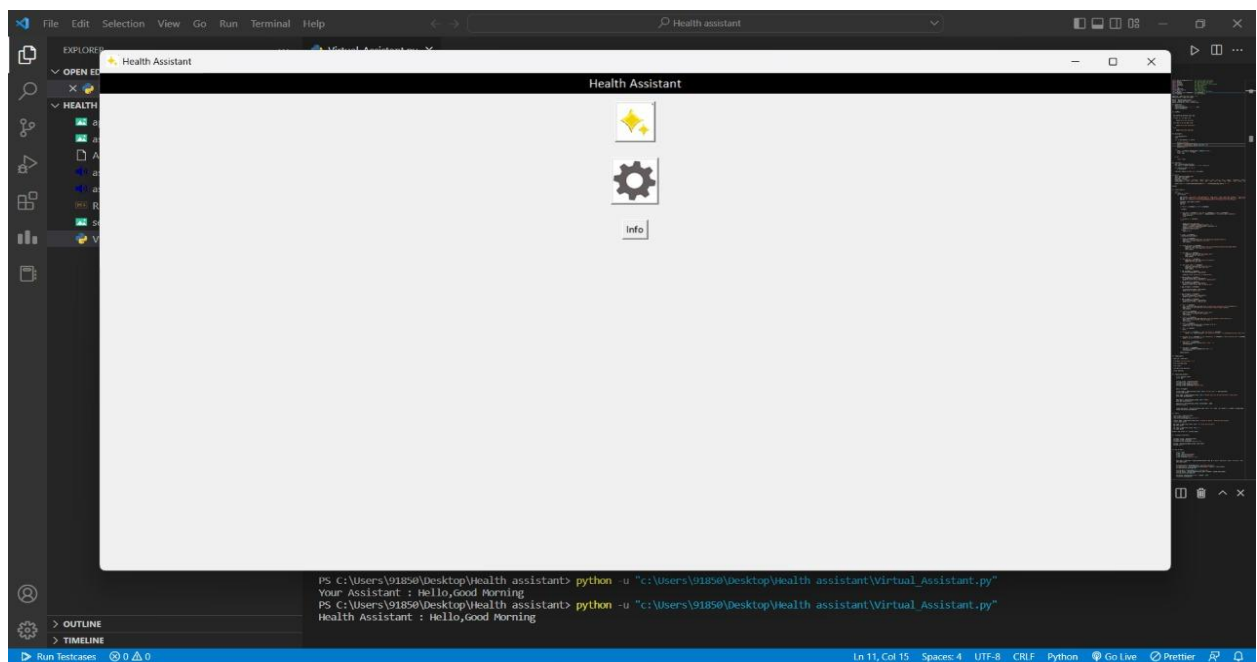
Fig 4.6 The UI of the Health recommendation.

CHAPTER - 5

CONCLUSION AND FUTURE WORK

5.1 Conclusion

In the near future, chances are high that instead of consulting a doctor for a diagnosis, you might just communicate with an AI-powered healthcare bots in a mobile app and get suitable prescription or appointment." Consumers today expect that with continuous updates in digital trends- technology should not only be fast, but readily available and intuitive as well. We are constantly using smartphones, tablets and other devices to search for information, we need. Getting and sharing information has been on fingertips just because of the latest technology updates. Even the Healthcare informatics professionals are no different.

For the past decade, robots have been performing all kind of tasks which were once exclusive to humans only. But now they are being utilized in almost everything like from manufacturing cars to managing inventories and billing and much more. As the digital age is experiencing continuous evolution in AI and neural networks – devices are busy perfecting their interpersonal communication skills.

Chat bots have become more commonplace, even in healthcare and these are also called healthcare bots! In the near future, chances are high that instead of consulting a doctor for a diagnosis, you might just communicate with an AI-powered healthcare bot in a mobile app and get a suitable prescription or appointment.

Healthcare services face a huge challenge of supply-and-demand which you can fix when you create a chat bot. The role of chat bots in healthcare can be well utilized to help free-up valuable physician-time by reducing or eliminating unnecessary doctor's appointments. With costs increasing daily, healthcare organizations are looking for ways to keep them down while improving the patient experience. Not to mention a global shortage of healthcare professionals makes it increasingly necessary for us to augment care with technology in order to allow doctors to focus on more critical patient needs. Voice Chat bots are no doubt, a big boon to the complete healthcare industry which can save on time, efforts and cost but extra attention should be given to the functionalities that are automated. A

simple mistake in this area can be life-threatening. Adoption of these chatbots is yet another big question. We as consumers need to be comfortable trusting on the new technology for diagnosing health issues.

The main contribution of this paper is the definition of the Symptom Checker module, that identifies the patient's disease with a certain degree of accuracy, starting from a set of symptoms. This functionality is designed to assist the user in obtaining a set of automatic diagnoses that can be later discussed with her doctor. The classifier is based on a Bayesian algorithm, trained on an artificial data set created following the real distribution of symptoms for each disease. An in-vitro study and in-vivo user study were performed, both of which produced encouraging results. We measured an F1 score of 0.942 on the synthetic data-set, a success ratio of 76,271% on real use cases. Besides, we noted that the doctor recommendation system and the Treatment Management functionality were widely appreciated. They have proven to be effective and able to satisfy the needs of end-users.

As future work, we are planning to improve the performance of the Symptom Checker module by adding information on the rarity of the diseases. Moreover, we will focus on adding new functionalities, such as the management of medical records, and the automatic suggestion of food and physical activity to perform based on the user's health conditions. Finally, we will perform a more extensive user study once a large enough community of HAB users will be established.

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APPENDIX - 1

Python

Python is an interpreted, high-level, general purpose programming language created by Guido Van Rossum and first released in 1991, Python's design philosophy emphasizes code Readability with its notable use of significant White space. Its language constructs and object oriented approach aim to help programmers write clear, logical code for small and large-scale projects. Python is dynamically typed and garbage collected. It supports multiple programming paradigms, including procedural, object-oriented, and functional programming.

Guido van Rossum began working on Python in the late 1980s as a successor to the ABC programming language and first released it in 1991 as Python 0.9.0. Python 2.0 was released in 2000 and introduced new features such as list comprehensions, cycle-detecting garbage collection, reference counting, and Unicode support. Python 3.0, released in 2008, was a major revision that is not completely backward-compatible with earlier versions. Python 2 was discontinued with version 2.7.18 in 2020.

Natural Language Processing(NLP)

Natural language processing (NLP) refers to the branch of computer science—and more specifically, the branch of artificial intelligence or AI—concerned with giving computers the ability to understand text and spoken words in much the same way human beings can. NLP combines computational linguistics—rule-based modeling of human language—with statistical, machine learning, and deep learning models. Together, these technologies enable computers to process human language in the form of text or voice data and to 'understand' its full meaning, complete with the speaker or writer's intent and sentiment. Natural language processing is the driving force behind machine intelligence in many modern real-world applications. Here are a few examples:

◆ **Machine translation**: Google Translate is an example of widely available NLP technology at work. Truly useful machine translation involves more than replacing words in one language with words of another. Effective translation has to capture accurately the meaning and tone of the input language and translate it to text with the same meaning and desired impact in the output language. Machine translation tools are making good progress in terms of accuracy. A great way to test any machine translation tool is to translate text to one language and then back to the original. An oft-cited classic example:.

◆ **Virtual agents and chatbots:** Virtual agents such as Apple's Siri and Amazon's Alexa use speech recognition to recognize patterns in voice commands and natural language generation to respond with appropriate action or helpful comments. The best of these also learn to recognize contextual clues about human requests and use them to provide even better responses or options over time. The next enhancement for these applications is question answering, the ability to respond to our questions—anticipated or not—with relevant and helpful answers in their own words.

◆ **Text summarization:** Text summarization uses NLP techniques to digest huge volumes of digital text and create summaries and synopses for indexes, research databases, or busy readers who don't have time to read full text. The best text summarization applications use semantic reasoning and natural language generation (NLG) to add useful context and conclusions to summaries.

Machine Learning(ML)

Machine learning is a branch of artificial intelligence (AI) and computer science which focuses on the use of data and algorithms to imitate the way that humans learn, gradually improving its accuracy. IBM has a rich history with machine learning. One of its own, Arthur Samuel, is credited for coining the term, "machine learning" with his research (PDF, 481 KB) (link resides outside IBM) around the game of checkers. Robert Nealey, the self-proclaimed checkers master, played the game on an IBM 7094 computer in 1962, and he lost to the computer. Compared to what can be done today, this feat seems trivial, but it's considered a major milestone in the field

of artificial intelligence. Over the last couple of decades, the technological advances in storage and processing power have enabled some innovative products based on machine learning, such as Netflix's recommendation engine and self-driving cars. Machine learning is an important component of the growing field of data science. Through the use of statistical methods, algorithms are trained to make classifications or predictions, and to uncover key insights in data mining projects. These insights subsequently drive decision making within applications and businesses, ideally impacting key growth metrics. As big data continues to expand and grow, the market demand for data scientists will increase. They will be required to help identify the most relevant business questions and the data to answer them. Machine learning algorithms are typically created using frameworks that accelerate solution development, such as TensorFlow and PyTorch.

Artificial Intelligence(AI)

While a number of definitions of artificial intelligence (AI) have surfaced over the last few decades, John McCarthy offers the following definition in this 2004 paper (PDF, 106 KB) (link resides outside IBM), " It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable."

Today, a lot of hype still surrounds AI development, which is expected of any new emerging technology in the market. As noted in Gartner's hype cycle (link resides outside IBM), product innovations like, self-driving cars and personal recommendations, follow "a typical progression of innovation, from overenthusiasm through a period of disillusionment to an eventual understanding of the innovation's relevance and role in a market or domain." As Lex Fridman notes here (01:08:15) (link resides outside IBM) in his MIT lecture in 2019, we are at the peak of inflated expectations, approaching the trough of disillusionment. As conversations emerge around the ethics of AI, we can begin to see the initial glimpses of the trough of disillusionment.

USER MANUAL

step 1 : Need a code editor for python like vs code

step 2 : download the zip file provided and extract them .

step 3 : import the folder in the code editor

step 4 : install different packages through command prompt in your pc by typing commands

listed below :

i : pip install speech recognition

ii : pip install pyttx3

iii : pip install datetime

iv : pip install wikipedia

v : pip install webbrowser

vi : pip install tkinter

vii : pip install pyjokes

viii : pip install playsound-2.2

ix : pip install keyboard

step 5 : Use the run button to run your program and launch the gui for your health recommendation

step 6 : You are all set , use the GUI to ask any questions .