MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE GWALIOR

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

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Project Report

on

Chatbot In Healthcare

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CENTRE FOR ARTIFICIAL INTELLIGENCE

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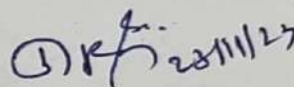(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

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CERTIFICATE

This is certified that **Akansh Namdeo (0901AM211007)** and **Atharva Pawar (0901AM211018)** has submitted the project report titled **Chatbot In Healthcare** under the mentorship of Mr. Mir Shahnawaz Ahmad in partial fulfilment of the requirement for the award of degree of Bachelor of Technology in **Artificial Intelligence and Machine Learning** from Madhav Institute of Technology and Science, Gwalior.

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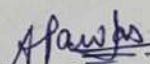
DECLARATION

I hereby declare that the work being presented in this project report, for the partial fulfilment of requirement for the award of the degree of Bachelor of Technology in **Artificial Intelligence and Machine Learning** at Madhav Institute of Technology & Science, Gwalior is an authenticated and original record of my work under the mentorship of Mr. Mir Shahnawaz Ahmad, Centre For Artificial Intelligence.

I declare that I have not submitted the matter embodied in this report for the award of any degree or diploma anywhere else.

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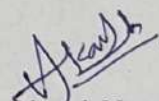(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)
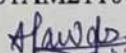
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ABSTRACT

Research says 60% of visits to a doctor are for simple small-scale diseases, 80% of which can be cured at home using simple home remedies. These diseases mostly include common cold and cough, headache, abdominal pains, etc. They may be caused due to the changes in the weather, intake of improper diet, fatigue, etc. and can be cured without the intervention of a doctor. There are a number of chatbots which provide services for the healthcare domain. But the problem with these chatbots is that they only provide answers for general healthcare FAQs. That is, these systems are unable to provide a natural communication with the user just as a doctor can. Work is being carried out to enable the chatbots to communicate in a way similar to the communication carried out between two humans. That is, the user must experience the feel of communicating to a person and not to a bot. This makes the chatbot a virtual communicating friend of the user. This type of smart communication (usually used in healthcare counselling) can be achieved by inclusion of NLU, NLP and ML techniques in the conventional scripted chatbots. There are a number of domains wherein the smart chatbots provide their functionalities. This paper briefs about the chatbot system for the healthcare domain. Also, it specifies various NLU, NLG and ML techniques to be incorporated in the chatbot and the comparison of the same.

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Chapter 1
Project Overview

1.1 Introduction:

A chatbot is a computer program designed to simulate conversation with human users, especially over the Internet. Chatbots are often used in customer service, providing information, answering frequently asked questions, and assisting users in various tasks. They provide a simulating platform for effective and smart communications with the user on the other end. They copy marketers, sales person, counsellors and other mediators and work to provide services that the above-mentioned people provide. There are wide ranges of chatbots catering in many domains some of them are as follows: business, market, stock, customer care, healthcare, counselling, recommendation systems, support system, entertainment, brokering, journalism, online food and accessory shopping, travel chatbots, banking chatbots, recipe guides, etc. The most famous chatbots like Alexa or Google assistant are the best examples that can be given for smart communicating chatbots. The aim of this paper is to discuss the usefulness of chatbots in medical field. MedWhat is a question-answering chatbot which gives answers to basic healthcare FAQs and also provides information about various diseases and its symptoms. Endurance is a chatbot which deals with users suffering from Dementia (disease).

1.2 Objectives:

The objectives of chatbots in medical field are enormous and critical in use. By using chatbots any medical professional can be assisted in a very timely and systematic manner & can utilize time for more complex issues. Following are prominent objectives that chatbots have:

1.2.1 Efficient Appointment Scheduling and Reminders:

Streamline the appointment scheduling process, allowing patients to easily book, reschedule, or cancel appointments through conversational interfaces. They can send automated appointment reminders, reducing no-show rates and improving overall clinic efficiency.

1.2.2 Provide Instant Medical Information:

Offer quick and accurate information on common medical conditions, symptoms, and treatment options. Serve as a reliable source of general medical knowledge, helping users make informed decisions about their health.

1.2.3 Medication Management and Adherence:

Aid patients in understanding medication regimens, including dosage instructions and potential side effects. Send medication reminders and monitor adherence, promoting better health outcomes and minimizing medication-related issues.

1.2.4 Support Mental Health and Well-being:

Assist in the identification of mental health concerns through empathetic conversations and appropriate screening tools. Offer immediate resources, coping strategies, and connections to mental health professionals when needed.

1.2.5 Enhance Patient Engagement:

Facilitate personalized interactions with patients, providing timely information on medications, treatment plans, and lifestyle recommendations. Encourage patients to actively participate in their healthcare by promoting adherence to prescribed regimens and follow-up appointments.

These are just some important objectives but the way chatbots can be used are enormous.

1.3 Scope:

The scope of chatbots in industries are enormous and being utilized in various fields even in medical.

Considering the objectives of chatbots in healthcare sector its usage is inevitable in filed.

Following are some possible scope scenarios of chatbots in medical field.

1.3.1 Telehealth Support:

Facilitate preliminary consultations through chat, helping users assess the urgency of their health concerns before scheduling a tele-health or in-person appointment. Offer post-appointment follow-ups, addressing common queries and providing additional information as needed.

1.3.2 Health Monitoring and Feedback:

Integrate with wearable devices and health apps to monitor vital signs, physical activity, and other relevant health metrics. Provide feedback on lifestyle choices, encouraging healthier habits and notifying healthcare providers of significant changes.

1.3.3 Data Security and Privacy Compliance:

Implement robust security measures to safeguard patient data and ensure compliance with healthcare privacy regulations such as *HIPAA*. Clearly communicate privacy policies and reassure users about the confidentiality of their health-related interactions.

1.3.4 Diagnostic Assistance:

Assist users in understanding symptoms and guide them on whether to seek immediate medical attention or manage symptoms at home. Provide preliminary information on preventive measures and lifestyle changes based on reported symptoms.

1.4 Project Features:

The features of the chatbot play a very important role for in answering the user query.

Our project "**Chatbot In Healthcare**" do comprise of some essential features on the basis of which it is answering the queries for its users.

Following are some important features of our chatbot.

1. The name of our chatbot is 'Meera'.
2. The chatbot is built for the medical professionals or general user for common queries.
3. The chatbot uses NLP model based on language, speech, and keyword analysis and use the mathematical probabilistic way for answering queries.
4. The chatbot is ready for general medical queries and can be implemented over web.
5. On web user can directly access our chatbot and make necessary analysis on its health condition.

1.5 Feasibility:

The feasibility of a chatbot depends on various factors that need to be considered before development and implementation; purposes and objectives, target audience, technical feasibility etc.

1.5.1 Purposes and objectives:

The purpose of this chatbot is to provide medical guidance to common person so that for minor issues he/she don't need to go to any clinic or hospital. The objectives defined above are aligned with purpose of the chatbot for providing a systematic service.

1.5.2 Target audience:

The target audience of our project is common people, who need regular minor checkups. Our audience can utilize our chatbot for making necessary overview of their health condition and can meet the doctor when necessary. Medical professionals can also use it for their practice and result evaluation and treatment.

1.5.3 Technical feasibility:

The chatbot is built on NLP model, practiced on some keywords. Technically it is providing results by using mathematical probabilistic functions on these keywords and showing results from its yet but limited answering directory.

1.5.4 Scalability:

The chatbot can be scalable to android or iOS applications so that it can reach to mobile users across the globe. For now it is being implemented over web for users. Following this it can also be upgraded into with more better and efficient ML models for answering the queries.

1.6 System requirement:

The system requirement for our chatbot is very basic. Any digital internet connected device (mobile, laptops, monitors, tablets) allowing web browsers can be used by users to access this chatbot for making their health analysis when needed. Device must have LCD screen with proper high internet connectivity at the end.

We are working on its web services on browsers like Safari, Chrome, Firefox, Brave etc. for fast and better results.

Chapter 2
Literature Review

Smart chatbots made up of NLU, NLG and ML engine. They work as a basis for providing computational algorithm and pattern detection in queries and showing results. Humans can understand language with a period of time and can speak fluently. In case of machines like chatbots they are needed to be trained with language and speech models to make them ready to provide a relevant and clear answer.

2.1 A review on Chat Interface:

This unit is the front end of the system. It is responsible for collecting the user queries from the user which are the input to the system. It is also responsible for displaying the system generated results to the user. Therefore, it can be said that the chat interface is the face of the system through which the entire communication takes place. It is the mediator of conversation between the system and the user. The type of interface depends on the requirements of the user that are to be satisfied by the system. If the system is accessed from a smartphone, the interface will be in the form of an app and if the system is accessed from a website, then the interface will be in the form of a website. For making a website, either Java or Python web frameworks can be used. Java provides Spring and Struts as the most advanced and latest web frameworks. Similarly, Python allows usage of Django and Flask (we used) frameworks for building of a website. The criteria for selection of the programming language depends upon the functionalities that the system intents toprovide, the requirements of the users that will use the system, the algorithms that are to be used by the system, etc.

2.2 A review on Word Segmentation:

Segmentation, also referred to as tokenization is the process of splitting text into smaller and meaningful units. These units could be paragraphs, sentences, clauses, phrases, words or letters. The smallest unit are theletters. Word segmentation is the splitting of sentences into individual words separated by blank spaces. The tokenized units of the sentences are called as tokens. The tokenizers split the sentences into words and punctuations marks as independent units. It is also required that the tokenizer should consider abbreviations, acronyms, dates, numbers in decimal formats, etc., which cannot split at punctuations andblank spaces, as they will lose their meaning if done so.

Naeun Lee et al. [2] [2017] proposed the implementation of word segmentation using NLTK. Natural Language ToolKit (NLTK) is a python package which caters to provide services for NLP. It has inbuilt tokenizers. Users need to import the package and use the required type of tokenizer which is present in the form of functions. The NLTK includes a wide range of tokenizers which are as follows standard, letter, word, classic, lowercase, N-gram, pattern, keyword, path, etc. The most commonly used tokenizer is the word-punkt tokenizer which splits the sentences at the blank spaces. The accuracy, speed andefficiency of the NLTK tokenizers is commendable. Also, it does not require any algorithm implementation as the package executes them at the backend.

2.3 A review on Dependency Parsing:

A dependency parser is used to establish the relationship between words in a sentence based on the grammatical tags attached to it. It is the next step after parsing. A dependency tree or graph is created for every sentence. This tree is called as the parsing tree or the dependency tree. There are a number of ways by which the parsing can be implemented.

Zhenghua Li [7] [2014] provided a further improvised model of the dependency parser. In the traditional method mentioned above the parser creates a parsed tree for the required sentence. In the graph-based dependency parser, the tree created is converted to a graph where the words in the sentences are the vertices and the dependency between the words are the represented by the edges. This data structure shows a better representation of the parsed sentence. Parsing is always to be performed by the traditional method. But graph-based parser improves the visibility, readability and understandability of the parser.

Chapter 3
Preliminary Design

The design that we are implemented for our chatbot is intended to be friendly with the user and device coherent also. We have tried to give our chatbot a familiar look as user needed when he/she is chatting with friend or family. This is so because in such environment user can be more open in expressing and communicating with the bot.

Chatboy
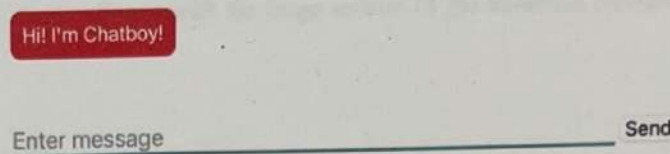
Hi! I'm Chatboy!

Enter message _____ Send

Fig 1
Chatbot Interface

This design is inspired from messaging service applications on our social apps. It provides a common and friendly interface to communicate. Users can type query in the box and just wait for a while for response.

The given chat interface design can also be applied to the chatbot application as many chatbot apps does like ChatGPT. We can also provide a history and result. section in next version of this bot which makes more easier for user to note the results.
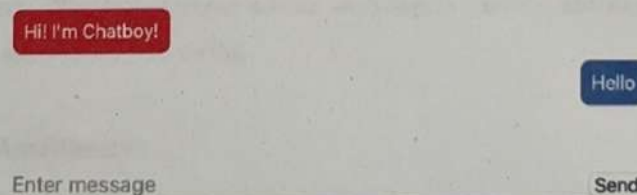
Chatboy

Hi! I'm Chatboy!

Hello

Enter message _____ Send

Fig 2
Chatbot message

Chapter 4
Final Analysis and Design

4.1 Objective Refinement:

We have ensured that the objectives of the chatbot align with the goals and user needs. We have refined and prioritized our objectives based on general chatbot framework and regulations and market analysis.

4.2 Technical Architecture:

We have finalized the technical architecture, taking into account integration requirements, scalability, and compatibility with existing systems and devices. Also on choosing a suitable platform or framework for chatbot development in accordance with the large section of the audience considering better operations and results.

4.3 Result Analysis:

The results of the chatbot are based on mathematical probabilistic approach applied on user keywords. Considering the results of the chatbot, it has now only excess to limited answer directory and keywords. The chatbot may show uncommon, no results when the keywords are of very unnatural or query consists of slangs. On the web it may take time depending on the internet connectivity.

4.4 Applications:

The applications of chatbots in healthcare or medical sector is not limited and with current technological scenarios and advancements it can also be implemented along with physical bots and health gadgets like watches, etc.

4.4.1 Health Education:

Chatbots can serve as educational tools, providing users with information on various health topics, preventive measures, and the importance of screenings. They contribute to health literacy and empowerusers to make informed decisions about their well-being.

4.4.2 Health and Wellness Coaching:

Healthcare chatbots can offer personalized advice on lifestyle choices, nutrition, and exercise, promoting preventive healthcare and overall well-being.

4.4.3 Emergency Assistance:

In emergency situations, chatbots can provide immediate guidance, such as CPR instructions or directions to the nearest emergency room. They can assist in assessing the urgency of a situation and prompt users to seek immediate medical attention when necessary.

4.5 Problem faced:

Following problems occur while working on this chatbot.

1. Cloud running time delays due to internet issues when loaded to web.
2. Keyword selection and answering parameters for levels management in query statement.
3. Language distortion and slang handling in query.
4. Repetitive answering or monotony in answers.
5. Algorithm or function selection for better and accurate results in association with existing coding language.

4.6 Limitations:

This chatbot comprises of following limitations.

1. Based on probabilistic model and not on fully fast ML algorithm as latest chatbots are.
2. The chatbot answering directory comprises of limited vocabulary words or answers for query keywords.
3. Not familiar with slags or twisted words in English language.
4. Limited data is provided for answering queries from answering directory.

4.7 Conclusion:

1. The proved chatbot in this paper is intended to be used by medical professionals or general people for health condition analysis.
2. It is based on NLP probabilistic algorithm for result showing.
3. Any device with active internet connection and display screen LCD or high resolution can be used by users to access the next web version of chatbot when released.

4.8 Future scope of this chatbot:

The future scope of the project is optimistically very advanced with current technological scenarios and advancements from many tech giants. The next version of the chatbot can be added with advanced ML models and algorithms in association with more refined and newly structured data.

In coming versions, sensor technology with IOT can be added with chatbot so that it can read body condition via sensors and process it affectively for showing accurate results.

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