



Development of a Healthcare Chatbot System

A PROJECT REPORT

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ABSTRACT

In order to live a better life, healthcare is crucial. Technology has never played a more important role in healthcare as patients and medical professionals negotiate the public health crises. Users are typically not aware of all the symptoms or treatments associated with a given ailment. For small problems, users need to go to the hospital for a check-up, which takes more time. This problem can be resolved by a healthcare chatbot that offers relevant guidance on maintaining a healthy lifestyle. Healthcare chatbots, which help users submit health-related issues, depend on natural language processing to function. Without being physically present at the hospital, the user can utilize the chatbot to ask any personal health-related questions. The suggested concept is to create a healthcare chatbot that, prior to seeing a doctor, will identify the condition and provide basic information about it. The purpose of the healthcare chatbot is to lower healthcare expenses and increase access to medical information. Large diseases can begin as little issues, and since most diseases have common symptoms, they can be predicted if a patient's body is examined on a regular basis.

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ABBREVIATIONS

AI – Artificial Intelligence

ML – Machine Learning

NLP – Natural Language Processing

HMI – Human Machine Interaction

DFD – Data Flow Diagram

DL – Deep Learning

SDLC – Software Development Life Cycle

GUI – Graphical User Interface

Tk - Tkinter

Chapter 1

Introduction

1.1 Introduction

A chatbot is an interactive program for computers that simulates human behavior and language. These days, when the development of AI is at its peak, chatbots are merely one instance of how it is being used to improve society. The goal was to use artificial intelligence to create a medical chatbot that could provide a few fundamental details about the ailment before a patient speaks with a doctor. By acting as a virtual doctor, a chatbot will facilitate communication between patients and doctors. Text-to-text medical chatbots allow patients to talk about their health problems and can offer a customized diagnosis determined by symptoms. The patient might then be transferred to a specialist.

This instruction effectively saves the doctor's time. On the other hand, chatbots are always available to help people who need medical assistance. Chatbots are computer programs designed to automatically reply to communications [1]. The chatbots interact with prospective patients on the internet, helping them locate specialists, scheduling appointments, and making sure they get the right care. Anyone can use chatbots because they are easy to use. On the other hand, personalized diagnosis based on symptoms can be provided via medical chatbots. Support for further medical operates, such as location, its duration, which stem intensity, and more specific description of manifestations, can greatly improve the chatbot's proficiency in diagnosis and symptom detection. Expanding the word permutations and using more databases can improve chatbot efficacy and allow medical chatbots to handle a variety of ailments. The proposed technology will engage patients in a conversational text bot to help them with their health issues. and patients can converse as if they were having a conversation with a real person. Computer-to-computer communication is made possible by the technology's utilization of natural language processing (NLP). Furthermore, many hospitals, assisted living homes, and even private centers are already using online chatbots to provide human services on their websites. Text-based messaging services are popular among young people because they are rapid, cheap, and easy to use. Chatbots are arguably the most innovative and promising form of interaction between people and machines. Giving the administrator the ability to collect the patient's healthcare records and apply data preparation techniques to properly filter them is the aim of this project. Gathering pertinent

medical information for the patients, handling missing and categorical data, creating sparse matrix visualizations, feeding data to the independent pipeline for predictions, and selecting and refining an appropriate machine learning algorithm are all part of the administrator's duties. Accessing the chatbot from the website's front end and answering its queries with a yes/no response is the visitor's main duty. The visitor will see a confidence interval linked to a specific prognosis that needs further investigation and testing for better results. The first step is to begin their process; each symptom then shows up on the client's screen separately at a time. They'll need to give a yes-or-no answer. The patient has to choose "yes" to see their concern on the screen once it has been recognized. It will provide you with the doctor's information, including biography and website URL, which is the greatest part. so that a patient can easily find their doctor and start receiving therapy. This will be made available with the help of a chatbot, allowing anyone to check their problem at any time. You can reply by simply clicking the Yes or No button.

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1.2 Background of the Study and Motivation

With the development of chatbots, users' issues are resolved more quickly. Globally, the use of automated chatbots in web applications is expanding in the healthcare industry. Patients who are ill with various ailments come to the hospital to receive treatment. Nursing takes a lot of time, and doctors aren't always available as a result. In order to solve this problem, medical chatbots were created. These chatbots are trained and evaluated on real-time datasets, and output accuracy is important. The AI-powered chatbots are accurate, dependable, and quick. The user submits the appropriate information and gets response based on their question. The chatbot offers validation and autocorrection capabilities in case any user commits a small error. These days, chatbots are doing multitasking tasks on every clinic and hospital portal. Patients save a great deal of time, and chores are finished with little effort [2]. Numerous businesses across a range of industries, including e-commerce, healthcare, automated phone answering systems, and help desk solutions, use chatbots. Sophia, a robot created to help Harvard students with mathematics by responding to their inquiries, is one example. This proved to be relevant in numerous other situations. The NLP and machine learning are the primary technologies that underpin chatbots. A chatbot receives a query, processes the input, interprets what the user is asking, and then uses a series of intricate algorithms to determine the best response. This chatbot system was developed using a pattern

matching algorithm and natural language processing. Python is used in its development. The healthcare chatbot system may respond to both general and in-depth inquiries and will assist users in providing online medical support around-the-clock.

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1.3 Goals and Objectives

The computer program communicates with consumers via voice and SMS communications and is genuinely intelligent. The AI-based medical care chatbot project's main objective is to use natural language processing to prevent illness and maintain wellness. Compared to the current system, this one is safer and easier to operate. The project's goals state that in order for the user to receive the particular condition, they must text the chatbot. By entering their details, which are stored in a database, users can also view their previous conversation history [3]. Users can input the necessary data and receive feedback depending on their question with the help of this application. It is easier to use and many more trustworthy. Because chatbots are user-friendly, anyone can utilize them. A healthcare the chatbot can provide a personalized diagnosis with respect to symptoms.

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1.4 Project Outline

Anyone can employ chatbots that operate because they are easy to use. A tailored diagnosis based on symptoms can be given by a healthcare chatbot.

1.Rules-based: These chatbots employ preset question-and-answer scenarios. Simple activities like gathering basic information or responding to frequently asked questions can be handled by such chatbots.

2.AI-powered: This is a conversational bot with intelligence that can evaluate requests and respond by drawing on prior knowledge of related queries. In addition to mental health difficulties, this bot can be utilized for sophisticated tasks including patient diagnostics and triage.

3.Hybrid: These chatbots will pair a patient with a human agent if the AI or non-AI chatbot is unable to respond to a query.

Chatbots are widely used for instant messaging clients, social media marketing, and customer service. When a patient tells this chatbot about their issue, it can also offer suggestions. Based

on their construction, chatbot models can be divided into two broad categories: retrieval-based and generative-based models. A virtual nurse that reminds patients to take their medications and check their blood pressure might be a healthcare chatbot. If needed, it also locates the closest physician. We learned about chatbots and created an accurate deep learning version of a chatbot in Python. We can train the chatbot with high accuracy by customizing the data to meet company needs. Chatbots are being used everywhere, and every company is eager to incorporate them into its operations. We concentrate on a single type of chatbot that is utilized for self-care or that comes before speaking with a nurse or physician. The chatbot will ask the user where they should talk about health-related issues. The chatbot will administer the medication if the patient has a fever. Text analysis is how natural language processing is used.

Chapter 2

Literature Review

2.1 Proposed System

The main goal of machine learning (ML), an application of artificial intelligence (AI), is to enable computers to learn and improve from experience without being explicitly programmed. ML focuses on creating computer programs that can access data and use it to learn for themselves. Data or observations, such as examples, direct experience, or instruction, are the starting point for the machine learning process, which looks for patterns in the data so it can later draw conclusions based on the examples provided. A subfield of artificial intelligence (AI) called natural language processing (NLP) makes it possible for machines to comprehend human language. Its goal is to build systems that can make sense of text and automatically perform tasks like translation, spell check, or topic classification[5]. Natural Language Processing (NLP) makes it possible for computers to understand the human language. Behind the scenes, NLP analyzes the grammatical structure of sentences and the individual meaning of words, then uses algorithms to extract meaning and deliver outputs. In other words, it makes sense of human language so that it can automatically perform different tasks. Probably, the most popular examples of NLP in action are virtual assistants, like Google Assist, Siri, and Alexa. NLP understands written and spoken text like “Hey Siri, where is the nearest gas station?” and transforms it into numbers, making it easy for machines to understand. Another well-known application of NLP is chatbots. They help support teams solve issues by understanding common language requests and responding automatically. The goal of Natural Language Processing is to make human language which is complex, ambiguous, and extremely diverse easy for machines to understand.

2.2 Overview of Existing System

Chatbots are computer programs that employ natural language processing (NLP) for human-machine interaction (HMI) and machine learning (ML) [6]. "A chatbot's complexity is directly correlated with the domain's size." An open domain necessitates a wider knowledge base, whereas a closed domain has a more focused knowledge base that was created to accomplish a particular objective. Usually, chatbots are employed to have conversations.

between machines and individuals. In a variety of scenarios, a chatbot could help physicians, nurses, patients, and others [7]. Here are some examples of research initiatives involving chatbots:

i. A personalized medical assistant chatbot (2019)

This paper describes the model that was trained using the conversations dataset. The apriori principle can be used to reduce the amount of item sets we need to examine. entire API medic dataset, simplifying the process of symptom checking.

ii. Chatbot in mental health care (2019)

This article uses an online poll and applies natural language processing. Although this method is adaptable, it cannot display our feelings.

iii. An interactive chatbot utilizing knowledge graphs for fact-based medical inquiries

This paper show knowledge-graph for factoid medical question. In this paper efficient handle the dialog, ask missing information, generate more precise and contextualized response are described.

iv. Emergency patient care system using chatbot (2019)

Sentiment analysis, tokenization, dependency parsing, normalization, and named entity recognition are all used in this article. Although it is easy to construct, there is no disease data available.

2.3 Drawbacks of Present System

1. Users may only receive a limited number of responses from a simple chatbot, which means that not all users will be able to find the answers they need.
2. Many chatbots have a minimal database, which means that if a user gets lost, the exchange could ramble on and on, which could annoy them.
3. It's possible that sophisticated chatbots cost more than basic ones: Simple chatbots may be less expensive than complex ones that handle some of the aforementioned problems [8]. That takes away some of the cost-saving potential of the chatbot. We can learn, but it still takes time.

2.4 System Requirements

2.4.1 Used Technology

- Language : Python.
- Technology : AI, ML, Deep Learning, NLP, TensorFlow
- Interpreter : Python 3.9.

2.4.2 Software Requirements

- Operating System : Windows 10/ macOS
- Browser : Google chrome
- Designing Tool : Visual Studio Code, CuDNN, CUDA Toolkit 11.2

2.4.3 Hardware Configuration

- Processor : Intel Core i5
- RAM : 4 GB or More
- Hard disk : 500 GB or more
- Monitor : 15” CRT, or LCD monitor
- Keyboard : Normal or Multimedia
- Mouse : Compatible mouse

Chapter 3

Methodology and Design

3.1 Methodology

The development of cutting-edge products like chatbots and driverless cars is fueled by artificial intelligence. Chatbots, sometimes known as virtual assistants, are a fantastic way to enhance the customer experience thanks to recent developments in Natural Language Processing (NLP). Among the most common use cases for chatbots are answering commonly asked questions, filing claims, checking the status of an order, and gathering customer feedback. An interdisciplinary team of business analysts, service designers, data scientists, machine learning engineers, and software developers must work together to create a chatbot that provides users with a favorable experience [9]. A variety of modern concepts and methodologies, including design thinking, AI innovation sprints, and agile software development, are combined in the chatbot creation process.

3.2 Analysis and Specification of Requirements

This section offers a concise study of the possible solution, outlining and dissecting the prerequisites for putting the chatbot into practice. This covers the following: the issue the project is trying to solve, the design approaches taken into account for execution, the functional and non-functional requirements, and the hardware and software used to carry out the project [10].

3.3 Defining the Chatbot's Purpose

It is crucial to sidestep the pitfall of attempting to build a jack-of-all-trades chatbot, as the hype surrounding certain conversational applications can lead to inflated expectations and detrimental user experiences [11]. Therefore, it will be crucial to establish a narrow scope and a clear purpose for the chatbot in order to manage the remainder of the chatbot development process. To begin the development of a chatbot, it is essential to specify its purpose, identify the issue it will address, and clarify the benefits it will provide to users.

3.4 Developing the Chatbot

The development team can map out the functionality and produce a technical design after the chatbot design is finished. Determining whether artificial intelligence (AI) is necessary for the chatbot to achieve its goals will be crucial in establishing the development process. Since not all chatbots require artificial intelligence (AI) to function properly, the team will probably use agile development techniques within the conventional software development lifecycle (SDLC). In addition to developing a rule-based chatbot, the software engineering team should specify what backup procedures and background operations must be performed to ensure that all system components are correctly integrated [12]. Development can be finished via incremental delivery, modifying the design based on end-user input. If a chatbot requires Natural Language Processing (NLP) components, it must be developed using a machine learning and agile software development methodology. Machine learning is significantly different from rule-based systems. Experimentation and exploration are required for data collection, feature engineering, model training, model evaluation, and data preparation (cleaning, wrangling, and merging). The team working on the project must consider experimenting when creating a chatbot.

3.5 Testing

It is important to conduct testing and evaluation after each component of the system has been designed and put into place. For middleware software, this includes testing individual components through unit testing, evaluating machine learning components in a different way, evaluating the trained models using testing data, and defining success metrics to measure model performance. Before and after deployment, usability testing should be conducted to determine whether the chatbot follows the expected conversational flows and error handling strategies by monitoring user interactions [13]. Since effective chatbots are built to learn, maintenance is a crucial component of the development process. Analyzing user sentiment and feedback, as well as any additional insights the interactions may yield, is crucial once the chatbot is engaging with actual users.

3.6 Quick Answers to Frequently Asked Questions

The frequently asked questions area is one of the most typical features of any website. Certain basic questions can be efficiently answered by a chatbot. Chatbots for healthcare make it easier for patients to get in touch with doctors when they have serious problems. In just a few seconds, a healthcare chatbot may provide a comprehensive solution to all of a patient's general inquiries. By adding an interactive healthcare chatbot to answer consumers' general inquiries, numerous healthcare service companies are revolutionizing their FAQs. It facilitates the retrieval of prompt answers to frequently asked questions [14]. Here's how healthcare facilities would benefit greatly from a chatbot.

Real-time response: A healthcare chatbot lowers the number of tickets by giving users prompt answers to frequently asked questions.

24×7 availability - Bots are available round the clock to engage customers and provide faster assistance.

Personalized responses: A medical chatbot recognizes and comprehends the patient's question before offering tailored solutions.

Gather patient data: Gathering patient data is one of the main use cases for healthcare chatbots. Healthcare chatbots can be used to gather information by asking basic inquiries like the patient's name, address, phone number, symptoms, current physician, and insurance details.

Get patient feedback: Getting patient feedback is very important for improving healthcare services. By using a straightforward, automated conversation flow, chatbots for healthcare can help you learn what your patients think about your hospital, physicians, services, and overall experience. 69% of consumers say they prefer interacting with chatbots when they have basic support questions. Nowadays, real-time chat is the main method that customers and organizations seek to communicate. The simplicity of a conversation has been expanded to include feedback.

3.7 Diagram of Data Flow

A classic visual depiction of how information moves through a system is a data flow diagram (DFD). The appropriate amount of the system need can be graphically represented by a clean and unambiguous DFD.

3.7.1 Level 0 Diagram of Data Flow: Another name for it is a context diagram. It is intended to be an abstract perspective that depicts the system as a single process together with its connections to other things. With incoming/outgoing arrows indicating input and output data, it depicts the complete system as a single bubble [15].



Figure 1: Level 0 DFD of the Chatbot Application

3.7.1 Level 1 Diagram of Data Flow: The context diagram is broken down into several bubbles or processes in 1-level DFD. At this level, we deconstruct the high-level process of 0-level DFD into smaller processes and emphasize the system's primary functions.

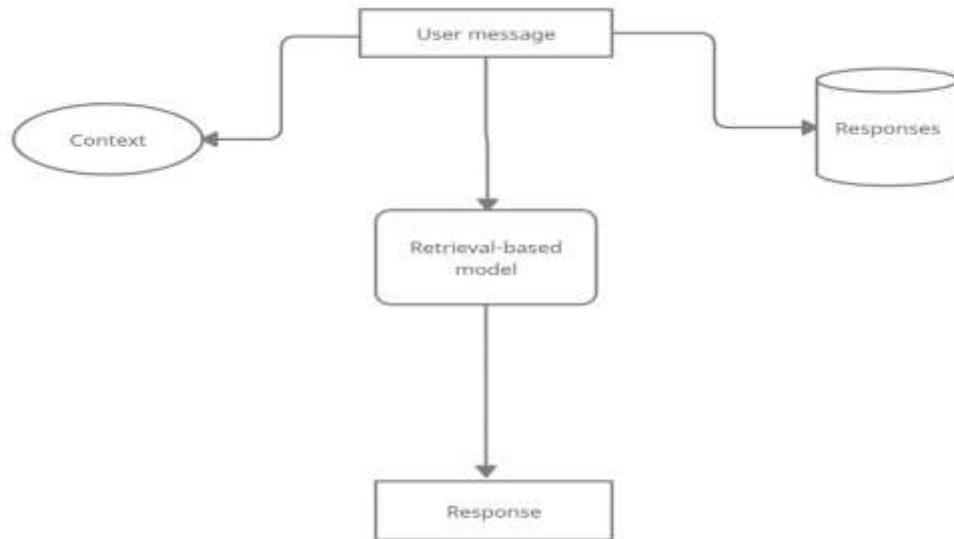


Figure 2: Level 1 Diagram of Chatbot Application

3.8 Use Case Diagram

A system's dynamic behavior is depicted using a use case diagram. It incorporates actors, use cases, and their interactions to encapsulate the functionality of the system. It simulates the duties, services, and capabilities needed by an application's system or subsystem. It illustrates a system's high-level functionality and describes how a user interacts with it [16].

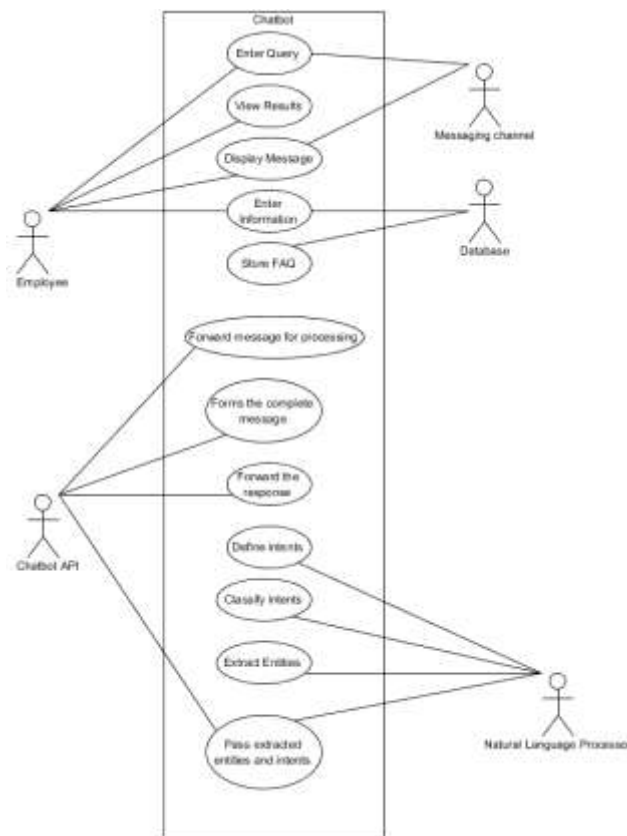


Figure 3: Use Case Diagram of Chatbot Application

Chapter 4

Implementation and Results Discussion

During the project's implementation phase, the theoretical design is transformed into a functional system that gives users confidence in the new system's ability to function successfully and efficiently. It entails thorough planning, analysis of the existing system and implementation limitations, method design to accomplish the switch, and evaluation of the changeover techniques. User education is a key component of planning and preparation for implementation. The amount of system analysis and design work needed for implementation alone will increase with the complexity of the system. A committee has been created to coordinate execution in accordance with the policies of each particular organization. The theoretical design is turned into a working system during the project's implementation phase, giving users assurance that the new system will operate effectively and successfully. It involves careful planning, analyzing the constraints of the current system and its implementation, designing a mechanism to carry out the transition, and assessing the changeover strategies. One of the most important aspects of implementation planning and preparation is user education. The more complicated the system, the more system analysis and design work will be required for implementation alone. To coordinate implementation in compliance with each organization's policies, a committee has been established.

4.1 ChatBot Library

A Python package called ChatBot is made to provide automated answers to user input. It uses a variety of machine learning techniques to produce a wide range of replies. This capability enables programmers to create Python chatbots that can have conversations with people and provide pertinent and suitable answers. Furthermore, as the bot gains experience, the ML algorithms assist it in improving its performance. The language independence of ChatBot is yet another great feature. Multiple programming languages can be used to train your bot thanks to the library's architecture [17].

4.2 Implementation of the System

4.2.1 Get the dependencies ready: The initial activity in utilizing the ChatBot library to build a Python chatbot is to install it on our computer. It is better if we create and use a new Python desktop environment for the installing.

4.2.2 Interface Console Based

We must simply write Yes or No in this. We must write "no" on our screen if our symptoms do not match. We only need to write "yes" when our symptoms match.

Symptoms Window: Our corresponding issue will be displayed on the console screen after we type "Yes." Additionally, it will reveal any symptoms that a patient might be experiencing.

4.2.3 Build and train the Chatbot: The third step in creating a Python chatbot is this. An instance of the "ChatBot" class will be our suggested chatbot. After creating a new ChatBot instance, we might train the bot to function better. Training ensures that the bot has enough knowledge to start reacting in a certain manner to specific inputs. We can also build and train the bot by creating an instance of "ListTrainer" and passing it a list of strings.

4.2.4 Talk to the Chatbot in Python: The `get_response()` function can be used to communicate with our Python chatbot. It's important to realize, though, that the Python-based chatbot may not be able to respond to all of our inquiries. In order to train it further, we must give it additional time and training data because its knowledge and training are currently somewhat limited.

4.2.5 Use a corpus of data to train our Python chatbot:

In the final phase of creating a Python chatbot, we may use an existing corpus of data to further train our chatbot. This is an illustration of how to use a corpus of data that the Python chatbot itself provides to train it.

4.3 Steps to Build a Chatbot

To effectively create an interface that is conversational for our chatbot, adhere to the instructions below.

Step one: Importing libraries

For your Python code to be properly organized, imports are essential. By enabling code reuse and preserving the maintainability of our projects, properly importing code will boost our productivity.

Among the required libraries are:

String: Access to a number of potentially useful constants is provided by the string.

Random: This module provides generation of pseudo-random numbers for different distributions.

WordNetLemmatizer: It is capable of lemmatizing.

Tensorflow: This symbol represents an array of dimensional items..

Sequential: A linear sequence of layers is sequentially grouped into a `tf.keras.Model`..

Step two: Creating a csv file

This step is going to generate a csv file that contains every possible outcome of a user engaging with our chatbot. To help users categorize their queries, we first desire a few rows and columns, each of which needs a unique pattern. By identifying these patterns, the chatbot may be able to learn how users ask inquiries concerning its name and develop into more responsive, answering questions with pre-programmed responses [19].

Step three: Data Processing

This step will create a list of classes, an understanding of all the terms used in the patterns, a list of every arrangement in the file, and all the related tags for each pattern before we create our training data.

Step four: Creating a model for a neural network

Since neural networks that are can only understand numerical values, we must first examine our data before they can understand what we are doing. The code transforms our data into numerical values using a bag of words encoding approach. Now that our data has been converted into a numerical representation, we can build a neural network model along with feed it our training data. The model will select an appropriate response from the tag associated with an identifiable feature.

Step five: Developing practical characteristics

We must first create the required functionality before we can use our model in a chatbot, which will be facilitated by creating a library of useful functions. A while loop will allow the user to enter a query, which will then be cleared. After converting our language into numerical values using our bag of words model, we estimate which tag in our intent best captures who we are.

4.4 Run the chatbot

Tkinter

The default Python GUI library is called Tkinter. Combining Python with Tkinter makes creating GUI apps quick and simple. The Tk GUI toolkit has a strong object-oriented interface thanks to Tkinter. Using Tkinter to create a GUI application is simple. All you have to do is follow these steps—

Import the Tkinter module.

Create the GUI application main window.

Include a number of of the aforementioned components in the graphical user interface..

To respond to each user-triggered event, enter the main event loop.

Tkinter Widgets: In HTML, gadgets are similar to elements. The various widget kinds in the Tkinter correspond to the various element types. Let's look at a quick overview of each of these the Tkinter interface widgets..

Button: Button icons are placed in the Tkinter using a button widget..

Canvas: - Your GUI's canvas is where you design shapes.

Check button: - The check checkboxes in your program are created using the check button. Multiple options are available for you to choose from at once.

Entry: - In the GUI, fields for entering are created using the text widget.

Frame: - The the Tkinter interface uses frames as storage.

Label: - Text, photos, and other single-line items can be created with labels..

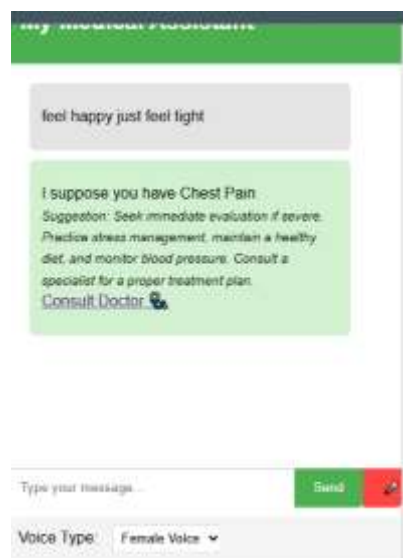
Menu: - In a graphical user interface, menus are created using menu.

4.5 Screenshots

Symptoms Window

When the user adds symptoms to the model, the Symptoms window is generated or invoked at runtime. when a suitable quantity of inputs is used to satisfy the model. After that, it produces a response that includes the projected disease, symptoms, confidence interval, and the next doctor's appointment advice. Additionally, the symptoms window offers a link to schedule an appointment with the concerned physician, which the user can copy and paste into their browser to proceed.

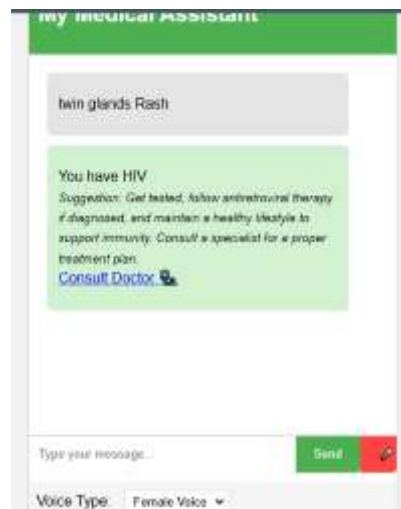
Figure 4: Screenshot of Chatbot example 1



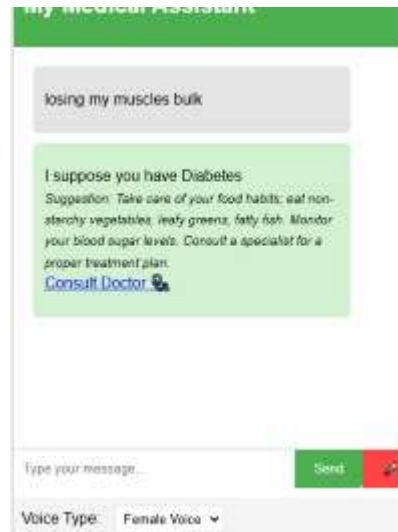
This is the screenshot of response of chatbot example 2:



Figure 5: Screenshot of Chatbot example 3



This is the screenshot of response of chatbot example 4



X_ DATASET: It contains number of input given by users.

	0	1	2	3	4	5	6	7	8	9	10	11	12
0	1	1	1	0	0	0	0	0	0	0	0	0	0
1	0	1	1	0	0	0	0	0	0	0	0	0	0
2	1	0	1	0	0	0	0	0	0	0	0	0	0
3	1	1	0	0	0	0	0	0	0	0	0	0	0
4	1	1	1	0	0	0	0	0	0	0	0	0	0
5	0	1	1	0	0	0	0	0	0	0	0	0	0
6	1	0	1	0	0	0	0	0	0	0	0	0	0
7	1	1	0	0	0	0	0	0	0	0	0	0	0
8	1	1	1	0	0	0	0	0	0	0	0	0	0
9	1	1	1	0	0	0	0	0	0	0	0	0	0
10	0	0	0	1	1	1	0	0	0	0	0	0	0
11	0	0	0	0	1	1	0	0	0	0	0	0	0
12	0	0	0	1	0	1	0	0	0	0	0	0	0
13	0	0	0	1	1	0	0	0	0	0	0	0	0
14	0	0	0	1	1	1	0	0	0	0	0	0	0
15	0	0	0	0	1	1	0	0	0	0	0	0	0
16	0	0	0	1	0	1	0	0	0	0	0	0	0
17	0	0	0	1	1	0	0	0	0	0	0	0	0
18	0	0	0	1	1	1	0	0	0	0	0	0	0

DIMENSIONALITY_REDUCTION: To avoid repeat value and contain unique values.

DISEASES: Number of Diseases.

Index	prognosis (vertigo) Paroxysmal P...
0	
1	AIDS
2	Acne
3	Alcoholic hepatitis
4	Allergy
5	Arthritis
6	Bronchial Asthma
7	Cervical spondylosis
8	Chicken pox
9	Chronic cholestasis
10	Common Cold
11	Dengue
12	Diabetes
13	Dimorphic hemmorrhoids(...
14	Drug Reaction
15	Fungal infection
16	GERD
17	Gastroenteri...
18	Heart attack
19	Hepatitis B
20	Hepatitis C

DOCTER DATASET: It will provide Doctor's name with its link where one can visit his/her site and also tell problem. It contain multiple rows and three columns

Index	name	link	disease
0	Dr. Amarpreet Singh Riar	https://www.practo.c...	(vertigo) Paroymsal P...
1	Dr. (Maj.)Sharad...	https://www.practo.c...	AIDS
2	Dr. Anirban Biswas	https://www.practo.c...	Acne
3	Dr. Aman Vij	https://www.practo.c...	Alcoholic hepatitis
4	Dr. Mansi Arya	https://www.practo.c...	Allergy
5	Dr. Sunil Kumar Dwivedi	https://www.practo.c...	Arthritis
6	Dr. Chhavi Bansal	https://www.practo.c...	Bronchial Asthma
7	Dr. Sneha Khera	https://www.practo.c...	Cervical spondylosis
8	Dr. Inderjeet Singh	https://www.practo.c...	Chicken pox
9	Dr. Suman Mohan	https://www.practo.c...	Chronic cholestasis
10	Dr. Manish Munjal	https://www.practo.c...	Common Cold
11	Dr. Ajay Jain	https://www.practo.c...	Dengue
12	Dr. Anshul Gupta	https://www.practo.c...	Diabetes
13	Dr. B B Khatri	https://www.practo.c...	Dimorphic hemmorhoids(...
14	Dr. Rajeev Adhana	https://www.practo.c...	Drug Reaction
15	Dr. Vedit Tripathi	https://www.practo.c...	Fungal infection
16	Dr. Arun Wadhawan	https://www.practo.c...	GERD
17	Dr. Neha Sood	https://www.practo.c...	Gastroenteri...
18	Dr. Vineet Narula	https://www.practo.c...	Heart attack
19	Dr. Yogesh Jain	https://www.practo.c...	Hepatitis B
20	Dr. Rakesh Singh	https://www.practo.c...	Hepatitis C

Table No : 01

Chatbot Responses

Input	Response	Referred Doctor	Suggestions
sneezing, itchy eyes, coughing	According to your symptoms you might have Allergies	https://healthcenterbd.com/dr-zahir-uddin-mohammad-babar/	Identify and avoid triggers when possible, consider antihistamines (if recommended), and keep indoor areas clean. Consult a specialist for a proper treatment plan.
coughing at night, wheezing, frequent cough	According to your symptoms you might have Asthma. You have Asthma. I suppose you have Asthma.	https://www.doctorbangladesh.com/prof-dr-a-k-m-mustafa-hussain	Take medication, Exercise regularly, Make your home asthma-friendly
blocked nose, runny or blocked nose, cough with phlegm	According to your symptoms you might have Bronchitis Disease, You have Bronchitis Disease, I suppose you have Bronchitis. Disease	https://sasthyaseba.com/doctors/dr-saroj-kanti-chowdhury	Stay Hydrated, Avoid Pollutants, Consult a specialist for a proper treatment plan.

chest feels heavy, chest feels tight, pain in chest and arms back and jaw, breathlessness.	According to your symptoms you might have Chest Pain, You have Chest Pain, I suppose you have Chest Pain.	https://www.doctorbangladesh.com/prof-dr-a-k-m-mustafa-hussain/	Seek immediate evaluation if severe, Practice stress management, maintain a healthy diet.
sore throat,sneezing,coughing.	According to your symptoms you might have Common Cold, You have Common Cold, I suppose you have Common Cold.	https://healthcenterbd.com/professor-dr-md-jahirul-alam/	Stay hydrated, get plenty of rest, use over-the-counter meds if needed, and maintain good hygiene. Consult a specialist for a proper treatment plan.
feeling very thirsty,loss of muscle bulk,feeling very tired.	According to your symptoms you might have Diabetes, You have Diabetes,I suppose you have Diabetes.	https://healthcenterbd.com/prof-dr-ajit-kumar-paul/	Take care of your food habits,eat non-starchy vegetables, leafy greens.
continuous sadness, mood off, losing interest in things, losing motivation.	According to your symptoms you might have Depression, You have Depression, I suppose you have Depression.	https://sasthyaseba.com/doctors/dr-md-sayad-ullah	Regular exercise,Sleep hygiene,Stay connected .

Loss of appetite, diarrhoea, abdominal pain.	According to your symptoms you might have Hepatitis C, You have Hepatitis C,I suppose you have Hepatitis C.	https://sasthyaseba.com/doctors/prof-dr-faruque-ahmed	Consult a specialist for a proper treatment plan.
Fever ,swollen glands,rash.	According to your symptoms you might have HIV, You have HIV,I suppose you have HIV.	https://healthcenterbd.com/dr-ayasha-akter/	Get tested, follow antiretroviral therapy if diagnosed.
pus in kidney,shivering,pain in the back.	According to your symptoms you might have Kidney infection, You have Kidney infection, I suppose you have Kidney infection.	https://healthcenterbd.com/prof-dr-delip-kumar-roy/	Drink plenty of water, follow doctor's advice on antibiotics.

4.5 Accuracy Conclusion:

The neural network-powered healthcare chatbot has a 79% accuracy rate. This suggests that in roughly 79 out of 100 instances, the model accurately predicts replies. Even if this accuracy points to a respectable degree of dependability, it can nevertheless be improved, particularly for a vital application like healthcare, where precision is essential. A 79% accuracy rate indicates that while the model does well, it may still give false or misleading results in 21% of instances. Even a minor error rate can have serious repercussions for healthcare applications. As a result, more optimization is advised. Performance may be improved by combining many models. In conclusion, even if 79% accuracy is a good place to start, more work is required to guarantee the chatbot's dependability and efficiency in medical environments.

Chapter 5

Concluding remarks and suggestions

5.1 Conclusion

I've had plenty of opportunities to design, write, test, and put into operation an application thanks to this project. Based on the data, there is unmistakable proof that the number of avatars being used in the financial services sector will rise sharply. More complex and intelligent chatbots are becoming more common as a result of the enormous amount of research that has been done and is still being done in the field of artificial intelligence. This will be very helpful in quickly delivering client care that is both accessible and easily reached. Additionally, this has aided in my learning of Python, NLP, AI, ML, and Personal Web Host. According to the study's findings, chatbots in healthcare are far superior to manual systems since they provide a number of aspects that contribute to their efficacy and effectiveness [18].

5.2 The future Improvement

We can incorporate voice-based questions and responses into this undertaking's future scope. In addition to providing the text output, the system will also provide a speech output while the user provides voice input. We may incorporate the aforementioned capabilities into our project by simply incorporating automated speech and speech-to-text. We'll work to improve the system's appearance. Our goal is to increase the efficiency of this system. Apps for the Web, Android, iPhone, and other technologies will be developed by us. Voice-based inquiries will be incorporated. We'll increase the amount of our dataset.

5.3 proposals

This necessitates putting the online system into use and assessing user reaction once it is in place. Similarly, user manuals and appropriate training should be provided to guarantee improved user engagement. Finally, this study suggests developing mobile apps regarding this chatbot in order to spread the system.

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