



Medical Chatbot Using Machine Learning with Disease Prediction

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ABSTRACT:

This application is an Online Pharmacy Application with a Medical Expert chatbot in it. A chatbot is a budding idea in the Machine Learning Field, by using this one can able get immediate response to their queries. Once the user logged in to the application, the user can be able to order medicines and get their medicines at their doorstep also they can make their queries to the chatbot, which can able to respond to the user until the user gets the proper answer. And the vital role of the chatbot is to give the disease prediction based on the symptoms given by the users.

Index terms: Machine learning, Disease Prediction, Chatbot, Angular, Firebase, MySQL Workbench.

1. INTRODUCTION

People have been addicted to the internet recently to find solutions to their problems. This encourages people to seek information not only about general issues but also about personal health concerns. People are worried about misunderstanding while Google their symptoms since most queries create unneeded paranoia in consumers and are occasionally erroneous.

This is a chatbot-powered online pharmacy app that interoperates with a medical expert. A Chatbot is a relatively new product in the Machine Learning sector that provides consumers with rapid answers to their concerns. The chatbot will gather information from the user and forecast illnesses based on the symptoms. Using the NLP Algorithm, a chatbot was created for this application that responds to the user based on the input it receives.

Individuals begin to design various technologies to help people receive the most precise findings on their sickness based on that necessity. One method is to develop a yes-no questionnaire system. It undoubtedly helps, however because several diseases have almost identical symptoms, people can't respond to this yes-no questionnaire technique because more information is needed to gain accuracy. Another option is to create a website, whereas some medical websites already play an important part in today's digital world, and there are several forums accessible to answer the user's questions.

The necessity for a trustworthy and precise diagnosis has prompted the creation of a new generation of healthcare technology known as the Medical Chatbot. The major goal of developing this chatbot is to replicate a person's conversation.

The Medi-bot will receive input from the user, process the command supplied by the user, and then generate an appropriate answer based on the training set it possesses.

1.1 MACHINE LEARNING

Machine Learning is based on the assumption that multiple models learned independently will be valuable for a variety of reasons. To create predictions, each model examines marginally different areas of the data and obtains some component of reality, but not all of it. Combining classifiers in machine learning is commonly done using a combination of experts, a majority voting ensemble, boosting, bagging, and stacking. The majority voting ensemble is a combiner that may be used in conjunction with stacking-based machine learning. Stacking is built on a diverse group of weak learners. Every classifier is trained independently and the final decision is taken by a majority vote, with the results averaged. Because the results are produced utilizing ensemble learning of all classifiers rather than a single dominant classifier, it is a straightforward and efficient technique for combining weak and/or dominant classifiers while producing a well-balanced output.

Artificial intelligence (AI) is a broad term for computer software that consists of a complicated mathematical algorithm that analyses incoming data to create any pre-defined outputs that lead to meaningful results. AI systems that make use of massive datasets can be created to improve decision-making and analytical processes while mimicking human cognitive capabilities. AI has been used in medicine and a variety of healthcare services, including diagnostic imaging and genetic diagnostics, as well as clinical laboratories, screening, and health communications.

A chatbot can employ a variety of strategies. NLP, Machine Learning, Braun and Clarke's, Compare Keyword, and Data Mining are some of the methodologies.

Machine learning and natural language processing are the algorithms that match medical chatbots. Machine learning algorithms include ensemble learning, supervised and unsupervised learning, artificial neural networks, binary regression, and classification. The NLP approach is used to convert raw user input into a token that machine learning can understand. The NLP takes the text input and translates it into unstructured output, which is then fed into the chatbot system. After the text input is analyzed, the chatbot will answer with a series of questions to better comprehend the user's condition. So, they employ NLP to extract the term from the user input so that machine learning can analyze it. Ensemble Learning is used to predict user disease based on user symptoms provided in the form of a token or processed string in the user input.

1.2 CHATBOT

A chatbot, at its most basic, is computer software that replicates and processes human interaction (either written or spoken), allowing humans to communicate with digital devices as if they were speaking with a real person. Chatbots can range from simple programs that respond to a single-line question to complex digital assistants that learn and adapt to provide greater degrees of personalization as they receive and analyze data.

1.3 FIREBASE

Firebase is an app development platform that allows to creation and expand popular applications and games. Google-backed and trusted by millions of companies worldwide. Firebase Hosting hosts web apps, static and dynamic content, and microservices quickly and securely. Firebase Hosting is a high-quality online content hosting service for developers. Users can swiftly deploy web apps and serve both static and dynamic content to a global CDN with a single command (content delivery network). To create and host microservices on Firebase, can also combine Firebase Hosting with Cloud Functions or Cloud Run.

1.4 ANGULAR

Angular is an HTML and TypeScript-based platform and framework for creating single-page client applications. TypeScript is used to create Angular. It provides essential and optional functionality through a collection of TypeScript libraries that the user can include in their apps.

The architecture of an Angular application is built on a few key concepts. The basic building blocks of the Angular framework are Angular components organized into modules. Modules are collections of code that bring together similar code to build functional sets; an Angular application is defined by a collection of modules. An application always comprises at least one root module that allows it to bootstrap, as well as several feature modules.

- A component-based framework for constructing scalable web applications.
- A collection of well-integrated libraries that cover a wide variety of operations including routing, form management, client-server communication, and more.
- A suite of developer tools that helps to develop, build, test, and update the user's code.

1.5 RULE-BASED GRAMMAR MATCHING

In computer science, rule-based machine learning (RBML) refers to any machine learning method that identifies, learns, or evolves 'rules' to store, alter, or apply. The identification and use of a set of relational rules that collectively describe the information gathered by the system is the defining attribute of a rule-based machine learner. Other machine learners, on the other hand, frequently identify a single model that can be applied generically to any instance to produce a prediction.

1.6 ML MATCHING

Natural Language Processing and Algorithmic Probability are used in Machine Learning. The system reads the entire user input and analyzes it thoroughly. The strength of the match is determined by the user's confidence score configuration. The default matching system is ML, which is turned on by default.

1.7 PROBLEM STATEMENT

People rely on the hospital to answer any questions regarding drug dosage or any other medical-related questions, and everyone hurried to the hospital to get answers. People may not be able to travel to the hospital or get medications during our most vulnerable periods. Furthermore, users must be able to obtain disease predictions based on their responses to the symptom questions that have been posed to them.

3 SYSTEM STUDY

3.1 EXISTING SYSTEM

Web E-Commerce programs such as Net medicines, 1MG, Pharm-easy, and Apollo Pharmacy are now available. Users can purchase drugs for their personal use using these applications. The E-Commerce application is utilized in the existing system to order drugs based on prescriptions.



Fig 3.1 Net meds Application

The home page of the Net Meds application Fig 3.1, which is one of the Online pharmacy Applications, will assist the user in ordering and purchasing their medications.



Fig 3.2 1mg Application

The image mentioned above Fig 3.2, is the home page of the 1mg web E-commerce application to buy and sell medicines.



Fig 3.3 Apollo Pharmacy Application

The image shown above in Fig 3.3 shows the home page of the Apollo pharmacy web application, which allows users to order medications from an Apollo pharmacy branch near their location.

3.1.1 Disadvantages of Existing System

This system makes no recommendations or warnings about dose usage. If a user of those applications has a question regarding medicine or has any other questions about medicine, they should go to the hospital to get answers. Furthermore, they refuse to deliver the drugs to a specific branded E-Commerce platform because the delivery location is too far away from the intended destination.

3.2 PROPOSED SYSTEM

The proposed application, FingerTip Pharmacy, is a web application that will allow users to obtain medications online and have them delivered to their door. Because the drugs are classified based on their use, the user will have a better understanding of them.

This program includes a Medical Chatbot. After logging into the application, the user can engage in chats with the trained chatbot. The chatbot has been trained with a large number of talks, and new intents have been built based on the discussions for a suitable response.

Within this application, there is another chatbot. The chatbot will take the user's symptoms as input and predict the ailment depending on the user's input.

This application will load on Firebase, it will be hosted for free, and will be able to use it from anywhere.



Fig 3.4 Proposed Logo for the Application

3.2.1 Advantages of Proposed System

The user can able to make their queries to the chatbot regarding the medicine and medicine dosage consumption. The chatbot is also responsible for suggesting a medicine for an illness that is mentioned by the users. This application also lists the common disease name, also categorizes the medications as per the user need.

3.2.2 Comparison of Existing Systems versus Proposed system

The table mentioned below compares the existing systems such as Net-Meds, 1mg, Pharm-Easy, and Apollo Pharmacy with the proposed system FingerTip Pharmacy.

Table 3.1 Existing versus Proposed

Functionalities	Net Meds	1mg	Pharm-easy	Apollo Pharmacy	Finger Tip Pharmacy
Order medicines Online	✓	✓	✓	✓	✓
Shop by category	✓	✓	✗	✓	✓
Get Medicines from all the shops irrespective to a particular branch	✓	✓	✓	✗	✓
Chatbot help	✗	✗	✗	✗	✓

6 RESULTS AND DISCUSSION

This chapter discusses the overview of Medical Chatbots using Machine Learning and a detailed description of the flow diagram of Medical Chatbots using Machine Learning in addition to that it will predict the patient disease as per the symptoms given by the users as input.

6.1 Overview

A web application that enables users to purchase both prescription and over-the-counter medications as well as items related to pharmacy and the medical industry. Prescription medications can also be purchased with the help of a doctor's prescription. There is a chatbot in this application. That programme replicates and processes human dialogue to offer users a sense of human interaction, enabling them to interact with digital gadgets as if they were speaking to real people. Users are able to receive medical advice by using that. The Medi-bot will take input from the user, process the command they have received, and then develop an appropriate answer for that in accordance with its training set. On the other side, this chatbot will also use the user's symptoms as input and make a possible disease prediction.

6.2 Login Page

If a user has the credentials to log in, they can do so once the application has launched by using those credentials. Or if they don't have any credentials, they must make some via the signup page in it.

The user has the option to purchase things without first logging into the application, however doing so will allow them to access order data and saved information.

The below image is for the users who have login credentials. If the user has the login credentials, then they have to enter that in the input box and have to click the sign-in.



Fig 6.1 Login Page

6.3 Home Page

The brands that are offered in the application are first listed on the home page. The user will be taken to another page, the Whole Product Page, in the same tab after selecting any one of the brands, where they will see a list of the products that belong to that specific brand.

The below image is the one that contains the list of brands, the user can able to scroll it horizontally. The user can able to select any one brand, that one brand.

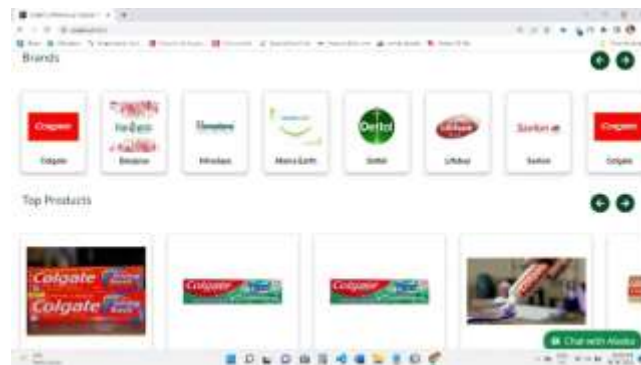


Fig 6.2 Home Page with Brands

The products from the online pharmacy application that were retrieved from the database are also included on the homepage. These products will display the name price and any applicable offers. At the top of the card is a buy now button. Clicking this will add the item immediately to the user's shopping cart and take the user to the cart page.



Fig 6.3 Home Page with Products

The application also has the slider and that slider will scroll the products with the help of the that the users can able to choose the products with an offer. This particular slide is working with a animation and it will scroll infinitely.

6.4 Whole Product Page

The user can filter the products based on price using the slider that is present to the right, once all the products have been loaded. The user can then select a product to be taken to the product page by clicking it.



Fig 6.4 Whole Product Page

The above image contains the products which is available in the application under the brand – Colgate. The slider is also visible. The users are allowed to give the lower end and the higher end price threshold.

6.5 Product Page

When the user clicks the product on the Whole Product page or if the user clicks any other product displayed on the home page that will route the user to this product page.

The Product page will contain the Product name, SKU (Stock Keeping Unit) – By which the seller can able to segregate the product, and Ribbon which contains the special data about the Product, the product quantity, together with any applicable offers, will be displayed on the product page.

If the user clicks the Add to Cart button in the Product Page that Product will be added to the cart.



Fig 6.5 Product Page

Additionally, that page will include the product's description, other information, and customer reviews.



Fig 6.6 Additional Information

6.6 Cart Page

This page will update if customers add the product to their shopping cart. All of the items that the user has added to their cart are listed on the cart page.



Fig 6.7 Cart Page

The user-added product's Product Name, Unit Price, Quantity, and Subtotal are all displayed in the above graphic. The overall amount, delivery cost, and input field for applying a coupon are all located on the right side.

The subtotal will be lessened if the user used a valid coupon id. The user can confirm the order and continue to complete the payment.

6.7 Chatbot Implementation

The "Chat with Alaska" button is located in the bottom right corner of this program. A popup of the chatbot will appear if the user clicks the button. There are two alternatives available in that chatbot, one of which is to learn more about an illness. With this chatbot option, the user will receive a detailed explanation of the disease question they have posed. On the other side, the program will gather the user's symptoms, and the chatbot will utilize those signs to predict the condition.

6.7.1 Chatbot – Gives Definition about the Disease

The users will be assisted by this portion of the chatbot in providing the name of the disease, and the chatbot will then provide a description of the disease to the users using training data stored inside the program.

The user may obtain a detailed description of the ailment through this portion of the application.



Fig 6.8 Chatbot for getting Definition of Disease

6.7.2 Chatbot – Predicts the Disease

The user can select one or more symptoms in this section of the application. The chatbot will then ask for another symptom depending on the symptoms selected by the user, and so on up to levels 4 and 5.



Fig 6.9 Chatbot for Predicting the Disease

Once the user has selected every symptom level, the chatbot will identify the disease the user may be suffering from based on the symptoms provided by the user.

7 CONCLUSION AND FUTURE SCOPE

The proposed system give the users to order the medicines and get them at the doorstep. Also, with the help of the chatbot, they can able to get the proper medical suggestion, and also they can able to predict the disease with respect to the symptoms given by the user. Also, they can able to solve their queries by building conversations with the chatbot.

7.1 FUTURE SCOPE

- Adding image processing will allow users to update the application's image of the user's lungs, which will then be compared to the templates already in place to determine what stage corona is at.
- Analytics that are based on application user information indicates the appropriate dosage for a given medicine.

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