Artificial Intelligence based Chat Bot for Patient Health Care

[1]Anandan P, [2] Kokila S, [3] Elango S, [4] Gopinath P, [5] Sudarsan P

[1] Associate Professor, Department of Electronics and Communication Engineering,
Vel Tech Rangarajan Dr Sagunthala R&D Institute of Science and Technology, Chennai, India.

[2] Assistant Professor, Department of Electronics and Communication Engineering,
Vivekanandha College of Engineering for Women, Tiruchengode, India.

[3] Professor, Department of Electronics and Communication Engineering,
Paavai Engineering College, Namakkal, India.

[4] Assistant Professor, Department of Electronics and Communication Engineering,
Sengunthar Engineering College, Tiruchengode, India.

[5] Assistant Professor, Department of Electronics and Communication Engineering,
Er. Perumal Manimekalai College of Engineering, Hosur, India.

[1]anand.phd.dip@gmail.com, [2]kokila.singaram@gmail.com, [3]nandhu_prema@yahoo.co.in, [4]mail2gopiece@gmail.com,
[5]sudarsanps@gmail.com

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Abstract— **India is a country with an increasing population of more than 1.3 billion yet lack of medication is a crisis here. While travelling around government hospitals and as well as public hospitals, it is discovered that there are insufficient numbers of doctors to handle the growing population, where lack of sufficient doctors are the one of the reasons for patient deaths. To overcome these issues, we set to create a medical chatbot using Artificial Intelligence, which has the potential to provide an immediate access about any medical information-based queries. These chatbots helps the patient to discover the nearby specialists and fixing their appointments. If the user is suffering from severe fever by asking few questions in series the chatbot provides the precautions based on the users' answers or it will suggest any specialists nearby according to the timeline of both user and specialist. In case if the user is searching for any diagnosis centre, for example if he/she needs any MRI scan the chatbot provides the information of labs in surroundings along with the opening and closing times. The design of the software is done through the combination of NLP and Machine Learning.**

Keywords — Natural Language Processing, Artificial Intelligence, Decision Tree, Dimensionality Reduction, Feature Selection, Feature Extraction.

I. INTRODUCTION

After the ascent of the web and portable applications, virtual chatbot applications are the most recent developments of computerized plan. These applications are notable for programmed conversational specialists that sudden spike in demand for PC programming or a sort of computerized reasoning Artificial Intelligence (AI) communication between the clients and machines with the intervention of Natural Language Processing (NLP). Chat bots are conceivably alluded to as the most encouraging and progressed type of human-machine connections. In the long run, these virtual specialists are engaging in the fundamental worldwide areas like medical services, banking, instruction, agribusiness, and so forth. The medical services area is firmly connected with human communication, and it appears to be strange. The utilization of chat bots has spread from client assistance to immeasurably significant issues. Chat bots are entering the medical services industry and can assist with tackling a large number of its issues. Well, being visit bots is to speak with clients. It permits clients to ask clinical inquiries and get replies from specialists. The clinical chat bots assist the clients with presenting their concern about the wellbeing. The client can ask any close to home question identified with medical care through the chat bots without truly accessible to the clinic. Inquiry is shipped off chat bots and gets related responses to the customers. A major sickness can begin from little issues, for example, migraine which feels ordinary however it very well might be the start of large infection like dengue and the greater part of the illness can be recognized by normal indications so the sickness can be anticipated. Wellbeing Service Provider that gives conferences specialists and medical care.

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II. LITERATURE SURVEY

A chatbot based medical system [1] has developed a chat bot based medical system based on three phases. The first phase is the pre-processing stage, which incorporates (NLP) Natural language processing methods such as word splitting, punctuation filtering, stop word removal, and porter stemming to find the root word. Aspect extraction and aspect mapping are carried out in the second phase of modelling. In phase 2, the detected topics and aspects are mapped together, and each categorized dataset is assigned to an SVM with machine learning. The trained algorithm recognizes the problem typed by the person in the medical chat bot in the third step, and these problems are linked with

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data base sets. A Medical chat bot is used to check the state health of the person at anytime [2], anywhere same like meeting the doctor directly and having medication directly. For predicting the diseases machine learning algorithms are used. There are many machine leaning algorithms which can be used for predicting the disease. (SVM) Support vector machine is a technique used for achieving the prediction and for boosting the efficiency of the model. This system uses (NLP) Natural Language Programming for achieving the style of chatting. This NLP algorithm reduces the time spending in hospitals of the patients. This medical assistance chat bot is used [3] for making present generation life easier. As for medical assistance it is taking hours in hospital so the medical assistance came forward in to mobile phone for guiding. By using (NLP) Natural Language Programming algorithm [4], auto response system or chat bot system was implemented to guide the patient based on the symptoms said by the patient and from Doctor Me application treatment records are gathered.

The system proposed by Kavitha, B. R., and Chethana R. Murthy [5] is about implementing a Medical based chat bot system for helping the patients without consulting them to the doctor directly. Here (NLP) Natural Language Programming, (AL) Artificial Intelligence are used and N gram is used for calculation and TF-IDF, Cosine Similarities are also used. This chat bot has the potential to provide patients with access and immediate medical response and also fixes the doctor appointment. The system proposed by Gopi Battineni, Nalini Chintalapudi and Francesco Amenta[6] designed a chat bot for Novel corona virus. As this pandemic was the major crises all over the world, People got suffered in pandemic and lockdown for consulting the doctors and for medical assistance. This chat bot is especially for those people who are suffering with Corona Virus. Algorithms like (AIML) artificial intelligence markup language and some functionalities are used. The designed proposed by Imran Ahmed and Shikha Singh [7] is about implementing an Chatbot using its voice synthesizer. This is an artificial intelligence chatbot with whom humans can interact by speaking. This chatbot can be used in various fields like Education and Medical fields. By using Microsoft voice synthesizer and (AIML) Artificial Intelligence Markup Language algorithms are used for AIML based enabled Artificial Intelligent Chatbot.

III. METHODOLOGY

3.1. Decision Tree:

Decision tree classifier which can be used for both classification and Regression problems is one of the supervised learning techniques, but mostly it is used for solving classification problems. In this there are two nodes they are decision node which is used to make decisions and have multiple branches and the other is leaf node which is the output of those decisions and do not have any further branches. It is a tree structured classifier in which internal nodes represent the features of datasets based on which the decisions are performed and branches represent the decision rules. The name decision tree is given as it is similar to a tree i.e., it starts with a root node and further expands as branches resulting in a structure of tree. Classification and Regression Tree algorithm (CART Algorithm) is used for attaining a tree structure. The decision tree breaks down the datasets into smaller and smaller subsets while this process happens simultaneously an associated decision tree is developed. The decision tree simply asks a question, and based on the answer Yes/No, it further split the tree into sub trees. The aim is to create a model which predicts the value for a target variable inferred from the data features.

3.2. Dimensionality Reduction:

It is the process of lowering the number of random variables, also known as features, by taking into account numerous aspects, i.e., by generating a set of major variables, and then finalizing the classification based on these factors. Dimensionality reduction is divided into two parts, they are:

1. Feature Selection
2. Feature Extraction

3.2.1. Feature Selection:

A subset of the original set of features is obtained in this method, which can be utilized as a model for the problem. It can be done in three different ways.

1. Filter
2. Wrapper
3. Embedded

3.2.2. Feature Extraction:

In this the dimension space of the data is reduced i.e. the data in high dimensional space is converted to low dimensional space (with less number of dimensions).

IV. PROPOSED MODEL

The proposed system consists of user login credentials in the database maintain, whenever the user logins to the chatbot it compares the credentials which are present in database if the user is new, it allows the user to register. Then the chatbot asks questions regarding disease diagnosis (like some symptoms) whether the user has this particular symptom or not, which can be seen in the figure 1. The user needs to answers the queries with yes/YES or no/NO, based on the answer of the user the chatbot predicts the disease by using Decision Tree Classification method.

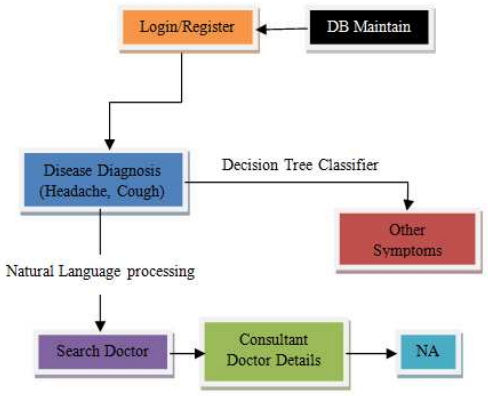


Figure 1. Block Diagram

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The proposed method not only predicts the disease but also it gives the best suited doctor for that particular disease treatment.

V. RESULTS

Step – 1: In this an account login page or a window will pop – up asking the user to either login or register as shown in Figure 2. Login/Register Page. The user has to login if user already have account. If the user doesn't have an account, then the user needs to register for a new account.

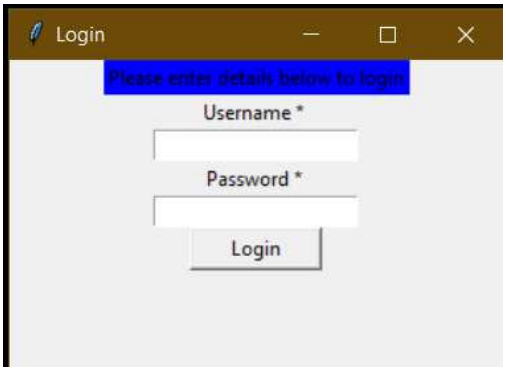


Figure 2. Login/Register Page

If the user doesn't have an account, then the user needs to register for a new account which is shown in Figure 3. Register Page.

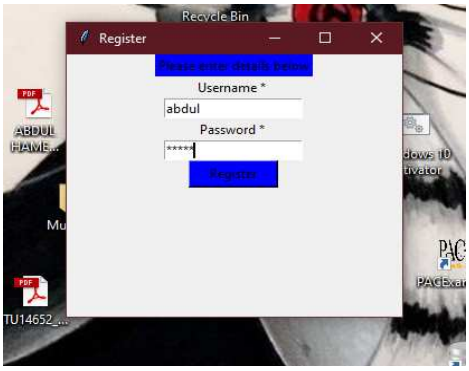


Figure 3. Register Page

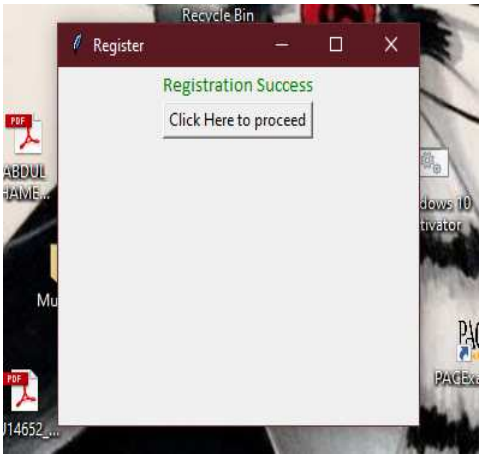


Figure 4. Registration Success

After clicking on register then an option called "Click here to proceed" comes then the user needs to click on it then it takes to step – 4.

Step – 2: After the user selects the login option an account login window comes up (shown in Figure 5. Login Page) asking the user to enters his/her credentials.

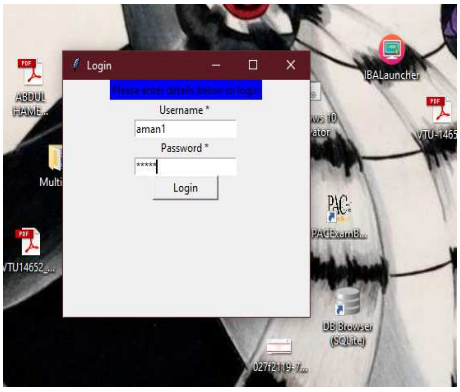


Figure 5. Login Page

Step – 3: After confirmation of user details from the database a pop-up window showing login successful comes up (Figure 6. Login Confirmation)

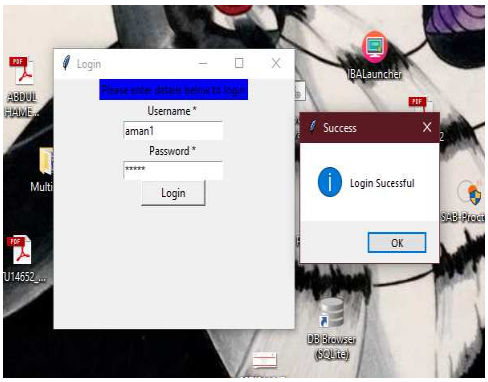


Figure 6. Login Confirmation

Step – 4: Then after clicking on OK a Self Examine Portal opens up on the screen as shown in Figure 7. Self Examine Portal Window.

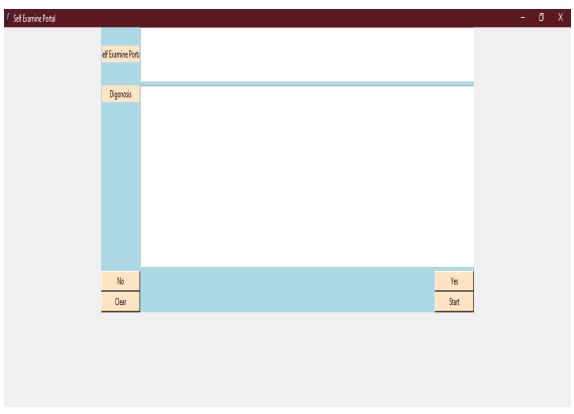


Figure 7. Self Examine Portal Window

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Step – 5: After clicking on Start button the query session gets started where the chatbot asks the queries to the user and the user has to click on Yes or No button based on the queries been asked. If the user clicks on No then the chatbot keep asking questions until it gets matched with the symptoms which it has been trained, when the user clicks on Yes, the chatbot shows the disease and other symptoms for that disease it also gives the best suited doctor along with his website link as shown in Figure 8: Query Session.

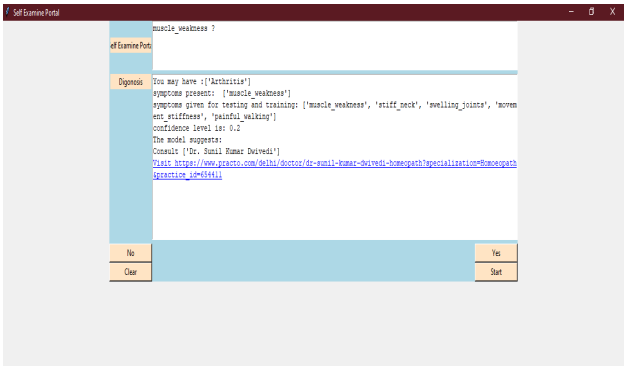


Figure 8. Query Session

VI. CONCLUSION

In this work, we have concentrated on various types of symptoms for particular diseases. By using Decision Tree Classifier and Dimensionality Reduction Techniques the disease is been identified quite early for example a major sickness can begin from little issues, for example, migraine which feels ordinary however it very well might be the start of large infection like dengue and the greater part of the illness can be recognized by normal indications so the sickness can be anticipated. In this work we are using Decision Tree Classifier to detect the disease based on the queries related to the symptoms for example the chatbot asks the user whether he/she is suffering from joint pains if the user clicks on Yes then the chatbot shows the related disease with those symptoms. By using Dimensionality Reduction, we are reducing the redundancies in the datasets. It also gives the confidence level of that particular symptom. It also helps the patient or the user by providing particular doctor for that particular disease and it also gives the information of that particular consultant doctor.

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