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INFOMEDICA: A Virtual Personal Assistant Build using Machine Learning for Disease Prediction

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ABSTRACT: One of the goals of Artificial intelligence (AI) is the realization of natural dialogue between humans and machines. in recent years, the dialogue systems, also known as interactive conversational systems are the fastest growing area in AI. Many companies have used the dialogue systems technology to establish various kinds of Virtual Personal Assistants(VPAs) based on their applications and areas, such as Microsoft's Cortana, Apple's Siri, Amazon Alexa, Google Assistant, and Facebook's M . Virtual Assistants are known for being great at many things and can make a positive contribution to the success of your SME. They can also assist with your organization skills and productivity by freeing up your time for you to focus on other important activities. Users can perform desktop control services by using only voice command, Users can perform the disease by knowing some symptoms and they immediately consult with doctors, users can get todays weather forecast prediction by virtual assistant, etc. Moreover, the new VPAs system can be used in other different areas of applications, including education assistance, medical assistance, robotics and vehicles, disabilities systems, home automation, and security access control..

KEYWORDS: Disease prediction, Face Recognition, Voice Recognition, Virtual Assistant.

I. INTROUDUCTION

Now a days we use lots of Artificial Intelligence and machine learning based services. Virtual assistant is one of that service. It provides lots of features like web searching through voice command and many device controlling services and may other services. Spoken dialogue systems are intelligent agents that are able to help users interactions. Also, spoken dialogue systems are being incorporated into various devices such as smart-phones, smart TVs, in car navigating system. Also, Dialogue systems or conversational systems can support a wide range of applications in business enterprises, education, government, healthcare, and entertainment. Personal assistants, known by various names such as virtual personal assistants, intelligent personal assistants, digital personal assistants, mobile assistants, or voice assistants. All these companies are trying to develop the competences in several of the core technologies for their dialogue systems, such as automatic speech recognition, text-to-speech, synthetic talking face and dialog management. Now-a-days, people face various diseases due to the environmental condition and their living habits. So the prediction of disease at earlier stage becomes important task. But the accurate prediction on the basis of symptoms becomes too difficult for doctor. The correct prediction of disease is the most challenging task. This research intends to apply the concepts of natural language processing and machine learning to create a chatbot application. People can interact with the chatbot just like they do with another human and through a series of queries, chatbot will identify the symptoms of the user and thereby, predicts the disease and recommends treatment. This system can be of great use to people to encourage them to make proper measures to remain healthy.

The remainder of this document is arranged as follows. Section **II** discusses literature survey.Section **III** presents the proposed framework and its concepts. Finally, conclusions and prospects of this research are presented in Section.

II. LITERATURE REVIEW

A) Chatbot for disease prediction and treatment recommendation using macine learning[1]

This paper explains a medical chatbot which can be used to replace the conventional method of disease diagnosis and treatment recommendation. Chatbot can act as a doctor. The chatbot acts as a user application. The user of this

application can specify their symptoms to the chatbot and in turn, chatbot will specify the health measures to be taken. General information about symptom and diseases are available in the dataset and thus the chatbot instance can provide information about disease and treatment to the user. After analyzing the symptoms of the different users, it finally predicts the disease to the user and provides with a link where details about the treatment is visible. A smart medical chatbot can be useful to patients by identifying the symptoms as described by them, giving proper diagnosis and providing with suitable treatment for the disease. In the busy life, it is rare for people to frequently visit hospitals for check-ups. Chatbot is of great importance in such situations as they provide diagnostic assistance with a single click of button. Chatbot doesn't require the help of any physician to give proper health measures to the users and this is one of the major advantages of chatbot. Moreover, the costeffectiveness in using chatbot is a major attractiveness to users. The chat with users is completely personal and this helps users to be more open with their health matters and paves way for chatbot to efficiently identify the disease.

B) Designing disease prediction model using machine learning[2]

In this paper it proposed general disease prediction system based on machine learning algorithm. We utilized KNN and CNN algorithms to classify patient data because today medical data growing very vastly and that needs to process existed data for predicting exact disease based on symptoms. We got accurate general disease risk prediction as output, by giving the input as patients record which help us to understand the level of disease risk prediction. Because of this system may leads in ow time consumption and minimal cost possible for disease prediction and risk prediction. We compare the results between KNN and CNN algorithm in terms of accuracy and time and the accuracy of CNN algorithm which is more than KNN algorithm and time required for classification for CNN is less than KNN. So we can say CNN is better than KNN in terms of accuracy and time.

C) Evaluation of multimodal Virtual Personal Assistant[3]

In this paper it presented the preliminary results concerning the user evaluation of a Virtual Assistant prototype developed in the context of the FASiL project. The conversational and multimodal approach to this kind of applications was very well accepted and supported by the users. We can conclude that the quality and speed of the system feedback as well as the recognition accuracy of the spoken components are key factors to a better user experience and for the acceptance and use of voice-enabled systems. The GUI approach adopted as a mean to overcome the slowness of the system response and the recognition problems suggest that multimodal interfaces can overcome the weaknesses of each modality and exploit the full strengths of combined modes. However, improvements are needed to increase the recognition accuracy of the spoken components, providing a better user experience and open the door to the acceptance and divulgation of multimodal systems.

D) Virtual Personal Assistant[4]

This paper describes one of the most efficient ways for voice recognition. This system uses machine learning. It overcomes many of the drawbacks in the existing solutions. It is mainly built to make a much more efficient VPA o that they can be brought into much more practical day to day uses.

III. PROPOSED SOLUTION

3.1 Problem Statement

To build a Virtual Personal Assistant which has features like Talk back service , Secured authentication, Animated character module for interaction with users and had facility of disease prediction.

3.2 Problem Elaboration

Generally chatbots are used in various day- to-day activities. Our goal is to provide this features in more efficient and more interactive way. We are using speech recognition module and gTTS module for this features. Disease prediction using machine learning algorithms is the highlight feature of this project. Build secured authentication using face detection and SMS alert system.

3.3 Proposed Methodology

Now a days virtual personal assistant(VPA) or chatbots are used in many day-to-day uses. They are used for various controlling operations and mainly information purpose. In information feature user just need to speak his query and the desired output is displayed as a result. For asked query this application searches that query on the internet and redirect the resulted website to the user. Now a days finding exact disease before consulting a doctor is a challenging task.

Based on existing symptoms we can predict the disease with this application. With the help of this application time consumption for finding the exact disease is reduced and we can easily consult with the doctor before any danger. This two main highlight features of our application that is Information System and Disease prediction feature that's why we named this project as INFOMEDICA. This Infomedica project mainly includes following features.

- Secured Authentication – which includes face recognition and SMS alert feature
- Talk back service feature like general question answers and web searching for requested query
- Disease Prediction feature
- Weather Forecasting of current day
- Interactive talkative animated Character for GUI purpose to interact with users.

Proposed System

1. Secured Authentication

This feature provides secured login (authentication) for legitimate users. This feature uses a Face detection method to recognize the legitimate user and if any new user is registering in the system then SMS alert is send to all existing users. With the help of this service we provide a security to our project.

Face detection feature uses a Local Binary Patterns Histogram (LBPH) algorithm. It is based further danger. This feature uses a Logistic Regression algorithm. The reason for using this algorithm is cross validation score was better than the other algorithms namely naïve Bayes , Decision Tree, random forest .The dataset of symptoms is in the form of .csv file. Data in the dataset is given for training model is 100% because we cannot leave any disease unrecognized by the model. We take at least three inputs from the user as symptoms (maximum symptoms a user can enter is 5) these inputs are taken to the model in the form of list, where the our model processes according to logistic regression algorithm. The dataset used for prediction and to train the model included diseases(unique) and unique symptoms , while for checking the score for each model we made a cross combination of dataset to see which model gives the best outcome for a complicated dataset. Then is predicts most closest disease according input symptoms (highest probability of 1 for a disease among the others). Then the predicted disease is returned by our model to the GUI, which will display the predicted disease.

2. Talk back Service

The Talk back service provides general question and answer feature and web searching for requested query.But this feature is not like other general features , in this feature user has to give voice command and according to that , the voice is converted into text we have used Speech_Recognition module. Speech-Recognition is a library for performing speech recognition, with support for several engines and API's, online and offline.And according to that text respective feature is called. If user is interest in some general answer then that function will be executed and desired answer is converted into speech with the help of gTTS module (Google's Text-To-Speech) module which is in the form of mp3 format. gTTS(Google Text-To-Speech),A python library and CLI tool to interface with Google Translate text-to-speech API.The converted speech is spoken by animated character which has some lip movements and facial expressions. This animated character gives us a same resembles a person talking with the user.If user wants answers from internet then that text will be searched on internet and respected websites will be redirected.

Weather forecasting feature also comes in this module. If user wants to know about todays weather then he just has to command it to our system through speech and our module will redirect you the todays weather report. For Weather forecasting feature it uses OpenWeatherMap API. This API gives real time weather data.

3. Disease Prediction

In this feature based on the symptoms of user the disease is predicted accordingly. The main aim of this feature is to provide more efficient and more accurate disease prediction for patients and get the treatment as early as possible to avoidfurther danger. This feature uses a Logistic Regression algorithm. The reason for using this algorithm is cross validation score was better than the other algorithms namely naïve Bayes , Decision Tree, random forest .The dataset of symptoms is in the form of .csv file. Data in the dataset is given for training model is 100% because we cannot leave any disease unrecognized by the model. We take at least three inputs from the user as symptoms (maximum symptoms a user can enter is 5) these inputs are taken to the model in the form of list, where the our model processes according to logistic regression algorithm. The dataset used for prediction and to train the model included diseases(unique) and unique symptoms , while for checking the score for each model we made a cross combination of dataset to see which model gives the best outcome for a complicated dataset. Then is predicts most closest disease

according input symptoms (highest probability of 1 for a disease among the others). Then the predicted disease is returned by our model to the GUI, which will display the predicted disease.

4.Talkative animated character

This feature gives a same resemblance as user talking with person. This interactive and talkative character module have lips movement according to words in the speech and it has some facial expressions too. This gives us a feeling of talking with the live person not with the machine.This talkative animated character has a name called G46.Talkative animated character implementation is done by synchronizing the audio and video. When any question is asked, the corresponding answer is generated and converted to audio, which is played. While the audio is being played, the video of lips movement has to be played simultaneously, which is done using multithreading. Main thread plays the audio and thread-0 plays video. At all times, staring video is played at thread-0. But when audio is played in main thread, a global variable communicates the signal to the thread-0 to stop staring video and play talking video. The moment audio play gets finished, again the global variable communicates the same, thereby indicating that stop the talking video and play the staring video. This in turn gives audio video synchronization, thereby implementing the animated character.
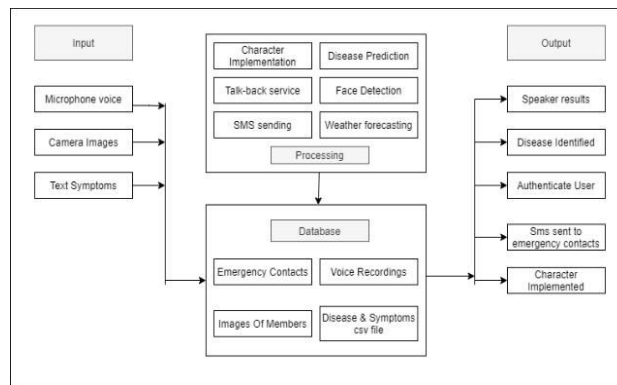

Fig 1. Architectural Diagram

IV. RESULTS

This project has implemented four features. The results of each feature is discussed below.

1. Secured Authentication

This feature provides security to our system. In this feature after starting our system, it open the web camera and authenticate the user upfront of system and validated that user. If any unauthenticated user tries to access the system then it gives alert to other users via SMS alert System. Below are the some pictures of this feature.
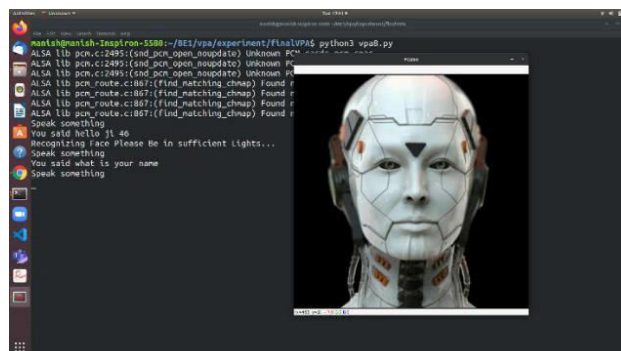

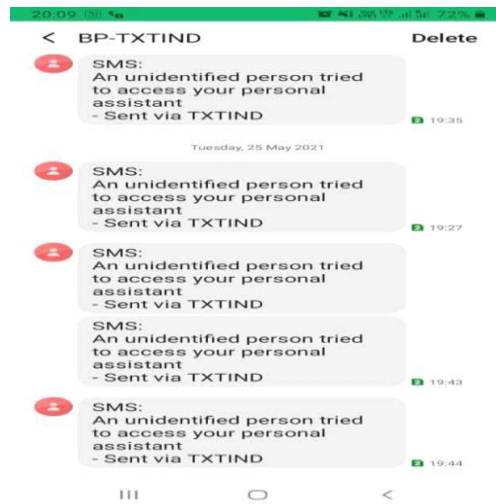
Fig 2. Face detection process

Fig 3. SMS alert system

2. Talk back Service:

This feature includes many services like General Questions answering which includes answers for question "What is your name? ","Who are the creators ?" etc. like this kinds of questions are asked by user through voice command and resulting answers also given through speech by our system. If user wants information from internet and hi has given a query through voice command then that query is processed and respective websites are shown to the user on screen. Like user wants to know about Sachin Tendulkar then he has to give a voice command like this "Sachin Tendulkar". Then according to this query respective websites shown to the user which contains information about Sachin Tendulkar.

Also if user wants to know about today's report then he just has gave a voice command and required todays weather report is shown to the user by our system. Below are the pictures of this features are given:
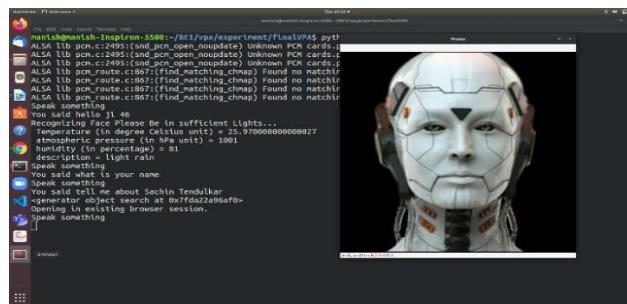

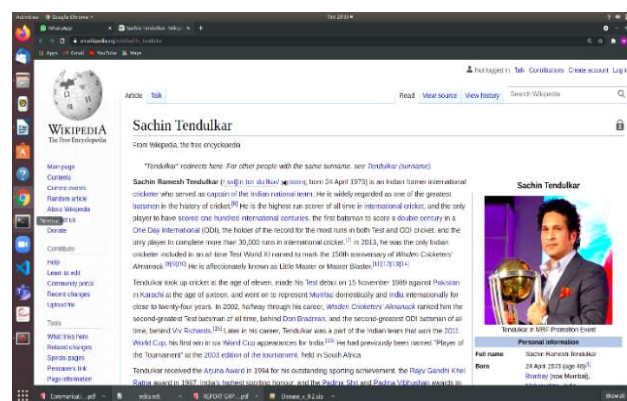Fig 4. General questions answering and web searching facility.

Figure 5. Redirected website for a internet query.

3. Disease Prediction

In this feature user has to give minimum three and maximum five symptoms according to that respective disease is predicted by our system using machine learning algorithms. If user has symptoms like "cough", "fever ", "loss taste smell " then according this symptoms " " this disease is predicted by our system. Below are some pictures explaining about this feature.
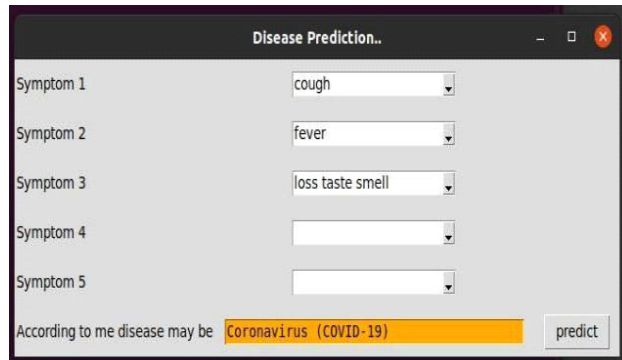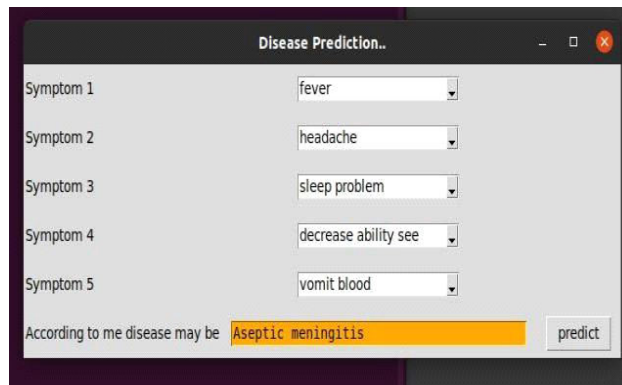

Fig 6. Disease prediction with 3 symptoms

Fig 7. Disease prediction with 5 symptoms

4. Talkative animated character

This feature is about animated character module which has some lip movement and facial expressions. This animated character module gives live talking experience with as same as person. Below is the picture of this feature.
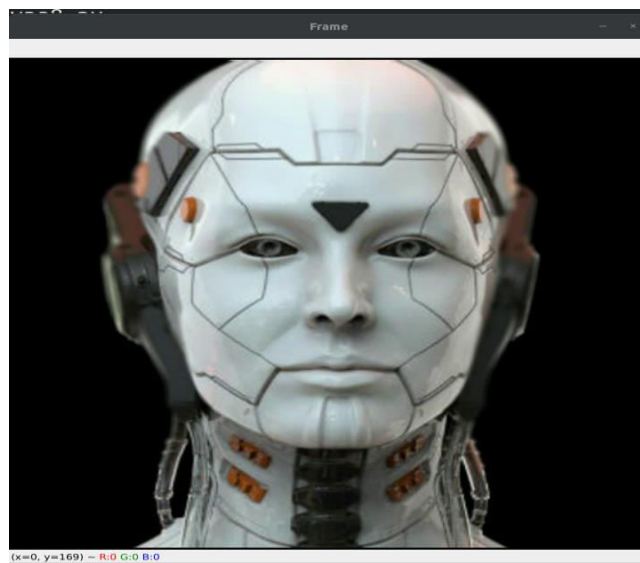

Figure 8. Talkative Animated Character

V. CONCLUSION

This project is adequate solution for many services. The main key feature of this project is disease prediction. We can easily and precisely predict the disease on the basis of symptoms. So the user get to know about respective disease as early as possible and according to that user can consult a doctor.

It also useful for other services like weather forecasting feature where we can get information about today's weather and plan according to that if user want to go somewhere. Secured Authentication feature is purely providing a very high security to our system based on the face recognition feature and SMS alert feature. Talk back service includes mainly two parts. General question's answering where those answers are spoken by animated character and web searching for requested query which is given through voice command feature using simple voice command.

VI. FUTURE SCOPE

Our aim is to implement a full fledge virtual personal assistant. It will reduce human interventions in many sectors. Where is will all day-to-day tasks of human being where he requires more to do it. This personal assistant will have feature of application control for various applications, where we can open, close, minimize and maximize the application through voice command.

The Personal assistant application can be further enhanced by adding functionality such as collecting the users current location or where he is planning to go and according to that location after analyzing this data ,it will provide suggestions other places where user can go for travelling. Improve health related services right from predicting the correct disease and taking appointment from respective doctors to get a proper treatment and also it will provide feature of buying the medicines online.

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