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Artificial Intelligence Powered Medical Expert

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Abstract- **Artificial Intelligence (AI) predictive techniques enables auto diagnosis and reduces detection errors compared to exclusive human expertise. Disease diagnosis is the identification of an health issue, disease, disorder, or other condition that a person may have. The study considered most frequently used databases, in which We further discuss various diseases along with corresponding techniques of AI, Machine Learning, and Natural Language Processing. Expert System using Artificial Intelligence interacts with the patients with the help of the Natural Language Processing (NLP) and takes the required information or data regarding the disease. Then calculates the possible outputs or diseases and their root causes and says those predictions back to the patient. . Finally, the paper also provides some avenues for future research on AI-based diagnostics systems based on a set of open problems and challenges.**

Keywords – Natural Language Processing (NLP), Artificial Intelligence, Expert System, Machine Learning

I.INTRODUCTION

Diagnosis of diseases is the most challenging process, a very pivotal phenomenon for a medical care professional. The diagnostic process could be very tiresome and complex. To minimize the uncertainty in medical diagnosis health, the care experts collect empirical data to as certain a patient's disease. Hence, there was a need of automatic diagnostic system that provides benefits from both human knowledge and accuracy of the machine [7].

A suitable decision support system is needed to achieve accurate results from the diagnosis process with reduced costs. Classification of diseases depending upon various parameters is a complex task for human experts but AI would help to detect and handle such kinds of cases. Currently, various AI techniques have been used in the aid of medicine to accurately diagnosis sicknesses. AI is an integral part of computer science by which computers become more intelligent. The vital need for any intelligent system is learning. There are various techniques in AI that are based on Learning like deep learning, machine learning, natural language processing etc.

Also Modern AI algorithms already helped doctors in arranging a comprehensive approach to disease management. Moreover, they are often used to improve surgical robots that execute highly complex operations. In the current growing age of digitization, Artificial Intelligence (AI) powered chatbots are playing a leading role by exemplifying the function of a virtual assistant that could manage a conversation via speech or textual methods. This paper describes integrating chatbots with voice assistant. Our solution includes a Multilingual Voice Application based on Natural Language Processing to provide primary healthcare education and advice to chronic patient. Using AI, it converts the user's speech to text which is processed and understood using natural language processing, and an output is generated which is then converted back to speech and returned to the user. Hence these systems are just collecting information through keyboard and gives the predictions on the screen. The objective of Expert System using Artificial Intelligence is to interact with the patients with the help of the Natural Language Processing(NLP) and takes the required information or data regarding the disease[8]. The Expert System then calculates the possible outputs or diseases and their root causes and says those predictions back to the patient. Expert system language Expert Systems language is a set of programs which allow the building of an expert system through the creation of knowledge and rules. Expert systems have three essential components.

I. User interactions- presents questions to the user and accepts inputs from them.

II. Knowledge base- contains data, facts, rules and objects in a specific knowledge domain. The knowledge base obtained from the human expert is prepared by a knowledge engineer as most human experts are not skilled in computer programming.

III. Inference engine- this is software that matches the users input with data contained in the knowledge base to reach appropriate answers. This is done using inference rules e.g. IF conditions THEN statements ELSE statements rules.The proposed expert system as assistant in improving healthcare was a plan to transform industrial robots into precision machines for surgery and beyond. But no matter how impressive, robotics in healthcare is still a system controlled by humans. However, most

experts agree that AI will not replace trained medical staff, just make them more efficient in several areas.

II. LITERATURE SURVEY

1. Literature Review There are many expert system that were designed to diagnose diseases. But there is no specialized expert system all kind of medical experts available[7]. Although it's linked to several human diseases such as: Diabetes, bacterial, Ear, Eye, Mouth Problems. Thailand developed an expert system for diabetes diagnosis is a famous expert system for diagnosing bacterial infections . Some of these Expert Systems are specialized in one specific disease and other in a few diseases. Machine learning algorithm is used for the accurate disease prediction for that purpose the hospital data are collected from a particular region[4][5]. However, the current proposed expert system is specialized in the medical expert for some disease predictor without any age limits.

2. Materials and Methods The proposed medical expert system performed by asking questions that requires True/False answers. The proposed expert system will ask the user to choose the correct answer in each frame. At the end of the session, the proposed expert system provides the proper problem and offer a recommendation of the symptoms to the users[3].

3. System Requirement Specification The main purpose of System Requirement Specification is to translate the ideas in the minds of a client into a formal document. Through System Requirement Specification the client clearly describes what client expects from the proposed system and the developer clearly understands what capabilities are required to build the system[5]. The purpose of the particular document is to serve as a guide to developers and testers who are responsible for the development of the system. The project is mainly concentrated on the prediction of multiple disease. The current system is used to find out one or two diseases[3]. But the Medical Expert System can be used for finding multiple diseases at a time. They fids out the possible diseases and then gives the list of medications[2][3]. Also the NLP (Natural Language Processor) is used for the interaction between user and the expert system.

3.1 Functional Overview- User need to give the genuine details. The expert system asks certain amount of questions regarding the disease. User have to answer the questions asked by the expert system. The expert system gives the predictions regarding the disease. The expert system gives the details of the list of medicines and other things to be done by the user.

3.2 Functional Requirement-

- User should provide the data regarding the disease to the expert system.
- User need to give the details consisting of name, age, phone number, Blood Group.
- The expert system asks questions regarding the disease.
- With the help of NLP system and user interaction in the natural language is possible.
- Expert System uses certain sensors for checkups.
- The expert system gives the details about the possible diseases that the user might be having.

3.3 Non- Functional Requirement- The system that has been designed is reliable, and the user can use the system anytime. By knowing about the possible diseases that the user might face, user can take precautions The complete details about the user will be stored in the database and can be accessed any time. The expert system is a very user friendly so any user can understand the application very easily. 3.4 Performance Requirement : The expert system can help the user to avoid to meet doctors. Thus the proposed expert system results in efficient usage of time.

The expert system will come in great use in case of a situation where doctors are not available at all.

III.RELATED WORK

1.Medical Diagnosis Process Using ML In this section we discuss current applied AI techniques which are used for disease diagnostic process, relevant survey articles on diagnostic process. Machine learning has granted computer systems new abilities that we could have never thought of. Machine learning is a eid of AI that gives machines to power to learn itself, in order to analyze how to different models perform in ML without using human judgment[12]. The working of ML are explained step by step as follow.

1. Data Collection: The very first step is to collect data. It is a very critical step as quality and quantity affect the overall performance of the system.
2. Data Preparation: After the collection of data, the sec-ond step is data preprocessing. It is a process to change raw data to useful data.
3. Model Choosing: To represent preprocessed data into a model, one chooses an appropriate algorithm according to the task.
4. Training the Model: ML use supervised learning to train a model to increase the accuracy of decision making or doing predictions.
5. Evaluate the Model: To evaluate the model, a number parameters is needed. The parameters are driven from the need objectives.
6. Make Predictions: To evaluate the developed model with the real world, it is indispensable to predict some outcome on test data set.
7. Compute Output: To compute the predicted output is then analyzed by the system which is already predicted.

Fig.1. Block diagram of the diagnosis process.

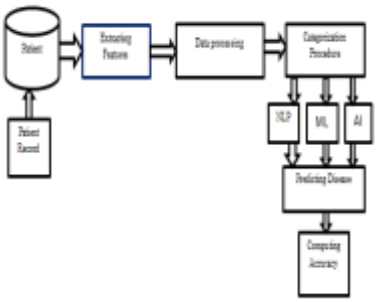

Fig.2. System Architecture of Artificial Intelligence powered Medical Expert.

2. Conversational Tele-Health Agent -Conversational Tele-Health assists in the form of an automated conversation between the user and computer in the form of either chat or voice. Tele-Health is poised to stailor the health service to users needs to improve their health condition by offering valuable consultations and information to patients at the comfort of their home[4]. i.

3.The Architecture of Conversational Bot- Serverless architectures (Functions as-a-Service) are gaining atraction as an alternative way of providing backend services without requiring a dedicated infrastructure. It is embedded with Natural Language Processing (NLP) and Natural Language Understanding (NLU) to understand the user's query and return respective responses. NLP facilitates to read, decode, understand, and make sense of the human languages. The first level of processing in our architecture deals with audio I/O. When a user makes a query, the user query is converted from audio input into text and this is referred to as Speech-to-Text[2][4].

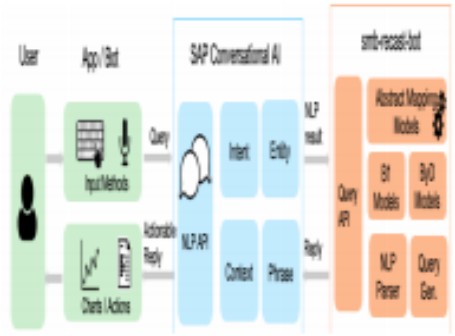

Fig.3. The Architecture of the Conversational Bot.

3. Design of Voice User Interface (VUI)- A typical voice-user interface (VUI) makes possible spoken human chat with computers via speech recognition to understand spoken words and answer questions, and specifically uses text to speech to create a reply[12]. The flow of the conversation consists of short and concise replies in layman language that aids in saving time and makes the interaction more human-like. It includes various health tips and suggestions to increase interactivity and encourage greater engagement.

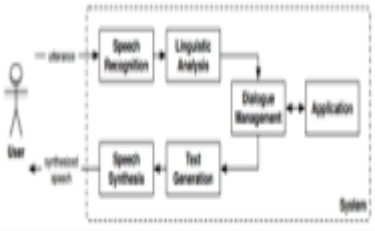

Fig.4. Block diagram of Voice User Interface.

4. Raspberry pi 3 Model -Raspberry Pi is a series of small single board computers developed in the United Kingdom.It is widely used in many areas such as weather monitoring, small computers, electronics devices. Health Monitoring System using IOT describes the collection and interoperation of Patient data collected from the sensors from the hospitals through IOT Technology. The hardware platform to implement the project consists of a sensor and Raspberry Pi 3 Model B equipped in a way to communicate with a doctor through the Internet and Smart Phone[13].

Fig.5. Raspberry pi 3 Model B+.

IV.CONCLUSION

Artificial Intelligence powered medical Expert System is an intelligent system which uses different concepts of AI which includes machine learning and natural language processing, With the help of system and chatbot. Were It is possible to diagnose any diseases through the interaction with the Expert System. The Expert System will collect list of systems either by asking the patients or by using various sensors including temperature and heartbeat sensor. Moreover, the roles of AI techniques for the diagnostics systems using sensors-based computing

frameworks will also be investigated. An in-depth assessment of the economic impact of AI in health care is also a part of our future works. Thus Expert System will be able to produce more accurate result.

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