**Chapter 1 Overview**

1.1 Introduction

Healthcare, though a new venture for the Artificial intelligence\ Machine learning domain, remains one of the most crucial domains of public service, one which has been devoted a lot of funding and research. With healthcare, we are possibly looking at the most cardinal and relevant applications of the advanced abilities of Artificial intelligence as well as Machine learning.

With big data growth in biomedical and healthcare communities, accurate analysis of medical data benefits early disease detection, patient care, and community services. However, the analysis accuracy is reduced when the quality of medical data is incomplete. Moreover, different regions exhibit unique characteristics of certain regional diseases, which may weaken the prediction of disease outbreaks.

In such a case, it is pertinent that we utilise mathematical modelling to iron out any imperfections and aberrations, so that we have the rigorous standards of accuracy that the medical diagnosis field requires.

Artificial intelligence presents challenges due the complexity involved in getting the balance between too much and not enough. We may design systems which can process an extremely wide variety of inputs, but we cannot actively ensure that the AI will respond to it in the way we want it to. It may present us an output which was intended to be for another input, or it may not be able to process it due to the load caused by the heavy processing on the interpreter. Thus, the challenge is not just of input handling or building features, but of efficiency as well.

1.2 Background

Many virtual assistants are available on the market, and they give high accuracy in handling input, particularly Siri and Google Assistant.

Siri is a virtual assistant part of Apple Inc.'s iOS, watchOS, macOS, HomePod, and tvOS operating systems. The assistant uses voice queries and a natural-language user interface to answer questions, make recommendations, and perform actions by delegating requests to a set of Internet services. The software adapts to users' individual language usages, searches, and preferences, with continuing use.

Google Assistant is a virtual assistant powered by artificial intelligence and developed by Google that is primarily available on mobile and smart home devices. Unlike Google Now, the Google Assistant can engage in two-way conversations.

Amazon Alexa is a virtual assistant developed by Amazon, first used in the Amazon Echo and the Amazon Echo Dot smart speakers developed by Amazon Lab126. It is capable of voice interaction, music playback, making to-do lists, setting alarms, streaming podcasts, playing audiobooks, and providing weather, traffic, sports, and other real-time information, such as news. Alexa can also control several smart devices using itself as a home automation system.

Although not anywhere close in accuracy, the application understands most commands with enough accuracy to extract results through them. Many assistants exist in the healthcare domain too. However, not many of them offer a catalogue of services along with Machine learning applications.

Besides these assistants, there are systems without AI capabilities as well, such as WebMD, which provide symptom matching without the use of AI features.

While one does come across a lot of AI steeped healthcare software, what one doesn’t see often is these services consolidated as a single package. For users, especially patients on medication or bedrest, it is paramount that they receive care without the vexation of having to juggle between multiple software platforms, annoyed as they already are at having to juggle between medicines and health routines.

1.3 Importance of the project

The project aims at creating an intelligent but lightweight healthcare assistant. This application will be able to help healthcare and other hospital staff work efficiently. This also aims at having a basic machine learning capability for disease prediction.

In an era where medical diagnosis and treatment has made massive leaps, it is unfair to deny anyone proper healthcare owing to a lack of means. This project aims to make healthcare less exclusive than it currently is and make it easier to find and avail services.

One often sees a lack of a proper software to help it out in such cases. Software can avoid the necessity of having to revisit doctors, or to spend hours self-researching complex medical terms and appendices, as many diagnosed patients tend to do. The use of a Bot here can automate such mundane tasks and still leave the patient satisfied and assured.

1.4 Perspective of stakeholders and customers

Stakeholder perspective is crucial to the success of this project. Part of the reason is that medical diagnosis is a highly sensitive field, and even the slightest of errors, which are evidently unavoidable in even the most sophisticated software, can lead to the patient’s condition worsening. It is also vital to involve the patients, as the patients being comfortable with the equipment, both hardware and software, is necessitous to the smooth working of the technology.

Stakeholders here include

* Doctors and nurses
* Health insurance companies
* Hospitals
* Health department (State as well as National/Federal)
* Biotechnology manufacturers

Doctors and nurses are highly conservative when it comes to adoption of technology, especially software. Due to the sensitivity of the data as well as the need for accuracy, most doctors do not adopt or advise any software, or rather any new technology, until it has been rigorously tested and reviewed by various independent evaluators.

Health insurance companies are much similar to doctors and nurses in this aspect, as there is an extremely large amount of money involved. However, customers looking for health insurance plans were eager for such kinds of technology, evident by the high amount of Google Searches for health insurance plan choosers.

Hospitals were more amenable as well, provided they were supported by the doctors. The use of bleeding edge technology in medical diagnosis is something that many hospitals in California, Massachusetts and New York were willing to try out. Many had, in fact, already done large scale tests on patients.

Health departments have a lot of restrictions on such technology, unless it is being used in a non-invasive way or is complementary to orthodox methods. There are numerous regulations concerning the use of cutting edge technology in the medicinal field.

Biotechnology manufacturing concerns the manufacturing of diagnosis equipment, measuring equipment, support equipment, surgery tools etc. Manufacturers are usually enthusiastic about such technologies. It is also imperative to obtain their support as it makes synchronisation between the devices easier.

Potential users, such as those who frequent the forums related to healthcare, wearable technology etc., seemed open to the idea, as anticipated. They seemed to like the idea of a machine learning being used to predict diseases, as well as the other minor features.

1.5 Objectives and Scope of the project

The project aims at creating an intelligent but lightweight healthcare assistant. This application will be able to help healthcare and other hospital staff work efficiently. This also aims at having a basic machine learning capability for disease prediction.

The main objective is to offer a way for doctors and patients alike to easily perform mundane healthcare activities as well as advanced prediction services.

We plan to offer various services parallelly. These services include but are not limited to

1. Hospital finder

2. Record keeper

3. Symptom matching through machine learning

4. Insurance selector

5. Wearable technology manager

6. Information catalogue

7. Doctor finder

Besides the features above, we also aim to make the software robust, accurate and fast.

1.6 Summary

Healthcare, though a new venture for the Artificial intelligence\ Machine learning domain, remains one of the most crucial domains of public service. With big data growth in biomedical and healthcare communities, accurate analysis of medical data benefits early disease detection, patient care, and community services.

It is pertinent that we utilise mathematical modelling to iron out any imperfections and aberrations, so that we have the rigorous standards of accuracy that the medical diagnosis field requires.

Many virtual assistants are available on the market, and they give high accuracy in handling input, particularly Siri and Google Assistant. Although not anywhere close in accuracy, the application understands most commands with enough accuracy to extract results through them.

The project aims at creating an intelligent but lightweight healthcare assistant. In an era where medical diagnosis and treatment has made massive leaps, it is unfair to deny anyone proper healthcare owing to a lack of means. This project aims to make healthcare less exclusive than it currently is and make it easier to find and avail services. This application will be able to help healthcare and other hospital staff work efficiently.

Stakeholder perspective is crucial to the success of this project. It is also vital to involve the patients, as the patients being comfortable with the equipment, both hardware and software, is necessitous to the smooth working of the technology. Potential users seemed open to the idea, as anticipated.

Stakeholders here include - Doctors and nurses, Health insurance companies, Hospitals, Health department (State as well as National/Federal), Biotechnology manufacturers.

This application will be able to help healthcare and other hospital staff work efficiently. This also aims at having a basic machine learning capability for disease prediction.

The main objective is to offer a way for doctors and patients alike to easily perform mundane healthcare activities as well as advanced prediction services.

***Citations***

***Wikipedia /Amazon Alexa/Siri/google assistant***

***Intro taken directly from ppt, same citations***