An Intelligent Virtual Medical Assistant for Healthcare Prediction

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INTRODUCTION

In city life, healthcare is an essential and significant part of every citizen to lead a healthy life. A typical healthcare system has to include the needs of patients, physicians, lab technicians, specialists etc. It needs to keep track of various stages of healthcare including monitoring, diagnostics, treatments, reports etc. Due to the increase of population density with steady increase of old age population along with the rise of pandemic diseases, challenges such as high demand of hospitals; personal medical care and administration of medical resources have been posed on traditional healthcare systems.

Traditional healthcare applications can no longer be trusted or completely relying upon due to the rapid spread of dangerous diseases worldwide. Hence, the medical practitioners, healthcare industries etc., are now focusing on developing smart healthcare solutions to tackle the challenges in delivering smart solutions especially during this pandemic era (Sumayya, 2020).

Smart healthcare is generally the combination of healthcare practices with information technology such as IoT, cloud computing, mobile communications, big data analytics and Artificial Intelligence (AI) / Machine Learning (ML) techniques. They act as an alternative of conventional medical service systems and manual or human based health management systems.

The IoT enabled healthcare systems are playing a crucial role in smart city applications. These kinds of applications can be used as assistants to detect the transmissible diseases, monitoring of treatments and further healthcare management activities. Apart from these, the application of AI in the area of smart healthcare has gained huge impact on providing more efficient, cost effective and personalized solutions.

Nowadays, machine learning techniques embedded in automated healthcare solutions have impact on providing robust and reliable solutions in smart healthcare. Also, management activities related to customer healthcare information management, customer insurance management, Laboratory equipments management, Doctors' prescriptions management etc. have been equipped with intelligent methods to improve the efficiency in storing, retrieving and processing of data from the repositories and to take intelligent decision making.

The current research works explore the application of AI and ML in smart healthcare systems and their allied areas. It is essential to trace the patients' historical data in crucial life saving situations and to prescribe immediate medications to rescue the patient's health are accomplished nowadays by intelligent solutions.

DOI: 10.4018/978-1-7998-9220-5.ch050

In this connection, several research works are carried out to apply Machine Learning (ML) and Artificial Intelligence (AI) to get greater impact on healthcare domain and its administration activities. The healthcare industries are now in need of a better independent solution to help the people by applying AI integrated medical solutions. Many industries and individual researchers are nowadays developing several applications using current programming languages such as Python (Admin, 2020).

It is predicted that, by 2025, there shall be at most 50% of increase in the automated, smart healthcare devices shall occupy the healthcare industry. The information technology organizations help achieve these kinds of personalized, automated healthcare services by significantly reducing the need for human assistants by means of AI based solutions (Sundaravadivel, Kougianos, Mohanty &Ganapathiraju, 2018).

Some of the significant advantages of AI based healthcare systems include (i) cost reduction and improved quality; (ii) more efficient healthcare products (iii) robust solution to the patients and their caretakers (iv) enhanced internal functionality.

In this connection, several smart applications such as AI powered Chatbots, Robots, Virtual nurse with AR etc. are developed to assist the patients, old-age people etc (Dodhia, Jha, Anudeep & Sarmah P, 2017).

This chapter discusses on the related work in this area of research, virtual medical assistant development, application of ML in virtual assistants' decision making process etc.

LITERATURE REVIEW

Manne &Kantheti (2021) have analyzed the use of AI in healthcare in various sectors. They have concluded that, organizations involved in healthcare research are more interested in applying AI based research. Also, they have exhibited the challenges involved in the application of AI in domains such as Radiology, Drug design etc.

Davahli (2021) has proposed safety guidelines for implementing AI black box models in order to reduce the unexpected accidents and other unwanted incidents. They have developed a multi-attribute value model approach by extracting the corresponding attributes and their scale values. Their proposed system can detect AI based risks and how to prevent incidents before their occurrence etc.

Balaha, Balaha & Ha (2021) have assessed the importance of automatic diagnosis of COVID-19 infection discovery as it has emerged as a pandemic and a contagious disease. Their study suggested a hybrid COVID-19 framework based on Deep Learning (DL), Genetic Algorithm (GA), and Weighted Sum (WS) etc. They have employed pre-trained models and CNN based analysis. The hybrid CNN framework proposed by them has used learning, classification and parameters optimization. Their extensive work targeted towards the applicability verification and generalization of their proposed solution.

Richardson, Smith, & Curtis (2021) have conducted a survey on patient's view on the use of technologies in healthcare. Their results indicated the patients' concern over security, safety and costs in using such AI based smart healthcare systems.

Parashar, Chaudhary & Rana (2021) have conducted their research in the area of applying ML in healthcare. From their study, they have identified that most of the smart healthcare applications are related to life threatening diseases such as cancer and epilepsy. They have also identified the application of explainable AI and Interpretable AI is gaining their importance in smart healthcare solutions.

Waring, Lindvall &Umeton(2020) have provided a review of the existing literature in applying automated machine learning (AutoML) to assist healthcare workers with limited data science experience