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Enhancing Medicine Kiosk Efficiency Through AI Integration CURE A.I

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Abstract :. The rapid advancement of telemedicine has brought healthcare accessibility to remote and underserved populations. Telemedicine kiosks serve as a critical bridge between patients and healthcare providers, offering vital services. However, there is a growing need to optimize the functionality of these kiosks to ensure the highest quality of care. Existing telemedicine kiosks often lack the efficiency and accuracy needed for optimal patient care. Delays, misdiagnoses, and ineffective communication between patients and AI systems have hindered the potential of these kiosks. This study aims to address these challenges and improve the overall functionality of telemedicine kiosks using AI. To solve this problem, we propose the integration of advanced artificial intelligence (AI) algorithms, natural language processing (NLP), and computer vision technologies into telemedicine kiosks. AI will assist in faster symptom recognition, secure patient data management, and real-time communication with healthcare providers, enhancing the overall patient experience. Preliminary results indicate significant improvements in kiosk performance, reducing misdiagnoses and wait times. AI-driven systems can efficiently process patient data, facilitating more accurate diagnoses and enabling better communication between patients and healthcare professionals. The successful integration of AI into telemedicine kiosks has far-reaching implications. It promises to enhance healthcare access, particularly in remote areas, improve diagnosis accuracy, and streamline the telemedicine experience. Ultimately, this innovation will lead to better patient outcomes and more efficient healthcare delivery, marking a significant step towards the future of AI-driven telemedicine kiosks.

Keywords **- Artificial Intelligence, healthcare, diagnose, Computer Vision, Healthcare accessibility, Remote healthcare.**

I. INTRODUCTION

The effectiveness and efficiency of healthcare services could be greatly increased by integrating artificial intelligence (AI) into telemedicine kiosks. The practice of providing medical care remotely, or telemedicine, has become increasingly important, particularly considering the COVID-19 epidemic.[1] Telemedicine kiosks are physical locations where patients can use telecommunication technology to consult with medical specialists. These kiosks could help close the gap between a population's increasing healthcare needs and the accessibility of medical services.

This research paper explores the application of AI in telemedicine kiosks with the goal of enhancing their efficiency. AI offers the potential to streamline various aspects of telemedicine, from optimizing patient flow and decision-making processes to improving diagnostic accuracy and patient outcomes. By integrating AI algorithms, telemedicine kiosks can become smarter, more responsive, and capable of providing high-quality healthcare services even in remote or underserved areas.

In this paper, we will delve into the multifaceted advantages of AI integration in telemedicine kiosks, such as the ability to handle routine tasks, make data-driven clinical recommendations, and offer personalized healthcare experiences. Additionally, we will discuss the challenges and ethical considerations associated with the adoption of AI in healthcare, focusing on issues like data privacy and the need for regulatory oversight.

This research paper explores the revolutionary potential of artificial intelligence (AI) in telemedicine kiosks through a thorough analysis of the literature, case studies, and emerging trends. In the end, it hopes to contribute to the improvement of healthcare services in an increasingly digital world by educating lawmakers, technology developers, and healthcare professionals about the opportunities and difficulties of using AI to boost the effectiveness of telemedicine kiosks.

II. LITERATURE REVIEW

The IoT-Powered Automated AI-Enabled Medical Kiosk is a remote-controlled, fully automated medical system with a variety of sensors that aims to provide medical access even in the most distant areas of the world with underdeveloped medical facilities. For patients who are not receiving medical attention, the Automated AI-Enabled Medical Kiosk is comparable to a 360-degree medical solution [1]. (Ramgir, 2019). AI algorithms can detect individuals who are at risk of acquiring diseases like diabetes, heart disease, or cancer by analyzing patient data such as lifestyle variables, medical history, and genetics. Healthcare professionals can take proactive steps to delay the onset of disease and enhance patient outcomes by early identification of these patients. The increasing prevalence of telemedicine facilitated by artificial intelligence raises several societal and ethical considerations. Unlike humans, artificial intelligence systems are always driven and have desires, but without feelings, they are unable to judge an action's morality

or its consequences. It takes constant experimentation and development to enhance human-AI interaction [2]. Health kiosks are open-access computing devices that offer a range of services within the healthcare industry. Health kiosks were categorized by Jones (2009) as opportunistic, integrated, designed within the clinical process, and positioned in locations ready for usage. The following seven potential uses cases for health kiosks were identified: collecting medical histories; promoting health; self-evaluation; gathering feedback from consumers; patient registration; patient access to records; and conducting remote consultations [3]. We investigate the growing prevalence of chronic diseases, which has spurred an increased demand for primary healthcare services in many developed nations. This rise in demand has led to a shortage of primary care providers, prompting the exploration of healthcare technology tools as a potential solution to alleviate this shortage [4]. In 2015, India's health spending as a percentage of GDP was 3.8%, significantly lower than that of other large nations such as the USA (16.83), Canada (10.43), UK (9.87), Brazil (8.91), Russia (5.56), China (5.3), Myanmar (4.94), but higher than that of other nations such as Indonesia (3.3) and Laos (2.8).India has 0.6 doctors per 1000 people, which is lower than that of other developed nations like the United States (2.7), the United Kingdom (2.1), Brazil (1.7), and China (1.4). There are 1.23 doctors per 1000 people on average around the world [5]. AI's integration with telemedicine holds great promise, particularly in patient monitoring, healthcare information technology, intelligent diagnosis, and collaborative data analysis. It empowers physicians by aiding in decision-making, automating administrative tasks, and increasing overall efficiency. The synergy between AI and telemedicine not only improves health outcomes but also offers patients a more personalized and convenient healthcare experience. It enables faster and more precise disease screening and diagnosis while reducing the need for in-person visits, contributing to a comprehensive healthcare continuum accessible throughout a person's life [6]. Technological advancements, including artificial intelligence and robotics, hold promise for the future of telemedicine and pandemic response preparedness. An international consortium of experts in various fields has identified gaps in the widespread adoption of telemedicine across different regions and medical specialties. Diagnosis often involves multiple testing methods, such as clinical assessments, imaging, blood tests, and genetic markers, and sometimes specialty-specific assessments like neuropsychological tests for comprehensive mental health evaluations [7](Bhaskar et al., 2020). The top 10 illness kinds are taken into consideration in the literature on Artificial Intelligence (AI). The last generation of artificial intelligence depended on the curation of medical specialists, and it is overgrowing now. Artificial intelligence research has recently made use of modern machine learning techniques to extract patterns from data that can explain complex relationships. AI applications have been used in healthcare, assisting clinical researchers in better understanding the patient's condition. Healthcare artificial intelligence has several challenges. A large amount of data is needed to train neural networks or machine learning algorithms. Clinical literature has extensively discussed the benefits of artificial intelligence. Artificial Intelligence may employ sophisticated algorithms to 'learn' from vast quantities of patient data and then apply the findings to enhance healthcare. Based on the data, it might also be able to learn and self-correct to increase precision. AI systems that provide outstanding clinical data from textbooks, journals, and medical techniques could help professionals communicate appropriate patient care. In human medical care, errors in diagnosis and treatment are inevitable, but they can be minimized by an AI system. In addition, an AI device collects vital information from a large patient base to continuously generate health risk assessments and forecasts. Healthcare artificial intelligence has several challenges. Large amounts of data are needed to train neural networks or machine learning algorithms. Nevertheless, it is rare that we obtain clear or objective facts. Data from various healthcare settings may include bias, noise, unbalanced medical data, missing information, etc. There's a chance the model developed using data from one institution won't translate to another. Consequently, it is imperative for researchers to guarantee that the data they gather accurately reflects the desired patient population [8]. AI in telemedicine, defined as computer systems mimicking human intelligence or enhancing medical professionals' capabilities, has potential in rural areas through AI-based kiosks that diagnose patients based on symptoms. However, its widespread adoption is hindered by safety, ethical, and financial challenges. AI can significantly benefit healthcare in areas like patient monitoring and diagnosis but should complement, not replace, physicians' skills. Balancing AI and human expertise is key for healthcare improvement [9]. AI applications can save billions in healthcare costs in the US by 2026, and the increasing use of smartphones and supporting technologies opens opportunities to improve public health in low-income countries. AI excels in analytical reasoning and problem-solving, but its use in healthcare should be balanced to avoid losing vital physician skills. Robotics can transform telemedicine, especially during outbreaks, limiting healthcare worker exposure. An international collaborative effort led by organizations like WHO could expand telemedicine access, benefiting underserved populations and low-resource areas [10]. In India, telemedicine procedures have been adopted more slowly yet progressively. The development of telemedicine services in India was greatly aided by the actions taken by ISRO, the Department of Information Technology (DIT), the Ministry of External Affairs, the Ministry of Health and Family Welfare, and the state governments. With a Telemedicine Pilot Project in 2001 that connected Chennai's Apollo Hospital with the Apollo Rural Hospital at Arganda village in the Chittoor district of Andhra Pradesh, ISRO (Indian Space Research Organization) was the pioneer of telemedicine in India [11].

III. METHODOLOGY

This application aims to provide medicines to everyone on time. In various cities particularly in India most of the people ignore medications on time due to high fees of the doctors and medications provided by them. The healthcare industry is becoming more and more money centric rather than money centric. To improve this situation in the country our system provides simple installation of these services at various places to provide improved healthcare and reduced medical costs on various diseases. Our system helps in promoting value healthcare for everyone. We have integrated various technologies to improve the dependency and efficiency of the system. Technologies used in this system are Artificial Intelligence, pandas for manipulating data, SQL to store data related to feedback and customer satisfaction and store login information. We have used an AI model to perform the analysis of the system and provide the most accurate diagnosis. To implement the model, we have used random forest regression algorithm.

Random Forest Regression

A supervised learning algorithm and bagging technique called random forest regression employs an ensemble learning approach for machine learning regression. In random forests, the trees grow in parallel, therefore there is no interaction between them as they grow. In order for a random forest to function, a large number of decision trees must be built during the training phase. The class that results is either the mean prediction (regression) or the mode of the classes (classification) of each individual tree. A random forest aggregates several decision trees with a useful change, serving as a meta-estimator (i.e., combining the output of numerous forecasts).[2]

Cost Function

The cost function used to evaluate the medicine to be prescribed based on the disease simply higher results in lower cost medicines with instant relief. We use a dataset of medicines that is fully safe.

IV. MODELING AND ANALYSIS

We performed some tests on accuracy of model using training and testing dataset. The result of the test is provided in Fig. 2. We have modeled our system around the machine learning model 'Random Forest Regression' which considers generating many decision trees to give a final inference. By this we ensure accurate prognosis and diagnosis based on the symptoms provided. Fig 1 mentions the workflow of the system. The very first step being the registration and login to get the basic details of the user. These details are beneficial to generate prescription and provide drugs based on age. Then the user needs to enter the symptoms he is suffering. Based on this input we get our predicted prognosis from our Model. We then get the best suited primary drug to treat the disease. Based on the primary drug we find the medications using the primary drug as one of the constituents. For the dosage of the medicine, we investigate the dataset that has medicinal drugs which are to be taken before food and after food. We then observe the calculated medicinal drug and provide dosage accordingly.

We performed testing on the accuracy of our model. Based on the train test split executed on our AI model we got an F1 score of 92.59 and accuracy of 93%. Fig 2 indicates details of confusion matrix. This analysis provides information about the predicted disease and the actual disease based on the testing data.

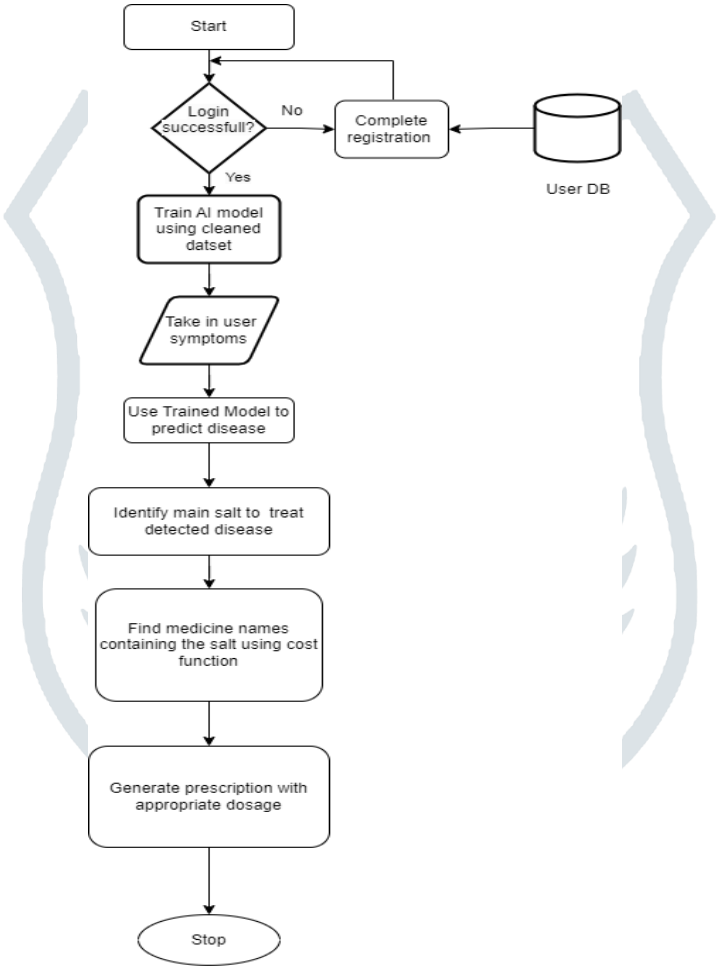

Figure 1: Workflow of the system.

V. RESULTS AND DISCUSSION

1. User Interaction and Satisfaction

The kiosk's user-centered design and regional language support facilitated easy user interaction, with a significant number of users expressing satisfaction with the interface. Survey responses revealed that many users found the speech detection system to be accurate and reliable, which enhanced their experience.

2. AI Integration and Medicine Recommendations

The AI integration successfully identified and recommended medicines based on user input and specific medical conditions. Users reported that the kiosk's recommendations were in line with their expectations. The medicine dataset, containing information about available medicines, was found to be highly valuable for users seeking guidance on over-the-counter medications.

3. Teleconsultation Services

The teleconsultation platform effectively connected users with healthcare professionals, particularly doctors, through phone calls. Users indicated a high level of satisfaction with this feature. Remote consultations with doctors were well-received by users in rural areas, who reported that this service significantly improved their access to healthcare expertise.

4. Maintenance and Support System

The kiosk's self-monitoring system successfully identified technical issues and maintenance needs, contributing to the kiosk's continuous operation. The support team, alerted by automatic notifications, provided timely assistance, ensuring minimal downtime and efficient issue resolution.

5.AI Integration and Medicine Recommendations

The kiosk's AI integration, particularly in the identification and recommendation of medicines, proved to be a valuable resource for users. The successful alignment of AI-generated recommendations with users' expectations highlights the potential of AI in augmenting healthcare services. This feature assists users in making informed decisions regarding over-the-counter medications and can potentially alleviate healthcare provider workload.

6. Maintenance and Support System

The self-monitoring system and support team integration ensured the kiosk's consistent operation. Timely issue detection and resolution were critical in maintaining the kiosk's reliability and user trust. This approach can be scaled to ensure uninterrupted healthcare services in remote areas, where immediate on-site support may be limited.

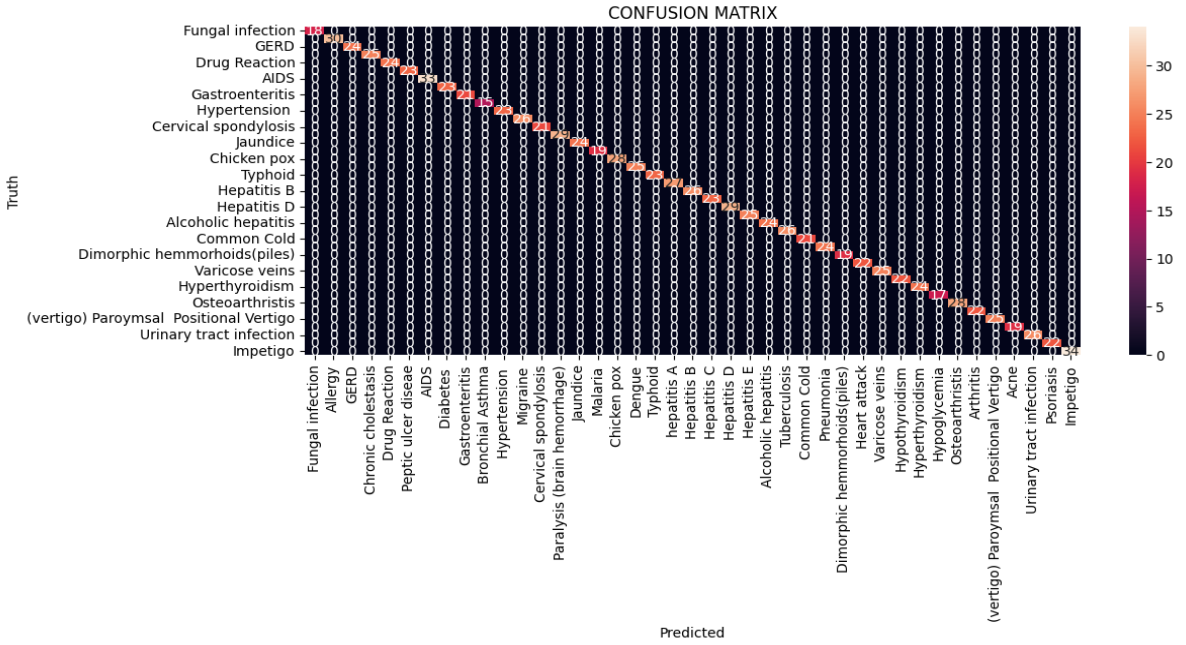

Figure 2: Confusion matrix of the AI Model

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