Evolving requirements of Smart healthcare in Cloud Computing and MIoT

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Abstract

We are entering a new era of healthcare with MIoT advancements. New technology has been improved in the field of healthcare. With the development of technology, the concept of smart healthcare has taken hold. Using the latest technologies in the field of smart healthcare, we discuss the key importance of cloud computing, data analysis, and artificial intelligence along with its subdomains. There have been numerous advances in the field of smart healthcare as a result of these factors. Along with this data analysis on the Role of Smart Healthcare in COVID-19 treatment in India is discussed. We are entering a new era of healthcare with MIoT advancements. With the development of technology, the concept of smart healthcare has taken hold. Smart healthcare uses the new and latest field of technologies such as big data, cloud computing, machine learning, artificial intelligence, etc. In relation to smart healthcare here, we discuss the key technologies and will also introduce several important fields. Using the latest technologies in the field of smart healthcare, we discuss the key technologies as well as introduce several important areas, such as big data, cloud computing, machine learning, and artificial intelligence. With the continuous development of technology, the concept of smart healthcare has taken hold. Analyzing data gathered from the IoT devices by using AI and Machine Learning can help to predict the upcoming situation of diseases and help design a better environment to fight such diseases. Using the latest technologies in the field of smart healthcare, we discuss the key technologies. It incorporates several performers in a range of areas, and it is frequently aimed at the local community as well as children and their families. This paper depicts the idea of solving health issues using the latest technology. Furthermore, we also list the solutions and find the best one out of those in this paper. We also analyze COVID-19 vaccination trends in India and discuss the role of smart healthcare and IoT in helping control the transmission of COVID-19 as well as making it easier for citizens to get vaccinated with the help of technology.

Keywords

MIoT, smart healthcare, AI in healthcare, COVID-19 treatment, Cloud Health care.

1. Introduction

With the advancement of technology, we are experiencing a transformation in smart healthcare, which incorporates a new generation of information technology [20]. Community health research is a complex field of research, due to the number of different possible factors concerning one case[21]. Along with this, the internet has become one of the most essential components of our life [22, 23]. There are many changes taking place which are mainly focused on the needs of individuals, the efficiency of medical care, and future advancements in modern medicine and

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its domains. Health authorities directed their intervention toward both the environment and the patients, as is typical of community health research. Today's era is one of information [24, 25]. With the advancement in technology, the concept of smart healthcare is incorporating a new generation of information technology [27, 28,29]. With the advancement of technology, we are experiencing a transformation in smart healthcare, which incorporates a new generation of information technology [30, 31]. In Section - 2 of this research paper we have discussed Generations of Smart healthcare for MIoT. Similarly, Section 3 describes the importance of cloud computing in the healthcare sector. How deep learning enhances the development of healthcare is described in Section 4. Data is one of the most important things in smart health care development. The role of IoT and technology in controlling the spread of COVID-19 in India is also discussed with the help of a flowchart and diagram.

2. Generations of Smart healthcare for MIoT

Patient-centricity is at the heart of the next-generation healthcare system. Healthcare systems are utilizing ICT effectively to improve the efficiency, speed, and accuracy of disease diagnosis, monitoring, diagnosis, and treatment. Artificial intelligence and its subdomains are being used in various ways such as disease prediction using machine learning, and robotic surgery [1]. It might use a cell phone to do image-based diagnostic and therapy recommendations. In the past, health care systems acquired and stored patient data, enabled remote diagnosis of illnesses, monitored and provided treatment without the use of Internet technology. This was known as telemedicine or telehealth. E-Health is the combination of internet technology and telehealth. In addition to cloud-based solutions, Blockchain technology, IoT medical devices, and so on, several internet technologies have been integrated into the healthcare system [2]. Figure 2(a) presents the first-generation model. In health care's future, the goal is to enable disease prevention, maintain high-quality medical care for a significant portion of the population, and manage illnesses effectively at a low cost. In Figure 1, we show how the evolution of Smart Healthcare and MIoT can be classified first based on Cloud Computing, which is a secure and cost-effective means of storing data from patients and sharing it with recipients[11]. Next, we classify devices that store data, such as body sensors worn by patients, and stationary devices like smart scales and medication monitors.

The second generation of E-Health depicted in Figure 2(a) does not rely on medical devices to store data, but rather on the cloud, which can be accessed remotely by clinicians. IoT and cloud technologies are also included. With this generation of IoT medical devices, remote monitoring and data collection are easier and more convenient. Providing real-time tracking of the patient in a nonstop manner 24 hours a day, seven days a week, lowering the risk of developing a serious condition. Whereas Figure 2(b) shows the second generation E-Health care system which mainly adds the technology of cloud storage to the preexisting architecture. As part of the third generation of E-Health, Blockchain technology has been used to address privacy and security concerns. Figure 3(a) illustrates the third generation of E-Health, which is built on top of the second generation. According to a predictive analysis based on Artificial Intelligence (AI) agents, figure 3(b) illustrates the fourth generation[8] of the E-Health system. Medical services and patient-centric services were at the center of the fourth generation of E-Health. Artificial

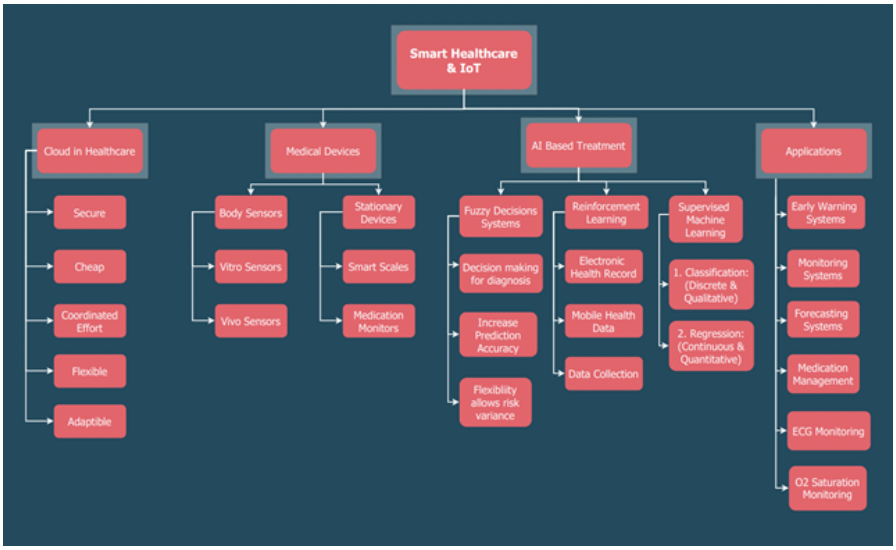


Figure 1: Classification of Smart healthcare and MIoT

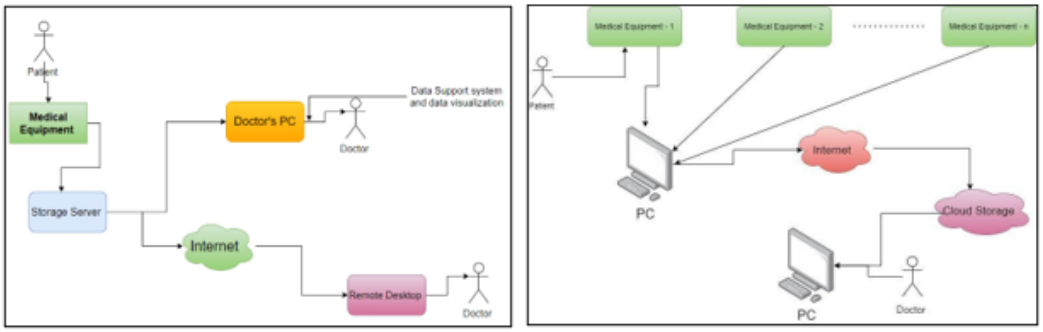


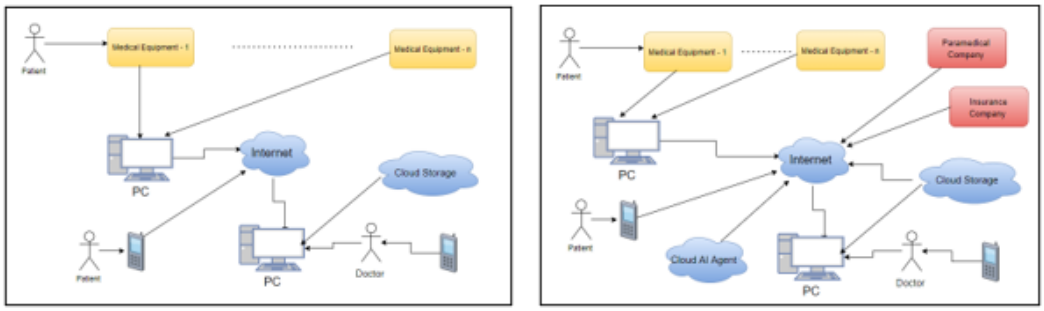
Figure 2: (a) The first-generation E-Health care system, (b) The second-generation E-Health care system.

intelligence agents are software entities that can be run on a cloud service to enable continuous health monitoring.

3. Need of Cloud in Healthcare

To adequately address the necessities of business and patients, well-informed services, experts are turning towards distributed computing for every one of its advantages. Distributed computing, with its on-request accessibility, web-based administrations, and high-information accessibility, has changed the whole medical services area and changed it into HealthTech [3, 4].

- Coordinated effort: In spreading information, collaboration is essential. With distributed



(a) (b)

Figure 3: (a) The third-generation E-Health care system, (b) The fourth-generation E-Health care system

computing, the process has become more straightforward and less complex.

- Security: Health-care information should be kept private. This space's richness of knowledge makes it a meeting place.
- Cost: The cloud can store a considerable amount of data at a very cheap cost.
- Adaptability and Flexibility: Healthcare, as an industry, operates in a particular setting.

4. Role of Smart Healthcare and IoT in COVID-19 treatment in India: Data Analysis

A Smart Healthcare Initiative launched by the Government of India is Aarogya Setu[5] which facilitates digital storage of registered user's personal health information and the places they visit. This technology has helped in contact tracing and minimizing the transmission of COVID-19. Another Smart Healthcare Initiative launched by the Government is the CoWin portal [6], which allows users to register for COVID vaccination online from the comfort of their homes. It has allowed people to get the COVID-19 vaccine without any hassle and also has made it possible for India to successfully cross 1 billion doses [7]. After that, we examine the vaccination trends in India and analyze how government initiatives and the digital revolution have increased vaccination rates and helped control the spread of COVID-19.

Figure 4 shows the weekly vaccination trend in India. From this graph, we can see that with the launch of Smart Healthcare Initiatives, the number of vaccinations has risen with the increase in awareness.

Figure 5 (a) shows the age-wise vaccination trend. As the 18-44 age group is the more tech-savvy one, COVID-19's awareness has increased due to the Smart Healthcare Initiatives by the means of information through digital media. Figure 5 (b) shows the trend of vaccination in urban and rural areas of India. The Digital Revolution has enabled the rural areas of India to enjoy the benefits of the digital world and the graph shows that the Smart Healthcare Initiatives have increased awareness about COVID-19 in rural areas as well[18, 26]. Intelligent monitoring of infected cases allowed rapid intervention in emergency cases and in limiting the spread of the

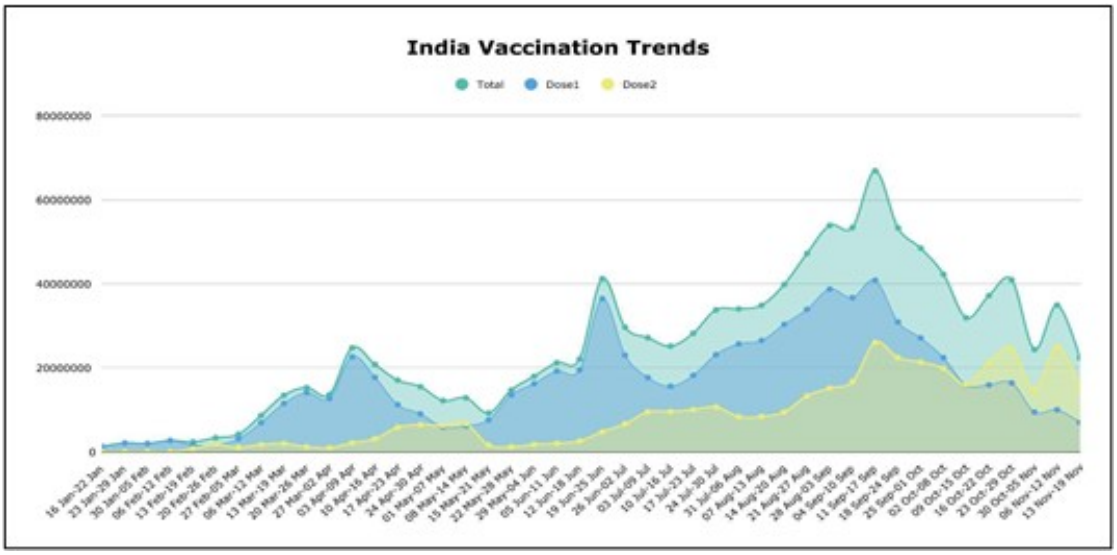
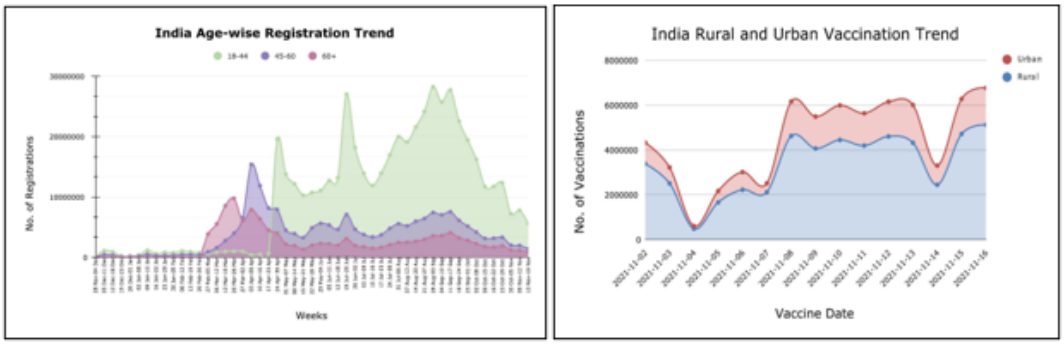


Figure 4: Vaccination Trend in India



(a) (b)

Figure 5: (a) Age-wise Vaccination Trend in India (b) Vaccination Trend in Rural and Urban Areas in India.

virus. Analyzing data gathered from the IoT medical devices by using AI and Machine Learning models have helped to predict the future situation of the virus and has helped to design a better environment to fight it[32].

5. Conclusion

A smart healthcare field is vast and can afford better health management for individual users. Besides analyzing the latest innovations in smart healthcare and MIoT, the study also discusses how deep learning and data analysis prove their importance in this developing field. The interventions in community health research are often aimed at the local community, as well as the children and their families. It is often the case that community health research is conducted using vertically partitioned datasets, which may perpetuate ethical concerns due to the selection of contributors. The data-centric workflow modeling approach shows promise for dealing with such complexity in community health research. By advancing smart healthcare, we can eliminate the status quo of medical resource inequality, promote the process of medical reform, and lower the social medical costs as well. A major concern for the development of smart healthcare and MIoT is cyber threats and data security. This is an appropriate approach for modeling complex analyses of data in community health research. IoT medical devices enable real-time and remote monitoring of COVID patients. IoT applications also help in contact tracing to find potential carriers of the COVID virus and help prevent further transmission. Government initiatives like the CoWin portal have helped people to register for vaccinations at the comfort of their homes and enabled India to cross 1 Billion vaccination doses.

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