ISSN: 2835-7914

Mini Review

Biomedical Science and Clinical Research

Navigating the Future of Healthcare: A Review of Emerging Technology Implementation

Aryan Chaudhary[1]*, Vikas Khullar[2] and Isha Kansal[2]

[1]*BioTech Sphere Research, India*

[2]*Chitkara University Institute of Engineering and Technology, Chitkara University, India*

***Corresponding Author**
Aryan Chaudhary, BioTech Sphere Research, India.

Submitted: 2023, July 03 **Accepted:** 2023, July 31 **Published:** 2023, Aug 02

Citation: Chaudhary, A., Khullar, V., Kansal, I. (2023). Navigating the Future of Healthcare: A Review of Emerging Technology Implementation. *Biomed Sci Clin Res, 2*(3), 286-288.

Abstract

Anesthetics, antibiotics, magnetic resonance imaging scanners, and radiation have all benefited from technological advancements. Even while developments in healthcare are being driven by new technology (drugs, gadgets, social media support for healthcare, etc.), human concerns will continue to be a barrier to any advances that are made. The field of medicine will continue to be disrupted by technological advances. The purpose of this mini review article is to help us think more clearly about how we want to go and gratify as many people as possible by highlighting the need for new developments in healthcare technology, its multiple uses, and fragments of the future.

Keywords: Healthcare, IoT, AI, Federated Learning, Block Chain

1. Introduction

In contemporary times, individuals seeking medical assistance are increasingly relying on digital platforms, such as the internet, and various technological tools, alongside engaging with other patients, to independently identify and assess their health concerns, locate optimal treatment options, consistently refine their treatment approaches, and even contribute to the financial and operational aspects of research endeavors. They are achieving this outcome in spite of, rather than as a result of, healthcare. There appears to be a prevailing sentiment among clinicians that they would prefer patients to refrain from utilizing Google as a source of healthcare information. Conversely, patients are inclined to avoid causing annoyance to the individuals whose assistance they want [1]. Undoubtedly, individuals afflicted with chronic or long-term ailments have the capacity to acquire extensive information about their respective illnesses. However, it is worth noting that people who demonstrate clinical expertise can encounter skepticism or outright resistance from healthcare professionals [2].

The market devises strategies to generate profits, while technological advancements are anticipated to occur in remarkable ways. In order to enhance the well-being and satisfaction of patients, it is imperative to explore strategies that transcend the conventional approach of treating patients as isolated individuals. To achieve this objective, it is crucial to prioritize the integration of technology with cultural considerations, rather than solely emphasizing technological advancements. From my perspective, it is crucial to engage in clear and logical thinking [1,3].

2. Need of Emerging Technologies in Healthcare

Healthcare has enabled the incorporation of cutting-edge technologies to produce and enhance healthcare provision. Remote health monitoring and disease prediction, surgery assistance technologies, and other innovations have transformed the way healthcare is delivered, moving beyond in-person medical visits. Only by incorporating innovative technology like Telehealthcare, software-defined networkings, and many others into healthcare systems have been able to make such progress [3]. Next-generation healthcare applications like robotic surgery, smart hospitals, etc., are being developed with the help of cutting-edge emerging technologies like Machine Learning, Blockchain, Cloud Computing, Internet of Things, Edge, Big Data Analytics, Software-Defined Networking, and many more [4].

3. Emerging Technologies Supporting Healthcare

Numerous extant and forthcoming technologies are poised to exert a beneficial influence on the healthcare sector in the next few years. Several technologies are described below

i. Image Processing

Medical imaging is the process of creating visual representations of the insides of a person for the purposes of clinical investigation, medical intervention, and visualizing the function of certain organs or tissues [2,14]. Surgeons and doctors have benefited greatly from the use of image processing technology in making diagnoses and carrying out operations on patients.

ii. Artificial Intelligence

The healthcare industry is fast adapting to the changes brought about by artificial intelligence (AI). The convergence of large data and robust machine-learning approaches has inspired the development of technologies to enhance clinical treatment, accelerate medical research, and boost productivity [3,16,17]. Algorithms, computer programmes designed to analyze

healthcare data and produce predictions or suggestions, are the backbone of these resources.

iii. Big Data

The Term "big data" is used to describe colossal amounts of data that could lead to extraordinary results. The vast opportunities in this field have attracted researchers' attention during the past two decades [4]. Many businesses, both public and private, generate, store, and analyze massive amounts of data to better tailor their offerings to customers' needs.

iv. Data Analytics

The quantity of data collected by the healthcare industry is exploding. On the other hand, the industry as a whole has not yet implemented the requisite level of data management and analysis to utilize such data. As a result, administrators in the healthcare industry run the risk of being inundated with unusable information [5]. Recognising that each organization's situation is unique, practices, hospitals, and healthcare systems conduct real-time analytics on minute data. Moreover, significant organizations that manage patient populations utilize predictive modelling.

4. Blockchain

The utilization of blockchain technology facilitates the establishment of a decentralized and distributed ecosystem, eliminating the necessity for a central governing entity. The simultaneous security and trustworthiness of transactions can be attributed to the application of cryptographic concepts [6]. In recent years, there has been a notable surge in the adoption and use of blockchain technology across several sectors, mostly driven by the widespread acceptance and usage of cryptocurrencies.

5. Federated Learning

The utilization of artificial intelligence (AI) in smart healthcare has been significantly influenced by advancements in communication technologies and the Internet of Medical Things (IoMT) in recent times. Federated Learning (FL) is an emerging distributed collaborative artificial intelligence (AI) paradigm that has particular promise in the context of smart healthcare [7]. This capability is advantageous as it facilitates the training of artificial intelligence by many clients, such as hospitals, while ensuring the privacy of raw data remains intact. This feature holds particular significance in the context of smart healthcare.

6. Robotics

Recent advances in Robotics and Artificial Intelligence (AI) have made it possible for robots to assist in the field of healthcare [8]. Robotic systems are frequently implemented in the care of the elderly, infants, and people with disabilities in hospitals, rehabilitation, and other healthcare settings.

7. The impact of the Internet of Things (IoT)

The Internet of Things (IoT) has had a significant impact on the advancement of medical technology. As a result of this foresight, solutions for the Internet of Things in Healthcare have been developed [1,15]. Examples of essential enabling technologies include the communication networks that are used to transfer data between the sensing nodes and the processors, as well as the processing algorithms that are used to provide an output based on the data that is gathered by the sensors.

8. Applications

Emerging technologies include educational technology, information technology, robotics, and artificial intelligence, among others. Listed below are explanations for a number of the applications.

9. Disease Classification using Historical Tabular Data

The careful selection of a model that aligns most effectively with the given circumstance is of utmost importance during the process of data analysis. Numerous researchers have proposed ensemble ways for addressing classification and regression challenges in tabular data, along with alternative methodologies for tackling classification and regression problems [9]. In addition, there has been a new implementation of diverse deep learning algorithms on tabular data, wherein the authors assert that deep models exhibit superior performance compared to Boosting and Model tree methodologies.

10. Infected Area Classification Using Image Data Classification

One of the most commonly occurring acute disorders in people is an infection or illness. Pneumonia is a highly widespread respiratory infection, with a rising annual global mortality rate when left untreated [10]. Pneumonia ranks among the most prevalent respiratory conditions. According to the findings of comprehensive computer simulations, it has been determined that the use of image enhancement in the persistent learning strategy for CT image segmentation exhibits greater performance in terms of both efficiency and adaptability when compared to the Medical Image Segmentation (MIS) method.

11. Infected Area Highlighting using Image Segmentation

After segmenting the infected image, the extracted region was post-processed to remove pixel regions that were not considered to be part of the target region [11]. This procedure was carried out by analyzing each pixel's surrounding area and the gradient of change between them.

12. Historical Record Maintenance

In recent times, there has been a growing trend among firms to include contemporary technologies like blockchain, cloud computing, and Internet of Things (IoT) into their record management systems. However, it is worth noting that certain organizations have been slower in embracing these technologies [12].

13. Robotic Surgery

Robotic surgery is an emerging field with enormous potential. One of the most talked about topics in modern surgery, robotic surgery has been called "the new revolution" [13]. There is little doubt that they will become a vital part of the surgeon's arsenal, but their precise applications are still being refined.

14. Conclusion

The aforementioned instances discussed within this scholarly mini review article represent only a limited selection of the numerous occurrences currently arising within the worldwide healthcare industry. While certain individuals have achieved

acceptance, others are currently in the developmental phase. There is nonetheless potential for other advancements and methodologies, a significant portion of which are presently being investigated. The aforementioned technologies are significantly altering the landscape of the healthcare industry and exerting a profound influence on its future trajectory. The advent of cutting-edge technologies had a profound impact on the healthcare industry. The primary aim of implementing digitalization in this domain is to enhance the quality of healthcare delivery while alleviating the burden on healthcare professionals [14-18].

References

1. Krishnamoorthy, S., Dua, A., & Gupta, S. (2023). Role of emerging technologies in future IoT-driven Healthcare 4.0 technologies: A survey, current challenges and future directions. Journal of Ambient Intelligence and Humanized Computing, 14(1), 361-407.
2. Naseera, S., Rajini, G. K., Venkateswarlu, B., & Priyadarisini, M. (2017). A review on image processing applications in medical field. Research Journal of Pharmacy and Technology, 10(10), 3456-3460.
3. Price, I. I., & Nicholson, W. (2017). Artificial intelligence in health care: applications and legal issues.
4. Dash, S., Shakyawar, S. K., Sharma, M., & Kaushik, S. (2019). Big data in healthcare: management, analysis and future prospects. Journal of big data, 6(1), 1-25.
5. Wills, M. J. (2014). Decisions through data: Analytics in healthcare. Journal of Healthcare Management, 59(4), 254-262.
6. Hölbl, M., Kompara, M., Kamišalić, A., & Nemec Zlatolas, L. (2018). A systematic review of the use of blockchain in healthcare. Symmetry, 10(10), 470.
7. Nguyen, D. C., Pham, Q. V., Pathirana, P. N., Ding, M., Seneviratne, A., Lin, Z., ... & Hwang, W. J. (2022). Federated learning for smart healthcare: A survey. ACM Computing Surveys (CSUR), 55(3), 1-37.
8. Kyrarini, M., Lygerakis, F., Rajavenkatanarayanan, A., Sevastopoulos, C., Nambiappan, H. R., Chaitanya, K. K., ... & Makedon, F. (2021). A survey of robots in healthcare. Technologies, 9(1), 8.
9. Fayaz, S. A., Zaman, M., Kaul, S., & Butt, M. A. (2022). Is deep learning on tabular data enough? An assessment. International Journal of Advanced Computer Science and Applications, 13(4), 466-473.
10. Sangeetha, S. K. B., Afreen, N., & Ahmad, G. (2021). A Combined Image Segmentation and Classification Approach for COVID-19 Infected Lungs. Review of Computer Engineering Studies, 8(3).
11. Camargo, A., & Smith, J. S. (2009). An image-processing based algorithm to automatically identify plant disease visual symptoms. Biosystems engineering, 102(1), 9-21.
12. Masenya, T. M. (2020). Application of modern technologies in the management of records in public libraries. Journal of the South African Society of Archivists, 53, 65-79.
13. Lanfranco, A. R., Castellanos, A. E., Desai, J. P., & Meyers, W. C. (2004). Robotic surgery: a current perspective. Annals of surgery, 239(1), 14.
14. Kansal, I., Popli, R., Verma, J., Bhardwaj, V., & Bhardwaj, R. (2022, March). Digital image processing and IoT in smart health care-A review. In 2022 International Conference on Emerging Smart Computing and Informatics (ESCI) (pp. 1-6). IEEE.
15. Khullar, V., Singh, H. P., Miro, Y., Anand, D., Mohamed, H. G., Gupta, D., ... & Goyal, N. (2022). IoT Fog-Enabled Multi-Node Centralized Ecosystem for Real Time Screening and Monitoring of Health Information. Applied Sciences, 12(19), 9845.
16. Ramesh, T. R., Lilhore, U. K., Poongodi, M., Simaiya, S., Kaur, A., & Hamdi, M. (2022). Predictive analysis of heart diseases with machine learning approaches. Malaysian Journal of Computer Science, 132-148.
17. Lilhore, U. K., Poongodi, M., Kaur, A., Simaiya, S., Algarni, A. D., Elmannai, H., ... & Hamdi, M. (2022). Hybrid model for detection of cervical cancer using causal analysis and machine learning techniques. Computational and Mathematical Methods in Medicine, 2022.
18. Chaudhary, A., & Islam (Naz), S.M.N. (Eds.). (2023). Computational Health Informatics for Biomedical Applications (1st ed.). Apple Academic Press.