

ARTIFICIAL INTELLIGENCE ENABLED INTERNET OF MEDICAL THINGS (IOMT) TECHNIQUES AND METHODS

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Abstract:

Artificial Intelligence or AI has been a boon in the medical sector as it allows the overall improvement of medical facilities. The deployment of an efficient and effective management within the healthcare society has been improved with the help of AI. The making of clinical decisions can be enhanced drastically with the aid of AI and its aligning methods. The study would look into the application of AI within the healthcare sector, and observe the pros and the cons of such an integration. The impregnation of the Internet of Medical Things or IoMT within the medical practices would be evaluated and the advantages of disease prediction within the healthcare society would be identified. Such aspects would be beneficial for improving the overall industry of healthcare through effective customer satisfaction. The ethical underpinnings of AI-IoMT are expounded upon, recognizing the imperative of data privacy and security. This exploration delves into encryption mechanisms, blockchain technologies, and patient consent frameworks that ensure patient data remains sacrosanct, fostering trust in this evolving paradigm.

Keywords: *Internet of Medical Things, Artificial Intelligence Medical diagnosis, healthcare, Machine Learning.*

I. INTRODUCTION

AI has been beneficial for the development of a comprehensive working technique, which is necessary for bringing about a positive growth within the healthcare industry [1]. Through the amalgamation of training data and evidence, the development of future planning for the doctors to improve patient care can be constructed [2]. A range of tools and techniques within the AI programming has been useful for making accurate diagnoses of the diseases and allows for a personalised form of medical treatment.

A variety of applications have been seen to be associated with AI within the healthcare sector such as the improvement of drug discoveries, increased AI robotics, monitoring of the health and well-being of the patients, and others [3]. Along with such, the adoption of new technologies for medical diagnosis and a reduction in dosage errors have also been associated with AI applications [4].

The massive volume of data produced by IoMT devices can be processed and analysed by AI-driven algorithms. Real-time patient vital signs, medical history, and diagnostic data are all included in this data. AI can get useful insights through advanced analytics, assisting healthcare practitioners in making decisions, tracking the evolution of diseases, and forecasting patient outcomes.

Continuous patient remote monitoring is made possible by AI-enhanced IoMT technologies. People recovering from surgery or those with chronic conditions will benefit most from this. Anomalies in patient data can be found by AI algorithms, alerting medical professionals to possible problems in real time and enabling prompt actions.

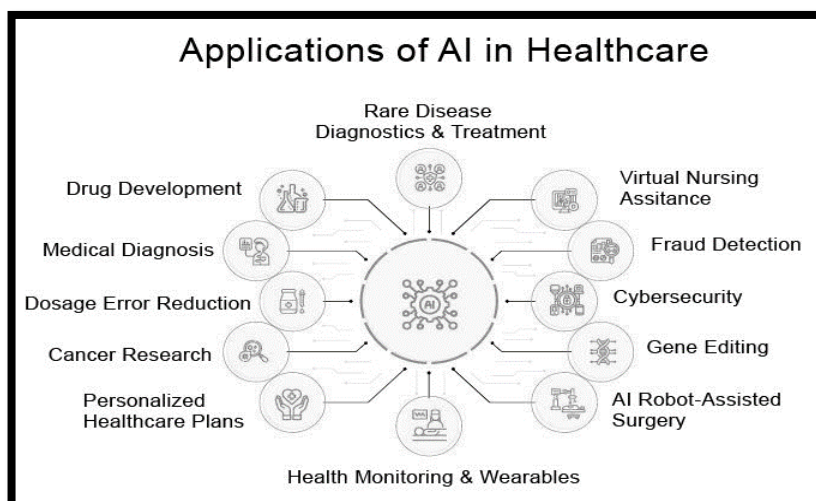


Figure 1: Application of AI within the healthcare sector [4]

Development in cancer research and gene editing has also been associated with AI induction. With the aid of IoM, internet connectivity allows for understanding the patient's living circumstances [5].

Aim

The aim of the study is to examine the application of AI within the healthcare sector through IoMT techniques and measures.

Objectives

The objectives constructed for the study are as follows:

- To examine the integration of AI within the healthcare sector
- To analyse the benefits and the issues related to IoMT in the healthcare system
- To evaluate the integration of AI through IoMT within the hospital environment
- To assess the advantages of disease prediction and the satisfaction of patients in the healthcare environment

II. LITERATURE/BACKGROUND SURVEY

Incorporation of AI in the healthcare division

The integration of AI in the healthcare section has been used in various methods such as automation of the decision-making process and the reduction in medical errors [6]. Tools such as Machine Learning or ML, Cloud Computing or CC, IoT of the Internet of Things, Neural Networks, and Deep learning has been utilised for bringing about positive development in the sector [7].

In addition to such, the interpretation of the collected information from the digital medical records proves to be useful to bring about an elaborate assessment of the condition of the patient. [8]

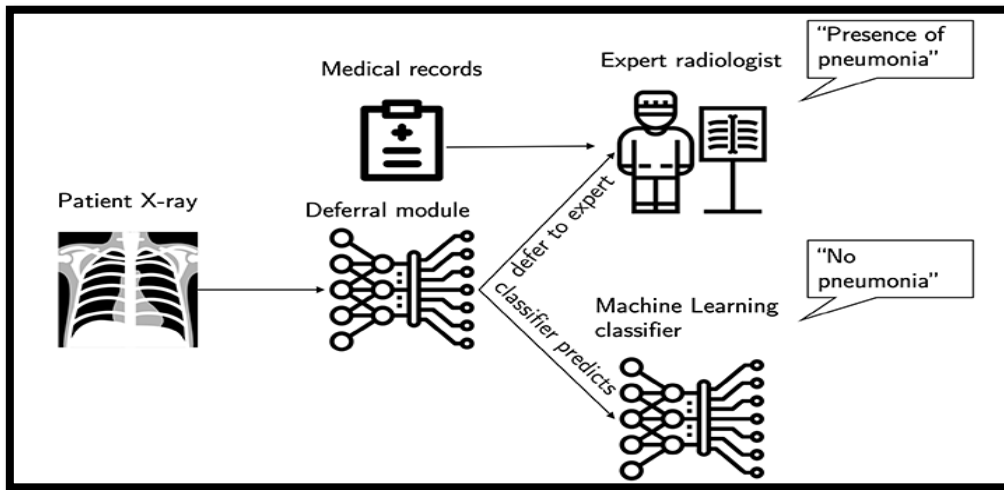


Figure 2: Application of ML to detect pneumonia in patients [7]

Such an aspect is necessary for bringing about an improvement in the levels of patient satisfaction [9]. Therefore, with the utilisation of AI in the medical sector, a betterment in the decision-making process for the doctors can be observed.

Assistance and the problems related to IoMT in the healthcare system

Within the healthcare system, the integration of IoMT had been of grave importance as it helps in the transfer of data and information between the different sources. Designated into three different kinds, namely IoMT 1, IoMT 2 and IoMT 3, the philosophy between the types remains the same [10].

However, the issue which has been observed with the integration of IoMT is the necessity of trustworthy data for an effective evaluation of the traits of the patients [11]. Without the presence of effective and true information, the forthcoming decisions would not be developed in a methodical manner by the doctors [12].

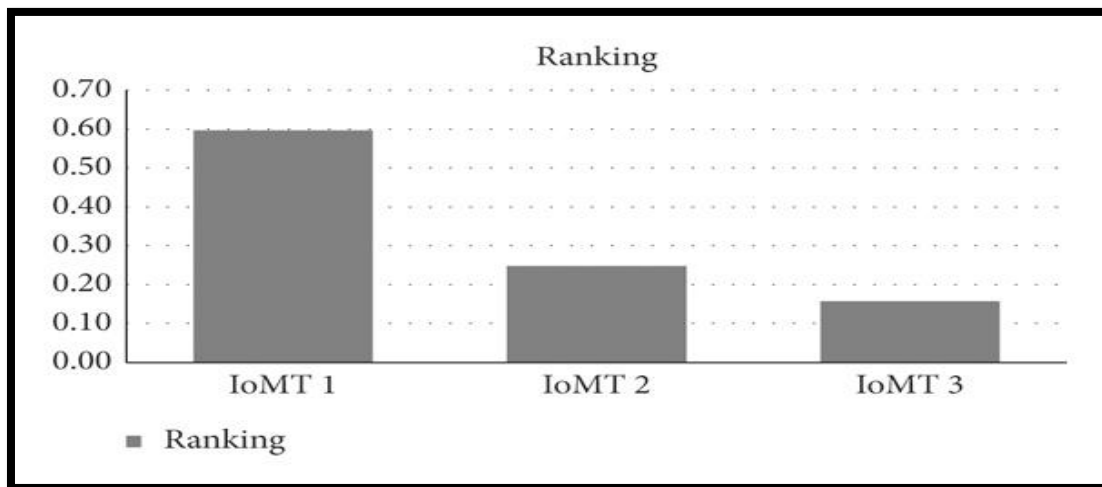


Figure 3: Ranking of different IoMTs based on their advantages [12]

Hence, the application of IoMT has been seen to contain both pros and cons, and the integration of necessary strategies is to be taken into consideration by the doctors during the decision making processes.

III.METHODOLOGY

For the overall betterment of the medical sector, the sharing of data and information proves to be extremely important [13]. The interpretation of the information shared with the help of the IoMT allows the assessment of the tracks of the patient's progress or regress and also enables the doctors to take into consideration the forthcoming decisions [14].

With the aid of the collected evidence over the digital platform, the prediction and the stages of the disease can be identified. From the data source, the acquisition of the data occurs, which is transferred to the data sub-layer [15]. Through network service, the transmission of the medical information records occurs [15].

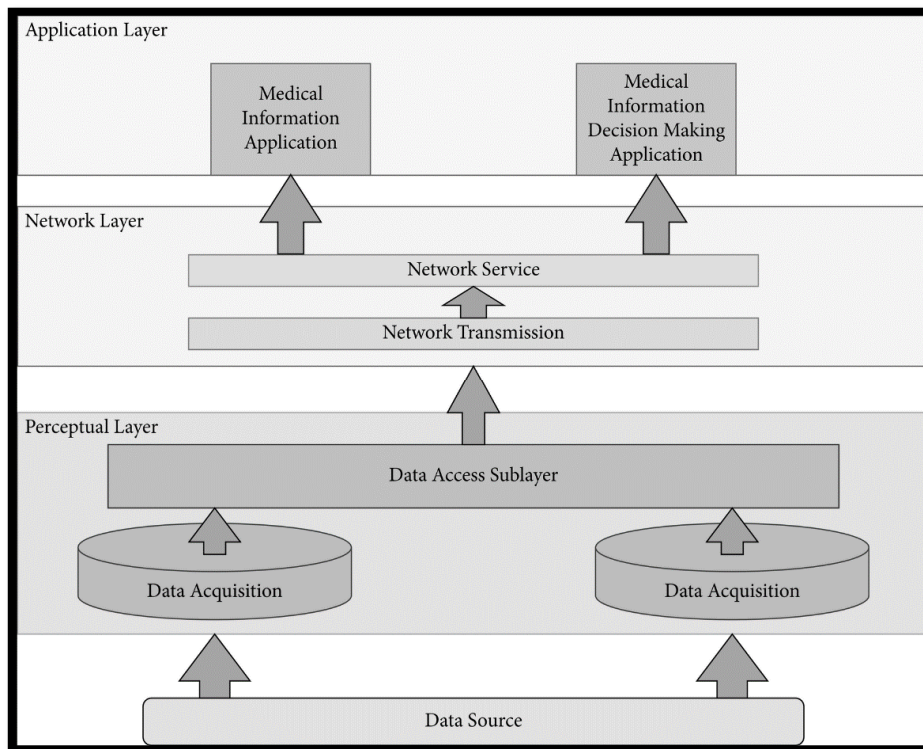


Figure 4: Overview of IoMTs devices [15]

Along with such, the examination of the data also enables the doctors to identify the processes to be taken for improving the working condition of the medical amenities [16]. Hence, the impregnation of AI and IoT for the overall betterment of the working grounds in the medical platform can be noted by the management.

IV.RESULTS/FINDINGS

Integration of AI through IoMT within the hospital environment

A range of IoMT devices has been seen to be utilised within the medical platforms such as Smart thermometers, MRI machines, heart rate sensors, and infusion pumps [17]. Glucose monitors have also been seen to be fitted with IoT for increasing the overall monitoring of the statistics of the patients [18]. The majority of the applications have been utilised for the early diagnosis of the disease and used as detection tools for the overall improvement of the informative architecture.

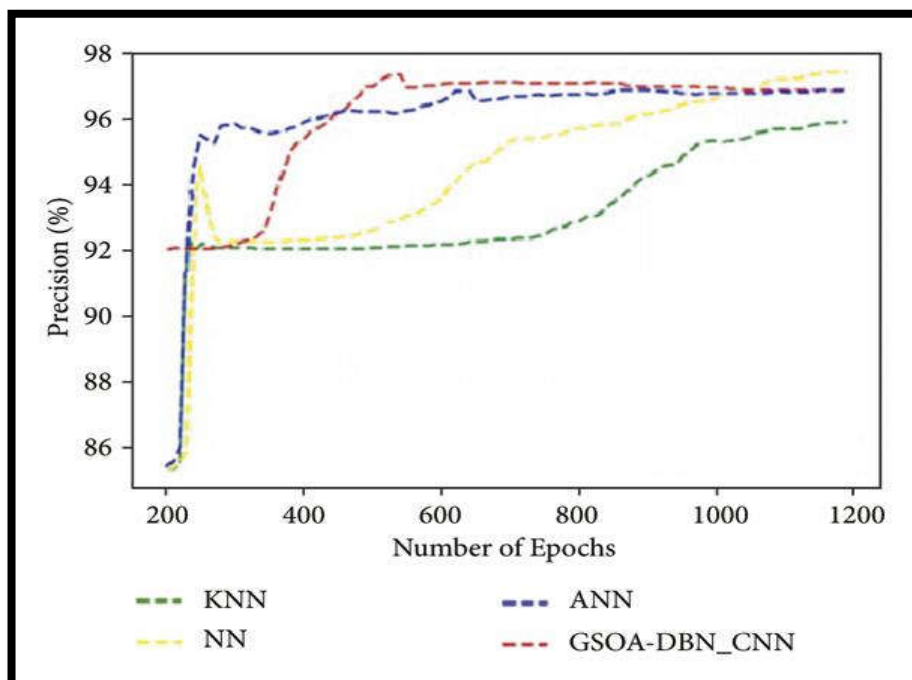


Figure 5: Precision in the reading ability of different forms of IoMT [19]

Through the involvement of IoMT, the recognition of the most suitable animal model can be known to the doctors, which proves to be of extreme importance in the forthcoming medical practices [20]. Along with such, the evidence from the clinical trials can be examined with AI and the necessary tactics for handling the cases [21].

Advantages of IoMT on disease prediction and decision making for doctors

For the medical assistances, the interpretation of the information from the IoMT devices proves to be extremely important [22]. This is due to the fact that the doctors have the ability to examine the sorted data and obtain the analysed information from the ends of the digital system [23]. Through the development of a predictive assessment, the steps the taken in forthcoming days can be considered by the medical associates.

Such an aspect turns out to be important for increasing the fluency of the decision-making process for the doctors [24,[26]]. In such a manner, the overall efficiency of the medical system is drastically heightened and the improvement of satisfaction levels is recorded [25, 27, 28].

V. DISCUSSION

IoMT application within the working arena of the medical industry has aided the doctors to have an overview of the records of the patients. Being able to tally with other records in the digital form has been effective to draw upon the necessary conclusions to be taken to increase the efficiency of the medicines and the medical processes. With the inclusion of AI, the transfer and the examination of the characteristics and patterns of the data had been made feasible. The massive volume of data produced by IoMT devices can be processed and analysed by AI-driven algorithms. Real-time patient vital signs, medical history, and diagnostic data are all included in this data. AI can get useful insights through advanced analytics, assisting healthcare practitioners in making decisions, tracking the evolution of diseases, and forecasting patient outcomes.

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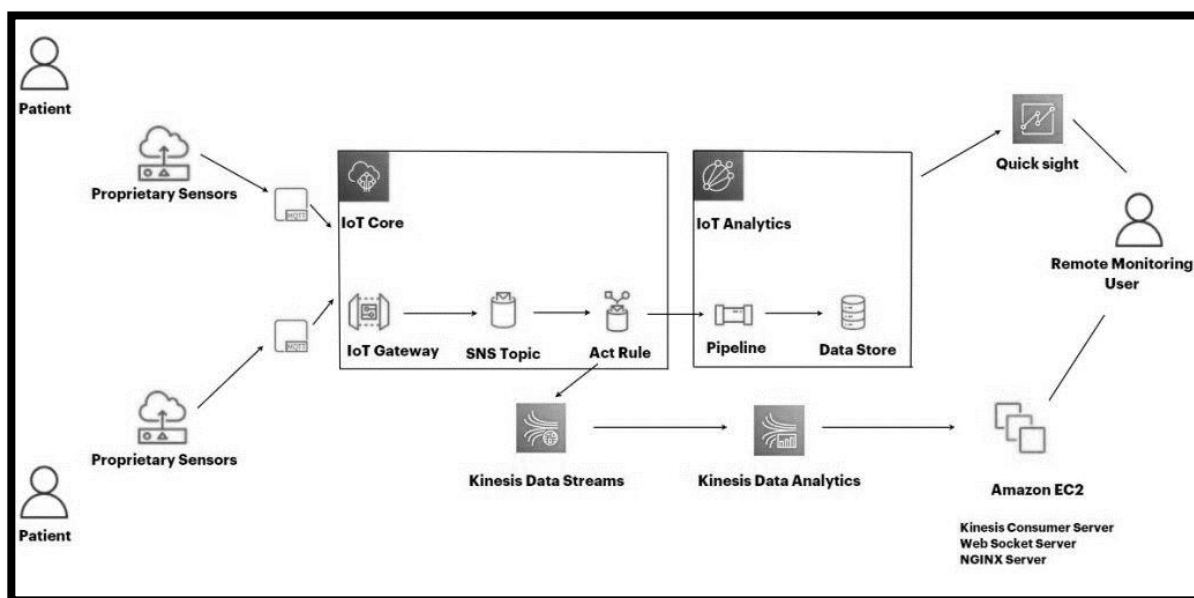


Figure 6: Remote patient monitoring with IoMT in the medical sector [28]

On the other hand, the betterment in the inclusivity of the medical records from the global scale has been important to lay down the predictive models or forecast on the forthcoming endeavours [29]. Hence, the implication of IoMT has been extremely beneficial for making the efficiency of the healthcare sector rise [30].

VI.CONCLUSION

Thus, the study provided an elaborate assessment of the utilisation of AI and IoT within the medical devices, tagged as IoMT. The benefits and the issues identified within the application of IoMT have been mentioned in the study, along with the range of opportunities for the implication of IoMT. With the help of such a device, the improvement in the decision making and the increase in the overall efficiency of the healthcare sector have been analysed in the study.

VII. FUTURE RESEARCH

The increase in the potential of IoMT through the betterment in the innovative means in the digital medical devices is to be considered by the medical companies. With the rise in the educational background and the theoretical framework of the organisations, the capacity to increase the efficiency of the working devices can be noted. In such a manner, the

decision making ability of the doctors and the medical assistants would be greatly supported and a growth in the potential of the medical industry can be recorded.

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