Research Article

The Modern Impact of Artificial Intelligence Systems in Healthcare: A Concise Analysis

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ABSTRACT

Artificial intelligence systems are receiving significant attention in the healthcare domain because they have a considerable impact on the development of patients' electronic medical records (EMRs). Artificial intelligence systems have the ability to develop healthcare institutions and assist physicians in making the proper decisions. These systems have the ability to perform diagnosis, provide appropriate treatment, and perform administrative tasks in hospitals. Healthcare institutions seek to integrate hospital systems with computer systems and construct large warehouses to store data and medical records for each patient. These methods allow machine learning and deep learning algorithms to analyse diseases, predict and determine new patterns for diagnosis and grow pharmaceutical applications. Big data is one of the essential things that artificial intelligence seeks to generate and develop algorithms to analyse, extract unique patterns from, and create strategies to deal with. In this article, the matter of integrating artificial intelligence systems in the healthcare domain, growing hospitals, and helping doctors and healthcare workers track patients and improve their health conditions will be analysed. This article is a straightforward description of the essence of artificial intelligence in healthcare.

1. INTRODUCTION

The healthcare domain is considered one of the most significant domains of interest for companies seeking to develop hospital systems by integrating artificial intelligence into the work environment [1-3]. The idea of integrating healthcare systems with the domain of computer science dates to the year 1950. Between 1964 and 1966, computational logic was applied to diagnose a specific type of disease through an application called ELIZA, which the Massachusetts Institute of Technology organized. After that, many terms appeared, such as computer medicine, electronic medical data processing, medical informatics, automatic medical data processing, medical information processing, medical information science, medical software engineering, medicine, and other terms that are integrated into healthcare institutions. Artificial intelligence systems are characterized by their ability to think like humans and act rationally, which favors their application in medical fields in conducting diagnoses, analyzing data, and developing healthcare workers [4-6]. In addition, these systems seek to grow continuously and act like physicians in making decisions about patients by diagnosing their medical condition and determining the appropriate treatment for them [7][8]. Integrating artificial intelligence systems and information and communications technology into healthcare institutions will contribute to the provision of electronic clinics and the use of telemedicine, which covers many aspects of patients and saves financial costs and time [9][10]. Executing these systems effectively requires disseminating health education to patients and increasing their awareness of the matter of telemedicine and what procedures they need to use this technology. Artificial intelligence systems have a marked impact on the effective organization and management of all roles within healthcare institutions and the development of the skills of physicians and specialists in pathology and neurology.

Robots are one of the most critical issues that use artificial intelligence, as they provide clinical support in decision-making or help patients interact with applications and telemedicine and enhance their skills in dealing with healthcare workers. Figure 1 shows the importance and role of artificial intelligence in healthcare services. Artificial intelligence supports physicians and will never replace them because machines lack human qualities such as empathy, compassion, and difficulty understanding. Patients generally prefer to deal with physicians or specialists to inquire about their health condition, as they find it difficult to interact with computers. Basic and limited tasks characterize artificial intelligence, as the primary responsibility for managing patients' affairs and their condition is left to the human physician. In healthcare, artificial

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intelligence is presented as a valuable tool for professionals in this domain, as it improves the prevention, diagnosis, and treatment of diseases [11-13]. For artificial intelligence systems to work correctly, they must be trained on a set of data because they can analyze the behaviors of this data and analyze it to find new patterns that contribute to decision-making. Healthcare organizations must create a secure environment for this data by providing scenarios that do not allow unauthorized persons to view or modify it. Artificial intelligence makes health information more accessible, relevant, and actionable [14][15]. Personal data is crucial for artificial intelligence because it has become a critical input for the functioning of some artificial intelligence systems and for making correct decisions. In this article, we will review a concise analysis of the importance and impact of artificial intelligence systems in health care, as well as the practices that contribute to providing electronic services to patients.
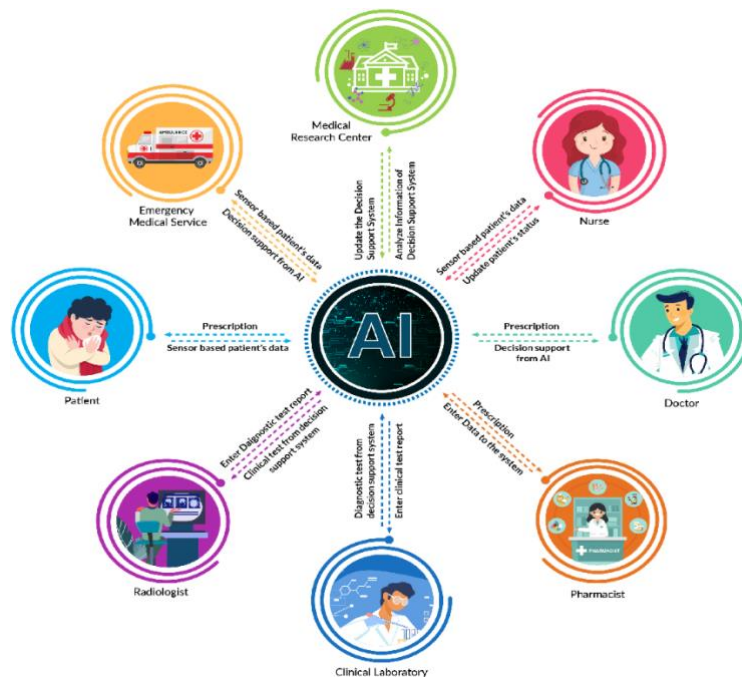

Fig. 1. The importance and role of artificial intelligence in healthcare services [16].

2. BENEFITS AND RISKS OF AI IN THE HEALTHCARE DOMAIN

In recent years, the healthcare sector has witnessed interest from many companies responsible for producing computer systems, as information technology has been introduced to healthcare institutions through medical diagnostic equipment, economic and financial management services, and many others. Many applications have been developed that support patients in communicating with healthcare workers at less cost and effort. Applications such as clinical management services have been created, as well as setting advance appointments for physician consultations, managing archives of medical records, and creating coding to classify patients. The integration of information and communications technology has had a significant impact on developing the activity of healthcare institutions and creating an electronic environment that helps develop means of communication between patients and healthcare workers. Artificial intelligence systems seek to increase the electronic health record by creating strategies that assist physicians in monitoring their patients constantly. This record is a repository of complete information about a patient as it is created by one or more interactions in the healthcare delivery environment. Likewise, this record includes patient demographics, progress notes, health problems, medications or vaccines, vital signs, medical history, immunizations, laboratory data, and x-ray reports. This entire record contains complete information about the patient, the services he uses, and the treatments he/she receives. Also, this record is interoperable with other systems in hospitals or medical clinics, where it can be accessed at any time or place where it is necessary to take care of the patient directly, with restrictions resulting from the guarantees stipulated in the personal data protection legislation established by healthcare institutions. This information is only available to individuals authorised to access it, such as physicians or experimenters in the medicine domain or the pharmaceutical industry. Therefore, artificial intelligence systems provide a safe and confidential environment, record all access to these records and determine who has access and what information has been entered or modified. The presence of electronic medical records is vital for healthcare workers as it provides them with all the information, they need about the patient. It also helps specialists in the pharmaceutical industry develop their treatments and vaccines and saves them a great deal of effort in improving patient

outcomes. Consequently, these records are a guiding tool that effectively establishes health and social services while putting the patient's needs at the center of attention. Figure 2 shows the services provided by AI for healthcare.
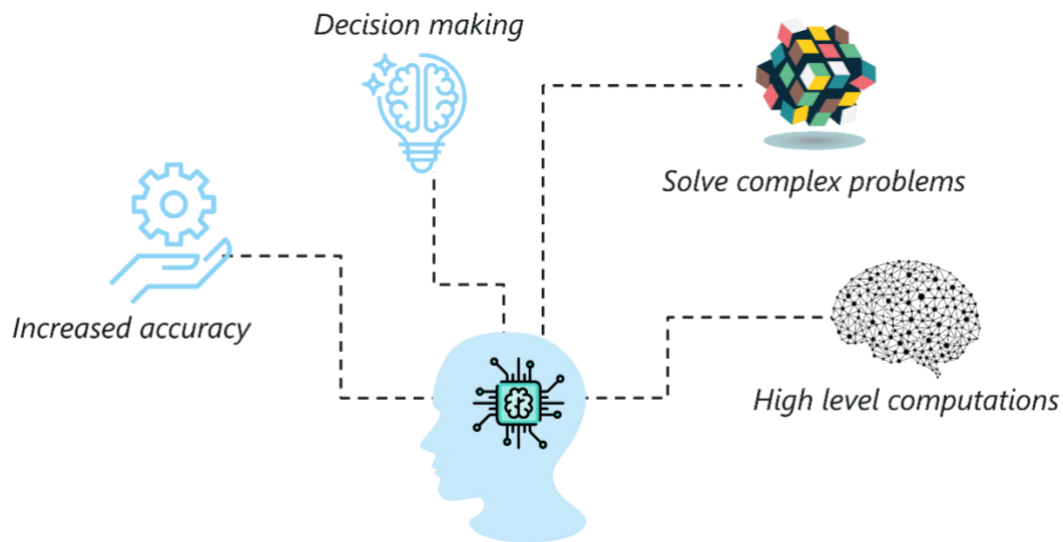

Fig. 2.   AI services in healthcare [17].

Artificial intelligence systems are distinguished by their ability to process large amounts of data by providing complex strategies for storing and analyzing all the data and giving summary information about patients or the spread of epidemic diseases. Big data combines five essential elements: volume, speed, variety, honesty, and value. Artificial intelligence systems have the ability to process and analyze terabytes or petabytes of data at tremendous speed. In addition, these systems manage homogeneous or heterogeneous datasets, and these systems also can audit and verify the reliability of data quality. Ultimately, the value of the data itself is essential. Knowing what data should be analyzed will lead to reliable and suitable results for making the proper decision and helping physicians monitor their patients correctly. Artificial intelligence systems work on statistical information that they collect from big data and identify valuable patterns that assist healthcare workers in tracking the spread of diseases or monitoring patients in places far from hospitals or medical clinics. The advent of modern social media technologies has led to the emergence of new forms of patient-generated data that include treatments obtained and data generation of physiological and psychological data (particularly data collected directly through real-time sensors) and data generated online (e.g., patients' comments and posts on online social media tools). Therefore, the presence of artificial intelligence systems is considered necessary in processing electronic health records and educating patients about utilizing modern applications.

Artificial intelligence systems are significant in healthcare institutions as they focus on advising physicians working in hospitals and reporting on a patient's condition [18-20]. These systems can detect many types of cancer, acute pneumonia, and other diseases. These systems provide telemedicine, which is an automated assistant for surgical operations or surgery with the help of a robot. This assistant gives the specialist physician the ability to perform operations without the need for the physician and patient to be present in the same geographical area. These systems have a significant role in collecting information about the patient, utilizing biosensors and machine learning to analyze the data. These systems provide alerts based on collected information, allowing healthcare workers to act quickly. Providing virtual assistants is an application that helps patients at any time and answers all their inquiries. Sensors provide the ability to monitor the patient, predict the development of his/her health condition, and assist physicians in making more profitable diagnoses. Moreover, these systems can detect diseases such as breast cancer through mammograms utilizing particle physics technology. Biomedical researchers and engineers are conducting research in the field of computer vision and deep learning so that computer systems can detect and diagnose diseases such as heart disease, diabetes, and eye diseases. Through telemedicine programs, patients or doctors can upload images for diagnosis, such as computed tomography, where the images are compared with historical clinical data to suggest an appropriate diagnosis for each case. It is using robots that use facial recognition technology to identify patients and talk to them to refer them to specialists or prescribe medications for them.

Regarding risks, it should be noted that many artificial intelligence systems have a significant impact on data due to factors of race, gender, and social and economic background. Accordingly, it requires the presence of people specialized in data science to correct these biases and obtain large and diverse amounts of data so that the breadth and depth of the data reveal the fine details relevant to each group of patients. Healthcare workers must have sufficient experience working with

artificial intelligence and incorporate practices that ensure the integrity, confidentiality, and availability of system information. In some cases, the clinical data is numerous and not of acceptable quality, and there needs to be specific information about the patient, which is inconsistent. Therefore, this data does not have clinical meanings, so ontologies cannot be created from it, nor a semantic layer that forms the basis of the work of artificial intelligence techniques, and the system cannot learn independently. The presence of incorrect information dramatically affects the performance of computer systems as it will generate incorrect outputs. Healthcare workers or physicians should audit all computer system output and only rely on it after verifying all results. Besides, artificial intelligence is unable to provide a comprehensive explanation of the decision-making process. There is a need not only for well-functioning approaches but also for reliable, transparent, and interpretable approaches. Thus, it is preferable to review all decisions issued by computer systems through specialists and not be biased or modified.

3. CONCLUSION

Electronic health records depend on five directions: interoperability, information systems, Internet of Things (IoT), big data, and artificial intelligence. Artificial intelligence systems have a significant role in improving healthcare services. The electronic health record must be proactive and more innovative, with an easy-to-use and intuitive interface that ensures the confidentiality and security of information. Big data has brought about a significant revolution in the healthcare domain with the ability to manage huge amounts of data, analyze it, and obtain the most critical information. Machine learning algorithms play a noteworthy role in analyzing the behavior of big data and getting new patterns that support physicians in making more profitable decisions and improving patient effects. Healthcare experts concentrate on improving public health, clinical research, and patient care by analyzing large datasets. All the information analyzed can be applied to create clinical guidelines, protocols, etc. Big data and artificial intelligence contribute to enhancing healthcare services with the help of computer memory, powerful processors, intelligent algorithms, machine learning, deep learning, intelligent software, statistics, mathematics, etc. Artificial intelligence supports physicians and healthcare workers and does not replace them, as machines lack human qualities such as intuition, empathy, or compassion, and physicians depend on them and cannot be easily replaced. Artificial intelligence also can avoid clinical errors resulting from incorrect human records. Thus, the patient benefits from accurate data of his/her information or ensures his/her safety. The more accurate the data and procedures are, the more accurate the performance of artificial intelligence will be, and the less information there is, whether from a group of people or variables, the more the information may be biased and not support the correct diagnosis.

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