



ARTIFICIAL INTELLIGENCE IN CARDIAC MANAGEMENT

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ABSTRACT

Cardiac disease is reported to be one of the leading causes of death across the globe. There has been an increasing demand to develop novel techniques and strategies to uplift the existing cardiac disease management. In recent usage of artificial intelligence has created an enormous impact globally; it has also been exploited in the health care domain. It is majorly used in the diagnosis and management of diseases. There has been extensive research to tap different health care applications using artificial intelligence tools. Based on this, there are comprehensive scientific studies on the management of cardiac disease using various tools. Hence the present research focuses on implementing artificial intelligence principles to manage and control the cardiac condition.

Keywords- Artificial Intelligence, DEC, Cardiac management, medical science

INTRODUCTION

Cardiac vascular disease is one of the leading causes of mortality across the globe. The dietary habits have greatly influenced cardiac disease owing to the consumption of unclean and junk foods. This street food with low-grade cooking increases the risks of cardiac disease. Blood gets cloth in the artery, which eventually increases the risk of heart attacks and other cardiac ailments [1,2]. In recent years, cardiac disease is also found in teenagers because they generally spend most of the time outside their house, and it is quite pre-requirement of everyone to have some food, but there is none other than junk food, so these are also found in these ages. Since everything is getting online in the

world of technology, you can treat yourself at your home by artificial help intelligence, which allows you to reach out to the doctor. He will tell the solution and medical treatment to your condition. He may try to cure you using some exercise in starting because the medicine may treat you soon. Still, it has several side effects that may give rise to a new issue so you can easily get cured at your home. If you need any immediate assistance, then allow artificial intelligence to reach out to that as soon as you question. Cardiology is the big field that focuses on diseases related to heart, circulatory system, and function. There are many cardiovascular diseases like coronary artery disease, stroke, heart failure, congenital heart disease, and many others that need a great concern from the doctor for better treatment and faster cure [2-5]. In recent times, Artificial Intelligence (AI) has become an essential tool in medical science which replaces actual humans and simulates human intelligence into machines programmed, which think like humans and also mimic human actions. It is mostly used in medical science, especially to those people whose life is at high-risk. It helps to monitor patients without their interventions. AI records the patient's response to the questions of doctors to determine and can be analyzed later. Voice technology, that is DEC's voice, is combined with artificial intelligence to record and respond. The factors for using Artificial Intelligence in cardiac management and its importance in the digital era. Though it's not new, it will still discuss its success and failure. Artificial Intelligence discovered immediate remote monitoring of high-risk patients by a healthcare department. Artificial Intelligence is done to monitor without the interference of patients. In some cases, regular patient monitoring is a must. It becomes a necessity to assure timely intermediation by a physician or healthcare practitioners to provide the right medicine and medical treatment on time. Situations with high-risk patients like in cardiology, neurology, obstetrics, etc. require regular monitoring for immediate care [6-8]. As the cost of hospitalization is increasing day by day, so health insurance companies are encouraging patients not to spend their time in admissions until it's become a necessity. Today's time when there is the cost of hospitalization increases, and some treatment like chemotherapy, infusion therapy, antibiotic therapy, etc. are considered to be safe treatment and can be regarded as cost-effective compared to home treatments. FDA has approved numerous infusion devices to prescribed for the patients for the regular use in intervals. It is used in many situations like in obstetrics for the patients to give precise data even from the childbirth [6,7].

Such fortitude, though, required patient contribution or interference. There are many situations where a participant's participation is not possible is not trusted upon, but patient monitoring is yet necessary. If we take the example of the cardiac patient, it requires expensive and reliable control to look after the patient's situation, which needed nurses to meet the patient daily, which required a physician or nurse there to present for monitoring the patient. This will maximize the number of patients that can be protected in a given time of healthcare professionals. There are a few solutions that have been offered by health maintenance organizations (HMO) to solve the above mentioned problems.

It recognizes in the prior art to make signals representing a patient's condition and record them later for monitoring by the doctors. Example- Holter heart monitor, which is used to record 5 hours of a cardiogram of the patient by monitor [7,8]. The fundamental deliberations in providing improved health monitoring services for high-risk patients include the following facts –

- The doctor has the responsibility of determining the timely manner for the appointment during the monitoring interaction; an appointment is necessary or not.
- Doctors have the opportunity to decide whether high-risk patients need any urgent treatment or change in continuous treatment.
- Adversive monitoring erstwhile is done by patients by intrusive, especially in the case of acute hypertension cases or some severe perinatal cases of patients.
- It is required to minimize the use of nurses or any other health worker to personally pay attention to the patients and do the monitoring work.
- Using any acoustic telephone devices like modems are unwanted to use for monitoring the purpose of patients.
- It is required to attend many risky patients at the same time for the doctor's intervention to save many lives altogether and focus on everyone.

Previous approaches are often used, which only helps in getting recorded real data to evaluate patients' condition by their doctors. The current creation delivers a health monitoring system with the methods of monitoring through machine learning without patient interference while using artificial intelligence. Many patients are located remotely, so they are generally monitored through telephone helps and artificial intelligence technology. These technologies help us treat people in a low cost at their home only, and these are typically controlled by the physicians or the staff who have all the instructions and guidelines of the right physician. There is an option that a patient can ask a question, and it will be answered with the preloaded question and answers updated by the physician or its medical team. These technologies allow us to view the previous question answers if required, which increases the level of conservation or contact with the physician so they can give you the best care from their side. These patients become a great marketing tool for the healthcare industry as they get the advantage of directly consulting without spending money on high-class clinics and electricity bills [9,10].

It can also provide a multi-monitoring feature which allows us to monitor more than one person at a time with having a different type of problems. This technology promises to lower the budget and expenditure of 25 hospitals, many medical practitioners, or the people who help during the treatment with reducing the risks of service quality. In addition,

it provides physicians to look after their patients at a particular interval time and can advise and help them to cure themselves a bit faster. It also helps to reduce unwanted visits to the doctors. Artificial Intelligence Voice technology provides patients and physicians to ask medical-related queries which are already there in the system needed by the expert physician and medical staff. AI Z Voice technology gives us features like voice recording so patient whenever required, call monitoring and call forwarding and alarms which allow patients to meet doctors online whenever needed. If a patient has high heart risk and is unable to move as it doesn't have one nearby, they can easily connect with the doctor. They can cure them for the essential need immediately required for the patient when he has a cardiac arrest and to save the lives of themselves. If the patient were already registered, the available doctor would get all the previous records and details so he or she can be treated correctly [11-13].

A physician who uses these technologies will use their system as a clinical tool, they can treat a single high-risk patient at a time, so they focus on the treatment of that patient, and it allows patients to be guided as per the physician guidelines already feed the physicians in the system that is controlled by the Artificial Intelligence. Many options are provided by many AI built companies like some provide to connect 48 remote patients at a time to treat them at a single time with the help of a multi-embedded Artificial Intelligence system.

Artificial intelligence also helps doctors to make many medical issues and several medical instruments like ventilator, automatic blood pressure measuring machine, pulse oximeter, sugar testing kit, ECG machines [12-14].

DEVELOPMENT IN ARTIFICIAL INTELLIGENCE SECTOR

In the digital era, where everyone focuses on the technological development industry to merge with the medical industry to create newly combined, dependable, and valid methods of providing health care. Artificial Intelligence is one of the latest trends in managing cardiac in enlarging and spreading the cardiologist's efficiency. Artificial intelligence is used to test screening results in machines like echocardiograms, MRIs, CT scans, etc. which have long been studied using more progressive methods in the field of technology. This became possible because of artificial intelligence, which allows us to measure correct working and analysis from the starting up to the end of the healing process. Cardiology aims to use artificial intelligence to do more research and development and focus on population fitness with the help of the clinical practice of AI. So when every field uses the artificial intelligence, medical, engineering, and research field, we collaborate in one to give the best medical facility to every citizen and many India one day the country with the best medical facilities [12-16].

USE OF ARTIFICIAL INTELLIGENCE IN CARDIOLOGY

Artificial intelligence has more known algorithms that can be used for real monitoring of patients in real-world tasks. Reflect on the situation of logistic reversion. To allow statistical implications such as approximation of coefficients and p values, the model needs several robust assumptions. When logistic deterioration is used for onetime purposes, the expectations that permit statistical implication may be distinct to the goal and delay the model's performance. Compared to AI used to make as many assumptions of the fundamental data. Though this method slows the probability of traditional statistical implication, it results in algorithms that are generally more precise for forecasting and classification. Thus, cardiovascular medicine can advantage from the combination of artificial intelligence and appliance knowledge. Artificial intelligence is used in the machine and is used in the treatment of the cardiac patient like a ventilator, which is used to give artificial respiration to those patients who are very serious. There is an ECG and ECO machine is a used to measure and graphically represent the heartbeat of a patient ECO is done when the proper representation of the pulse is not shown in the ECG output since for a cardiac person it necessary to see the patient see the pattern of the heartbeat to treat that patient. There is a more similar machine-like oxygen concentrator used to provide continuous oxygen to the patient. In the same way, there is an oximeter which is used to measure the level of oxygen in the human body to check whether it requires artificial respiration or not. in the health unit that uses artificial intelligence to treat and test the patient to address them in a better way and give the best facility to their patients [14-16].

THEORIES OF ARTIFICIAL INTELLIGENCE

The result can be seen on the monitor in the form of a general matrix arranged in rows and columns. Each line signifies a set of objects to evaluate the same features, and each column shows the values of given features for the different rows in the database. Every line shows results to be learned by the mathematical-computational model. The term artificial intelligence is frequently used interchangeably with the term algorithm, which is related to the ability to learn from the big data. Artificial intelligence is like human intelligence, which generally understands similar pattern recognition, the ability to solve problems, follow the languages, and recognize the objects and sounds [12,15]. One can use the following types of learning from artificial intelligence-

- Administered –When the system receives information about every message and the labels related to it, one can forecast based on their relations. For example, we can find about patients vulnerable to cough with the use of angiotensin-converting enzyme inhibitors.
- Unmanaged- when the message levels are not a priority. It is up to the system to find hidden structures of the database, so it gives the unmanaged in the managed to get every information regarding it. For example- finding a database of patients with hypertrophic cardiomyopathy with the image finding.

- Fortification- It is a kind of behavioral biology used to learn based on a reward like if you want to learn something. It gives you a sure bonus so one can gain an interest in learning anything. It is a process that is used to determine someone like a small child.

ARTIFICIAL INTELLIGENCE TOOLS

There are some artificial tools and their application. There is a diversity of machine learning models, each one of them their various uses and limitations. The machines are

- Support Vector Machine (SVM)- two group classification is solved using this support vector machine. A function called hyperplane from the resolution of a linear system built from the different lessons of the training subset can be easily found using it.
- Naïve Bayes (NB)- conditional probability can be learned using this. Conditional probability is used to recognize the specific chapter's classification, which helps the healthcare professional analyze data in detail and improve the patient best by giving the best treatment.
- K-nearest neighbors (KNN)- KNN uses a mathematical approach to function the pattern more precisely to connect with a course that has more value rather than zero. Either it will be high to equivalent to zero. The amount which will come and the difference between the vectors will be the value of between them. It is used to calculate the distance between vectors, and that helps in maintaining the database for the determining and projection, which will help in monitoring.
- Genetic Algorithms (AG)- It is used to process biologically to help the candidate to solve the problem quickly and demonstrate in a way chromosome comes which consists of genes, and it will undergo the execution of algorithm to get better solutions from the previous one to determine the best treatment and monitoring the results.
- Random Forests- This method is based on the edifice of several decision trees. It is done by collecting random samples to build data to process it, and this step is called bootstrapping. Each of these new databases will give rise to a decision tree, which is obtained iteratively, from a subset of variables After the construction of all trees, a new lesson in the database should be allocated to the group that has the most significant number of decision trees, showing that it belongs to this group
- K-means- It allows partitioning a database into k groups with similar characteristics. For this, one needs to update all necessary data and monitor to get a vector, which is also known as reference centroids for every group to calculate the distance of every period of the lesson we got from each vector we use. It is done to determine through the chart to get the accurate number of groups that make them separate from the vast database to access quickly and accurately.

- Artificial Neural Networks- It is done based on the nerve system, which is used in biology, and the structure form is called a graph, which has two sides nodes and edges, which is used to determine the weight assigned to them by connected layered nodes and edges. Inspired in biological nerve systems, a structure called a graph - a set of nodes and edges. This is used to get proper output by using nodes and edges. Many have proposed neural networks from simple to sophisticated to understand the nodes and edges system in-depth to understand the better production through artificial intelligence.
- Gradient Boosting- Gradient boosting uses gradient method to the monitoring which used maximum increased direction in a mathematical function which is used to produce consecutive decision trees to combine to create a prediction based on brush up and use many variants of approaches and ways to determine gradient boosting that required and discover random subsampling for the data to understand deeply.

BENEFITS TO CARDIOVASCULAR MEDICINE FROM AI

Cardiologists can make decisions based on patient data available to them, and they have access to research on quantitative data on patients with many other specialists. Notwithstanding some possible drawbacks, it is fetching evidence that the most excellent method to make decisions based on data is across the application of techniques drawn from artificial intelligence. Therefore, cardiologists need to have artificial intelligence and machine learning in their clinics. Indeed, the amount of available data will tend to increase daily, which will continue to incorporate new streams of complex medical data into the clinic. This will happen for sure later or sooner to have artificial intelligence machine learning for the fast adoption of automated algorithms for computer vision in radiology and pathology. Artificial intelligence is nothing to fear, but it's a thing that needs to be embraced by every clinic to ease out the work and monitoring of a large number of patients to get accurate data in less time. Artificial intelligence will drive improved care because healthcare professionals will be able to interpret and judge more data in-depth than ever before, due to the instant availability of data. Artificial intelligence has become the need of every clinic to take care of every patient more precisely. It will help catch any patients' disorders and ultimately lead to better treatment selection with improved and better outcomes. Artificial intelligence must be adopted for cardiac management to serve the patient best and better treatment with the best results. Artificial intelligence has been used in many clinics, and almost every department to monitor patients more precisely and understand their health more confidently. It will help in determining and analyzing their health in the best way to provide the best treatment. Also, artificial intelligence helps in cost-cutting and save time [9-11].

CHALLENGES AND FUTURE PROSPECTS

Artificial intelligence in cardiology has increased in recent years, and the growth is also with the same numbers. But there are few challenges as well which need to be addressed and improve to overcome those challenges. This will help in overall development, knowledge, security, and attention for the critical use of artificial intelligence as a necessity of today's demand. Everyone needs every process to be done automatically; they need artificial intelligence to do that correctly, but everything can't be perfect without challenges, so it has a few problems too [12,15]. Few issues are discussed below which need to highlight and worked out as soon as possible for better use of artificial intelligence in cardiology-

- Misuse of artificial intelligence- the ethics of artificial intelligence must be noted and used widely and discussed everywhere. Machine learning can be misused, which misleads the outcomes. Like it must pick the correct information which is required else you will fail to treat the person.
- Improve math knowledge- as I mentioned that it must choose the accurate information. It supports deciding on the data given, so it needs a good understanding of mathematics and excellent knowledge of computation to get the correct data required. As it treats a large number of patients at a time, so need to be good at computing and math else, you will lose the correct performance of the method.
- Get robust data- it is the essential requirement of artificial intelligence to get the correct information for the processing of the exact algorithms since it is now used in the health unit so it must have the exact algorithm and handling since it is dealing with the essential life.
- Get security- security is most important when it comes to information about someone, so you must check that there should be secured appropriately. Anyone can take the patient's report for the server in which it is used. There are specific tools to make the server secure enough that it should not take the information of someone from your server, so use those tools to make it perfect for the health unit.
- Good collaboration – for excellent processing, you just need to collaborate for superior performance and great working since it is a health unit. You can't take any risk regarding a step. You need to be perfect because you can't play with someone's life.

CONCLUSIONS

Artificial intelligence has been proved very successful in the field of medical and other. Currently, the researcher is trying to make it best in cardiology and has improved the diagnostic and therapy treatment using this technology. It helps us to treat the patient to their best and helps them to recover quickly and get all the benefits at a low cost, so it makes it economical. Doctors and medical staff also got much of the help through this technology as before; it was tough to treat them in a short time. The knowledge to operate these machines efficiently there are many courses, and

some doctors got expertise while practicing. So these helped a lot in every field and gave us a new view to solve medical issues automatically as it provides a machine like oxygen concentration which is frequently used for the patient which has a question of breathing. Artificial intelligence is used in ventilators also in which people who are unstable in their condition are put on it so they may become stable and functional. So it has been seen that many doctors have felt excellent after the introduction of artificial intelligence, and it helped them to give the best of medical science through the usage of the technology. As technology and engineers are working to make the medical facility the best in India, so no one dies due to the shortage of facilities. Medical and engineering fields are both working to give the best of it as there are many deaths due to cardiac attacks. It is their first focus to develop such equipment that it should not be tough to put someone out of the cardiac arrest and manage it as soon as possible. Both fields gave the best and tried a lot, and still, both are researching to make the medical system best, so they can save anyone from any problematic situation, but again, there are many difficulties and boundaries to make this researches possible as the people are not that much aware of the technology and actually didn't have that trust on the medical line but soon we promise that the world will believe and respect our technology, research, and therapeutic range. Everyone is doing good in this field to make it best one day and give you the best service worldwide. We have already seen that how artificial intelligence is growing in every area to provide excellence to the medical line and treat everyone with the best comfort and machinery, so one didn't feel that he is not addressed in the best terms.

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