Current Status and applications of AI in Medical industry: An overview

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Abstract: As things stand, every aspect of medical industry is converted by artificial intelligence (AI). Examining the research done on this technology is necessary in order to determine its various medical applications. Research articles related to "Artificial intelligence" & "Artificial intelligence in the medical field" were examined, and important uses of AI were found. This research paper examines & demonstrates how artificial intelligence (AI) is assisting in the resolution of difficult issues in the medical industry. The study found that the application of AI in the medical industry and its implementation process makes use of five key technologies. To improve patient results, a fruitful clinical choice is offered by AI. A variety of technologies are used and tested in an effort to increase automation in the domain of medicine. Artificial Intelligence is used in the medicinal profession these days to conduct smart technology-enabled patient examinations and maintain digital medical records. It offers answers, particularly in the areas of tailored therapies, precisely formulated medications, and focused treatments. Artificial Intelligence, a cutting-edge technology used to assists the surgeon with medication, treatment, and surgery of patients.
The principal use of AI is to improve decision-making of medical professionals in critical and complex situations. Additionally, it can support hospital infection tracking, detection, investigation, and control efforts. This technology creates and enhances the framework for online patient appointments. It will be beneficial in the future for all medicinal zones to serve humanity.

Keywords: Artificial intelligence, AI, AI Technologies, Medical, Treatment, Decision making.

I INTRODUCTION

In 1956, the perception of artificial intelligence (AI) was attained, but the last 12 years have seen significant developments. It is useful to analyze thousands of patient records to deliver quicker treatment and better results. The healthcare sector is undergoing a metamorphosis. The reasons behind this revolution include rising overall health care costs and a dearth of medical specialists. Consequently, the healthcare sector is seeking to introduce novel information technology-driven approaches and procedures that have the potential to reduce expenses and address these increasing challenges. Artificial intelligence uses computer systems that resemble machines to mimic the traits and functions of human intellect. Quick learning, prediction, analysis, conclusion-drawing, and self-improvement are all possible with this technology. It develops sophisticated tools for speech recognition, design, imaging, and problem-solving across a range of medical specialties. AI systems can be trained on a given collection of data to improve predictions and assist in accurately solving complicated problems. By digitally recording patient data and generating a digital database that can be utilized for routine care, diagnosis, and treatment in the future, artificial intelligence assists healthcare personnel in shortening the time it takes to document cases. Medical specialists will collaborate with software and hardware experts

to create a platform for data collection and standard duties for the General software based on the final requirements.

As a result, the modules for follow-up therapy and diagnosis treatment are created with the patient's needs in mind. However, the artificial intelligence system's ability to function depends on the analysis of the data that has been gathered. AI increases surgeons' and physicians' inventiveness. These sentient computers exhibit human-like behavior, rapidly picking up on the lingua franca of financial transactions, words, photos, and medical data. These devices can make error-free decisions because they comprehend human language [1]. It gives the patient access to pertinent information, enabling accurate operation. With the use of this technology, it is possible to locate and gather enough high-quality patient data that will be useful in the future to forecast and lower risk associated with joint replacement surgery, hospital stays, and enhance recovery prospects [2]. Right now, artificial intelligence appears to be the most promising technology for life extension. For complicated patients, it provides robotic surgery supported by AI. Through a variety of virtual resources, this technology generates information and keeps in constant contact with patients. This technology can be employed in 4,444 paid employment to address the scarcity of health care personnel in rural areas. To fulfill the pressing demands of rural areas, it raises the caliber of medical students. This technology raises healthcare worker productivity while lowering expenses and improving healthcare quality. It offers guidance on how physicians can obtain a precise diagnosis [3]. AI is crucial to scanning technologies like computed tomography (CT), x-rays, and, computed tomography (CT), magnetic resonance imaging (MRI) and 3D scanners. They aid in improving the decision regarding the patient. AI suggests a healthy diet and eating routine to enhance wellbeing. It efficiently schedules patients and notifies physicians in between. With the implementation of this technology, the medical industry becomes more effective in addressing a variety of issues. It also facilitates virtual communication between patients and physicians. The research questions listed below are addressed in this paper:

Q1: Explore the various benefits of AI in medical and healthcare.
Q2: Identification of various techniques of AI in the medical field.
Q3: Identifying the steps involved in using artificial intelligence in the medical profession.
Q4: Recognizing significant uses of AI in healthcare and Medicine.

The research paper is prepared as follows: Section I Explain Introduction part. Section II provides an overview of Advantages of AI in medicine, Section III describes AI significant technologies in medical field, Section IV describes Development of AI; Section V presents process chart of artificial intelligence in the medical; Section VI using artificial intelligence in medicine; Section VII concludes the paper.

II ADVANTAGES OF AI IN MEDICINE

AI is capable of handling a wide range of medical problems, including those with varying degrees of difficulty. It can also carry out more complex tasks with superior quality and outcomes. The patient can now take pleasure in prompt and precise judgments [4]. Numerous advantages of AI in medicine include:

- ➢ Check for abnormalities and recommend medical intervention

- ➢ Predict future diseases
- ➢ Accurate and effective diagnosis
- ➢ Help in complex and new treatment
- ➢ Balance the patient's blood/glucose level
- ➢ Appropriate monitoring of the patient
- ➢ Provide doctors and patients with convenience
- ➢ Suitably trains medical students
- ➢ Increase hospital safety
- ➢ Accumulate information in surgical process
- ➢ Better pathology outcomes
- ➢ Lower problem-solving costs,
- ➢ Clinical knowledge retention
- ➢ Positive outcomes, improved physician/surgical experience,
- ➢ Improved medical outcomes
- ➢ Better patient intelligence support

III ARTIFICIAL INTELLIGENCE TECHNOLOGIES FOR MEDICAL FIELD

Numerous jobs in the medical industry are carried out by artificial intelligence, including automated measurement tasks like pulmonary artery diameter, aortic valve analysis, and carina angle assessment. Orthopedic patients can now utilize it to diagnose fractures and trauma [5].
Through a variety of cutting-edge technologies, artificial intelligence is significantly influencing the medical industry. It makes the tasks of physicians, nurses, and surgeons easier. Patients' customized treatment programs can be created with the use of these technologies. It can be used in a medical diagnostic support system to diagnose congenital heart disease [6]. It has a significant impact on how health records are electronically registered. This may improve diagnosis consistency, accuracy, and speed. These methodologies reliably forecast patient outcomes and facilitate the collection of supplementary data. In a large medical organization, they are used to properly manage health systems by tracking coverage, health costs and treatment responses. Table 1 describes various AI techniques in medical field.

Table 1:- Various Artificial Intelligence Technologies in Medical Field

S. No	Technologies	Description
1.	**Machine Learning (ML)**	➢ ML systems are self-improvement software package and learn without experience or training over time [7]. ➢ Medical products can be evaluated automatically and the results will be displayed with the possible accuracy [8]. ➢ Depending on the approach, machine learning algorithms (ML) can generate judgments using algorithms including reinforcement learning, supervised learning, unsupervised learning, and unsupervised learning [9]. ➢ This technology is utilized in the healthcare industry to identify diseases. ➢ ML helps to store records of patients seeking better treatment

		[10].
2.	**Artificial Neural Networks (ANN)**	➤ Artificial neural networks utilize the principles of back propagation and layers, drawing inspiration from the neural architecture of the human brain (input layer, hidden layer, output layer) [11]. ➤ An ANN functions similarly to a network of linked neurons and acts as a neuron. Each ANN neuron has a weight with connections [12]. ➤ Through ANN training with large scale data sets, very heavy neurons equal to the connection capacity of the human brain can be obtained using ANNs [13]. ➤ Aids in the prediction of disease outbreaks and decision-making [14].
3.	**Natural Language Processing (NLP)**	➤ NLP focuses on analyzing and interpreting languages through many methods [15]. ➤ NLP encompasses numerous specialized domains, including HMM (Hidden Markov Model) is used for analysis, POS, signaling, etc. [16]. ➤ This technology is helpful in medicine for testing, supporting, and analyzing unstructured data for clinical choices [17]. ➤ Additionally utilized for clinical patient record keeping and automated coding [18].
4.	**Support Vector Machines (SVM)**	➤ The data class groupings for an input data set are determined by the support vector machine [19]. ➤ Solving basic data classification problems [20]. ➤ SVM is used in spam filters during classifier training. For future reference, new and undiscovered data points can be accessed and used [21]. ➤ Used to collect and process medical data [22]. ➤ Aids in appropriate patient management and evidence-based decision making [23].
5.	**Heuristics Analysis (HA)**	➤ This approach identifies and resolves issues through trial and error techniques [24]. ➤ The algorithm for efficient operation is to use efficient solutions that may not achieve the optimal goal, but do achieve optimal performance. Reaching that goal [25]. ➤ It is better to focus on heuristic analysis for patient safety and inform with precision any type of problem [26].

These technologies impact every facet of health and are employed in a wide range of specialties, including neurology, cardiology, orthopedics, and oncology. We provide patients with more appropriate and efficient services. Physicians can now decrease physical labor while enhancing their ability to plan, make clinical decisions, and administer care [27]. You may now easily find out a patient's past and communicate with their relatives. The AI can manage job requests with

ease thanks to backend processing and data storage. The patient is notified if there is a delay in the laboratory tests [28].

IV DEVELOPMENT OF ARTIFICIAL INTELLIGENCE

Artificialintelligence brings enormous innovation to the field of medicine. AI Analyze data, systems, and medical records effectively. Improve digital automation for quicker and more reliable outcomes. Accurate medicine administration and digital patient counseling are made possible by this technology. This aids in improving outcomes for physicians. Below is an explanation of it.

1. Pharmaceuticals

Advances in medication research, diagnosis, and treatment personalization are made possible by artificial intelligence. Carry out medical treatments that take a long time accurately. Clinical trials can benefit from this technology, which also aids in appropriate monitoring for precise outcomes. It is capable of providing precise patient monitoring and efficient communication.

2. Surgical procedure

AI has been successfully incorporated into surgery by medical professionals by collecting data throughout the procedure. is the way of the future for the best possible patient care. In order to enhance patient care and physician workflow, this produces evidence-based clinical decisions.

3. Radiology

AI-assisted-surgery

Increases consistency and accuracy, including learning under realtime operative conditions. They can help doctors improve treatment and medicine outcomes. All changes and developments
help increase the likelihood that patients survive and follow procedures. This technology can also identify data variables before or after   the   process in defined concepts. Recently, AI   has made significant advances in the field of visualization,enabling better presentation and interpretat ion of complex-data.

4. Medical and administrative documents from hospitals

By storing records digitally, this technology enhances accuracy and efficiency in the healthcare industry. Improved patient data, customer automation, and medical records are just a few of the areas where AI in hospital management systems has led to unequaled data synchronization and improvement, gathering, storing, and producing. This device gives doctors and patients' family access to real-time information while tracking patients' vital indicators. As a result, it helps with , system verification, which essentially runs the hospital. It correctly forecasts the etiology of an individual's illness. AI gives hospital administration digital power, enhancing the capabilities of medical professionals such as surgeons and nurses.

5. Cardiology

AI in cardiology is also being used to lower the risk of unexpected cardiac mortality. Data related to cardiovascular disease recommendations are included. Thistechnology recognizes blockages in heart valves, to prevent heart disease. It is also tells about bleeding. The execution of AI will help in all aspects of patient treatment from the moment of admission to the hospital until the end of life.

V PROCESS CHART FOR MEDICAL ARTIFICIAL INTELLIGENCE

AI medical procedure chart delivers   exact   accurate and fast information even during complex surgeries. Automate, validate and develop monitoring processes in your work program. IT   improves treatment effectiveness and reduces the   threat of death. This technology has been utilized by researchers, scientists, and doctors to advance human   health. AI   technology   can digitize patient results with labs and update/notify patients as needed. Successful applications include

automated electrocardiography (ECG), respiration monitoring, cardiac monitoring, clinical laboratory analysis, medical imaging, electroencephalography, and anesthesia. Among many other things, this new technology can assess blood tests, blood glucose levels, and medical images [29]. Artificial Intelligence (AI) can extract information required to treat medical problems when patient data is given into algorithms. A process graph of AIs in health is displayed in Figure 1.
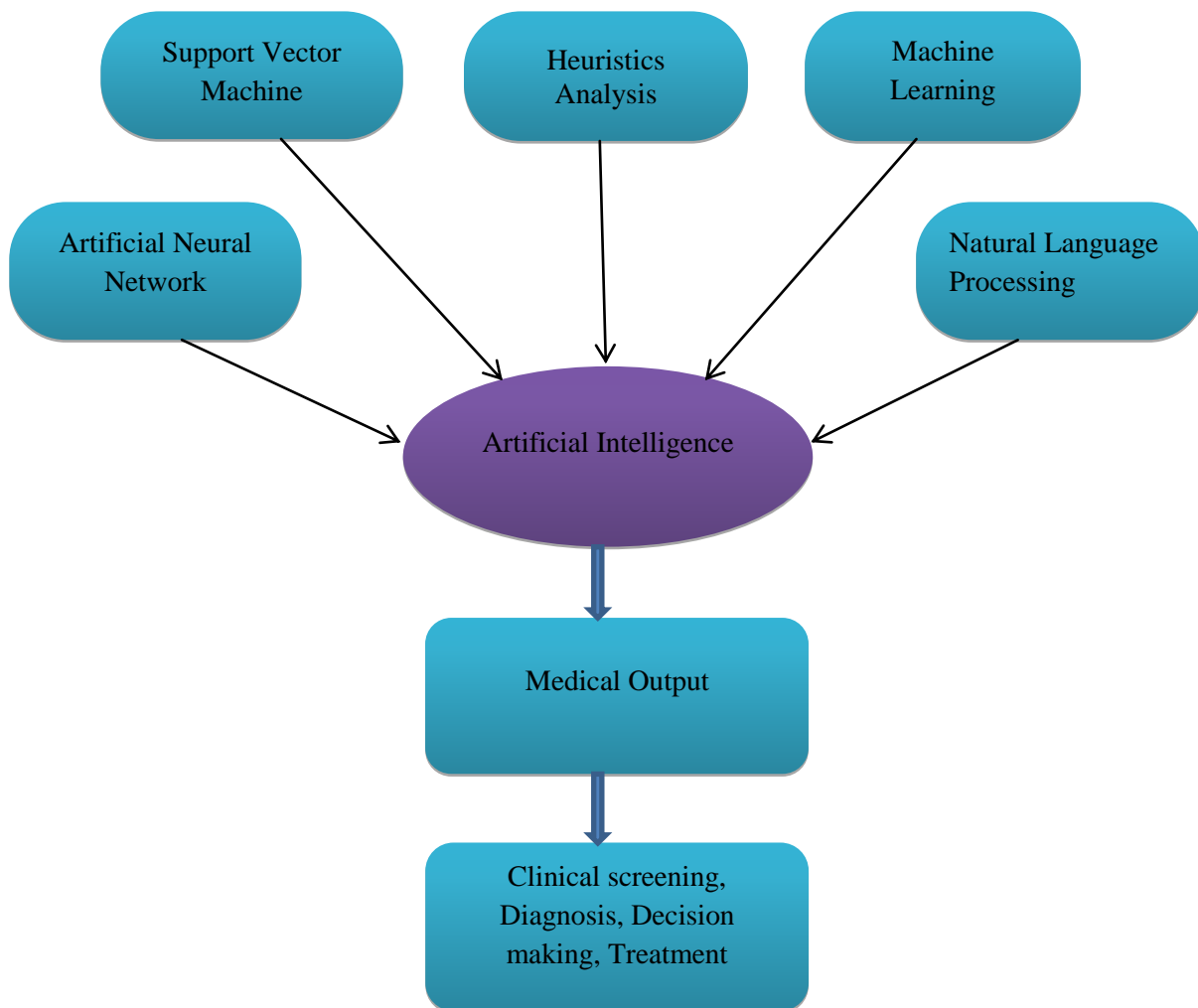

Figure 1:- Process Chart For Medical Artificial Intelligence

AI makes it possible for computers to read and write like humans, which helps with patient management and assessment across a range of platforms. Our mission is to help doctors,

surgeons, and other medical professionals learn new skills and achieve better results. The AI moves step-by-step with the surgeon, improving the diagnosis and achieving better results [30]. It is also being considered that new jobs can be created in healthcare. This will help measure doctors' prescriptions and deal with different complications. In everyday medical applications, AI can improve efficiency and less possibility. AI is very powerful in information retrieval usingneural networks, advanced ima ging and natural language processing [31].

VI USING ARTIFICIAL INTELLIGENCE IN MEDICINE

Our daily life needs newtechnologies that have a positive effect on people's lives. In healthcare, AI offers many opportunities for innovation. Doctors can assess patients without going to a clinic or hospital by using this technology. This technologycan be used to provide online services to patients.All patient questions about various health problems can be answered quickly. There are manyrequests for treatment planning to improve outcomes. Table-2 discusses the various uses of artificial intelligence in healthcare.

Table 2:- Applications of artificial intelligence in the field of medicine

S. No	Technologies	Depiction
1.	Medical data recording and storage	➢ Gather, compile, and evaluate health data to facilitate quicker decision-making and access. ➢ To make diagnosis and treatment easier, all patient data is kept in electronic form. ➢ Present a daily summary of the patient's progress. ➢ Information kept digitally. Along with aiding in research and development, they can assist in determining the etiology of sickness. ➢ Individual patient medical records are logged and cross-referenced with illness databases.
2.	Examine various tests	➢ Artificial intelligence can accurately assess a variety of tests, including MRIs, CT scans, X-rays, and ultrasounds. ➢ Ability to track the progression of diseases and identify important causes of illness. ➢ Rapidly sharing of patient information in an emergency facilitating the work of doctors and surgeons. ➢ Run , evaluate, confirm, predict and analyze data effectively using various scanning techniques.
3.	Patient monitoring	➢ It aids in keeping an eye on the patient's health and all prescribed treatments. ➢ Give appropriate monitoring to patients' needs, habits, and increased exercise. ➢ Assists in tracking and gathering data about the patient..
4.	Managing system	➢ AI aids in the management of the patient's condition.. ➢ This technology facilitates the early prediction of vascular diseases.

		➢ Recommend the appropriate drug, protein and diet for the patient.
5.	Appropriate Diagnosis and Care	➢ Artificial intelligence primarily employs computer approaches for clinical diagnosis and treatment. ➢ It can manage a range of clinical scenarios, including diagnosis, intricate therapy, and result prediction. ➢ This technology holds the capacity to present multiple astute methods and uses. ➢ All medical records and data are digitally maintained in the health sector, which aids in issue solving for medical personnel.
6.	Medications alert	➢ With the use of an application, this personal virtual assistant technology can notify patients about the necessary prescription. ➢ It can also offer patients with specific clinical needs suitable monitoring, education, and support. ➢ AI is a cutting-edge technology that promotes improved health.
7.	Composite and customized treatment	➢ Using digitally recorded data, artificial intelligence is used to treat each patient in a complicated and individualized way. ➢ It can accurately forecast ailments and swiftly comprehends human commands for effective therapy. ➢ It offers tailored care and predictive alerting for every patient. ➢ It offers tailored care and predictive alerting for every patient.
8.	Management and service for patients	➢ It enhances hospital patient care. ➢ Appropriate for constantly needed tasks including invoicing, scheduling, and other clinical applications. ➢ Analyze medical images quickly, including CT, X-ray, and MRI.
9.	Training	➢ Patient mortality is high in many diseases due to a lack of specialists and facilities. ➢ Many patients often pass away during the training of new doctors, increasing the danger of illness and death. ➢ AI technology is currently accessible in the medical profession to train new physicians with distinct needs.
10.	Making Decision	➢ Through information technology, artificial intelligence creates intellect similar to that of a person. ➢ Healthcare professionals facilitate this technology to improve access to data that aids in the design and customization of decision support systems. ➢ It appears to be the most effective tool for assisting medical decision-making given the information at hand. It fosters innovation that improves staff productivity and patient outcomes.

AI offers incredible capabilities to   perform   the tasks required in healthcare with minimal human intervention. AI appears to be the best for clinical judgment, analysis   and   training purposes.   Proper implementation   of this technology has been proven to enable fast and accurate decision making. For patient safety,

a critical requirement for patients, AI can lessen human mistake in medical procedures and surgery. The medical staff is capable of carrying out intricate testing and evaluating the results. This is employed to examine each patient's unique genetic composition. This technology gathers information on case studies, health state, and patient history. This can inform patients about the best diet, exercise, and medications for improved health.

AI uses advanced algorithms and specialized tools to assess complex and large amounts of medical data. It can be finished without the need for direct human assistance and produces precise results. Thanks to this technology, intelligent machines can now analyze and create information.   Analyzing the link between patient outcomes and treatment/prevention technologies is AI's main objective. Hospitals can lower expenses, improve patient happiness, and satisfy staffing demands with the use of AI solutions. This technology expedites data collection and enhances computer performance. In order to enhance outcomes, this technology assesses the effects of surgery or other treatments. Information on occurrences of diseases can be carried by it. AI is able to track and identify changes when monitoring patients. Every patient's data is unique at Medical. To determine whether the condition is improved, we employ several laboratory tests and examine the primary causes of the illness. In an emergency, patients can benefit from this information. AI taught novice physicians and medical students new skills and improved their surgical performance. AI is capable of making judgments to enhance patient outcomes with ease, thanks to the availability of patient and health data.

VII CONCLUSION

Artificial   intelligence   monitors   patients and provide appropriate treatment. Perform the evaluation of images/products without   the need for doctors, nurses or surgeons. AI-based technology provides decisions that can   help   predict unexpected events   and provides health information effectively over a digital application. This technology's practical significance lies in its ability to improve diagnosis and treatment accuracy. It can be applied to lower medical expenses and avoid illness. By using this technology, fewer hospital visits are required in response to patient inquiries. AI is a fantastic resource that can detect issues in places without medical professionals. In order to provide patients with better care, this technology will first   identify   the   biological   cause   of   the   illness.   Consider the   medical   images and perform the tasks correctly. AI will help identifycancers and their treatments by analyzing pa tient data. Its applications are used to diagnose heart disease. Accelerate clinical trials to produce real results. AI helps create   multi-feature analysis algorithms   from   patient data, providing   data   of   the   patient, life span and level of disease. In the coming years, applications will be used to improve patient care through digital hospital monitoring. When AI is used properly, healthcare will improve in the future.

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