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Artificial Intelligence In Public Health Care System

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Abstract: The This chapter is focused on predicting cardiovascular diseases, and machine learning and neural network models are instrumental in this process, reducing human effort and providing accurate results. However, the challenge lies in interpreting the predictions made by these complex algorithms. To address this, the authors introduced Explainable Artificial Intelligence (XAI) to understand the reasoning behind the cardiovascular disease predictions. The authors used an explainable artificial neural network (ANN) with a multi-level model, achieving an impressive accuracy of 87%, outperforming other models.

On a different note, the ongoing SARS-CoV-2 (n- Coronavirus) pandemic has resulted in the loss of millions of lives worldwide. This virus can lead to severe respiratory illnesses such as pneumonia and severe acute respiratory syndrome (SARS), sometimes resulting in death. The asymptomatic nature of this sickness has made life and work more challenging for people. In this research, the authors focused on forecasting the global situation and impacts of the COVID-19 pandemic, utilizing the FbProphet model to predict new cases and deaths for the month of August. The goal of this study is to provide valuable insights to scientists, researchers, and the general public to aid in predicting and analyzing the effects of the epidemic. The study concludes that the virus's second wave was approximately four times stronger than the first. Additionally, the trajectory analysis of COVID-19 instances (monthly and weekly) revealed that the number of cases increased more during weekdays, possibly due to weekend lockdown measures. The application of the FbProphet model and other algorithms facilitated accurate predictions and improved the understanding of the COVID-19 situation.

Keywords: Artificial intelligence, Digital transformation, Healthcare, Implementation, Healthcare leaders, Organizational change, Qualitative methods.

I. INTRODUCTION

Artificial intelligence (AI) is revolutionizing the field of medicine by leveraging recent advancements in digitized data acquisition, machine learning, and computing infrastructure. Previously, certain domains were considered exclusive to human experts, but AI applications are now expanding into these areas.

This review article highlights significant breakthroughs in AI technologies and their biomedical applications. It also ddresses the challenges that need to be overcome for further progress in medical AI systems.

Moreover, the economic, legal, and social implications of AI in healthcare are summarized.

AI can be effectively applied to various types of healthcare data, including both structured and unstructured data. Machine learning techniques, such as classical support vector machines and neural networks, are employed to "learn" patterns from vast volumes of structured data. Additionally, modern deep learning algorithms and natural language processing are used to extract insights from unstructured data.

The advantages of AI in healthcare are extensive. It can assist clinical practice by providing valuable insights and predictions based on data analysis. Furthermore, AI systems can continuously learn and self-correct, enhancing their capabilities over time. Incorporating AI into medical practice has proven beneficial in various disease areas, including cancer, neurology, and cardiology. AI tools have demonstrated significant potential in improving diagnosis, treatment planning, and patient outcomes in these fields.

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As promising as these developments are, challenges remain in fully realizing the potential of AI in healthcare. Issues such as data privacy, regulatory compliance, and ethical concerns need to be addressed to ensure responsible and secure implementation of AI technologies.

In conclusion, AI's integration into the medical field has brought about transformative advancements, yet careful consideration must be given to address challenges and foster responsible utilization. The ongoing progress of AI in healthcare holds the promise of enhancing patient care, medical research, and overall healthcare efficiency.

II. BENEFITS OF AI FOR HEALTHCARE

- **High Quality of patient's lives:** The term "high quality of patients' lives" refers to a state where individuals experience a standard of living that is characterized by overall well-being, satisfaction, and fulfilment of their physical, emotional, social, and psychological needs. In the context of healthcare, it specifically pertains to the level of well-being and satisfaction that patients experience while managing their medical conditions or receiving medical treatment.

High quality of patients' lives often implies the following key aspects:

- **High accuracy of treatment:** "High accuracy of treatment" refers to the precision and reliability with which a medical or therapeutic intervention can effectively address a specific condition or illness. It indicates that the treatment has a high probability of achieving the desired outcome and successfully managing the targeted health issue.

When a treatment is considered to have high accuracy, it means that it consistently delivers positive results and has minimal risks of adverse effects or complications. Medical professionals and researchers assess the accuracy of a treatment through rigorous testing, clinical trials, and evidence-based studies.

- **Reduced costs:** "Reduced costs" refers to the situation where the expenses associated with a particular activity, service, product, or process are decreased or minimized. It implies that the overall financial burden or expenditure related to that specific aspect is lower compared to previous levels or alternative approaches.

- **Higher employee engagement with patients:** "Higher employee engagement with patients" refers to the level of involvement, commitment, and connection that healthcare professionals, such as doctors, nurses, and other medical staff, demonstrate when interacting with their patients. It indicates that the employees actively invest themselves in understanding and meeting the needs of the patients, resulting in a more positive and effective patient experience.

- **Streamlined workflows:**

➢ **Benefits of having streamlined workflows include:**
➢ **Increased productivity**: Employees can complete tasks more efficiently, leading to higher output levels.
➢ **Reduced costs**: By eliminating wasteful steps and improving efficiency, organizations can lower operational expenses.
➢ **Faster turnaround times**: With smoother workflows, projects and tasks can be completed more quickly.
➢ **Enhanced customer satisfaction**: Streamlined workflows often result in quicker response times and improved service delivery, leading to happier customers.
➢ **Improved employee satisfaction**: Employees experience less frustration and more job satisfaction when they work in a well-organized and efficient environment.

Streamlining workflows is a continuous process, and organizations must be willing to adapt and make improvements regularly to maintain optimal efficiency in a dynamic business environment.

➢ **High employee efficiency:** "High employee efficiency" refers to the ability of employees to produce high-quality outputs and achieve their goals while utilizing the least amount of time, effort, and resources. It indicates that employees can complete tasks and responsibilities effectively and productively, maximizing their output and contributing to the overall success and performance of the organization.
➢ **Decreased labor demand:** "Decreased labor demand" refers to a situation where there is a reduced need or requirement for labour in a particular industry, sector, or organization. It means that fewer workers are needed to carry out the necessary tasks or operations due to various factors that influence the demand for labor.
➢ **Reduced workload:** "Reduced workload" refers to a situation where the amount of work or tasks assigned to an individual, team, or organization is decreased or lightened. It involves reducing the quantity or complexity of tasks and responsibilities to create a more manageable and balanced workload for the employees involved.
➢ **Enhanced protection against cybercrimes:** "Enhanced protection against cybercrimes" refers to the implementation of improved measures, strategies, and technologies to strengthen the defences and security of digital systems, networks, and data from cybercriminal activities. The goal is to safeguard sensitive information, prevent unauthorized access, and mitigate the risks posed by various cyber threats and attacks.

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Fig A – Benefits of AI for Healthcare

III. TYPES OF AI USED IN HEALTHCARE

1. **Machine Learning:** Machine Learning, a subset of Artificial Intelligence, utilizes algorithms to analyze past data, current information, and interactions to make predictions and recommendations for optimal patient treatments. It also plays a crucial role in enhancing healthcare procedures and administration. Data annotators are integral to ML, ensuring accurate marking of tumor cells in CT and MRI scans, aiding in precise diagnoses.

2. **Natural Language Processing (NLP):** Natural Language Processing involves the machine's ability to understand and interpret human language or text. In the medical field, NLP assists in analyzing patients' medical records, offering suggestions to improve treatment methods, and generating better patient outcomes. It is commonly used to understand and categorize medical records, enabling machines to respond appropriately based on user input.

3. **Physical Robots:** Physical Robots are increasingly utilized in the medical domain, with early versions designed for tasks like delivering hospital supplies. Modern robots are more advanced and capable of collaborating with humans after receiving specific training. These robots integrate AI capabilities into their operating systems, making them more intelligent and efficient. Surgical robots, introduced around 2000, have become a significant presence in operating theaters, and ongoing advancements continue to explore new possibilities in this AI-powered branch of healthcare.

4. **Robotic Process Automation (RPA):** Robotic Process Automation is an AI technology primarily designed for administrative tasks in healthcare. Unlike its name, RPA does not involve physical robots but refers to computer programs. One of the advantages of RPA is its cost-effectiveness compared to other AI technologies. In the healthcare industry, RPA finds application in tasks such as recording early authorizations, updating patients' medical records, and managing billing processes. Additionally, when combined with other technologies like image recognition, RPA can even extract relevant data, expanding its utility in healthcare settings.

IV. APPLICATIONS FOR AI IN HEALTHCARE

➢ **Robotic-Assisted surgery:** Robotic-Assisted Surgery refers to a surgical approach in which a robotic system, controlled by a trained surgeon, assists in performing surgical procedures. The system consists of robotic arms with surgical instruments attached and a computer console that allows the surgeon to control the movements of the robotic arms with high precision.

➢

During the surgery, the surgeon sits at the console and uses hand and foot controls to manipulate the robotic arms, which mimic their movements in real- time with enhanced dexterity and stability. The robotic system may also incorporate a camera that provides a 3D view of the surgical site, allowing the surgeon to have a clear and magnified view.

The robotic technology does not replace the surgeon; instead, it acts as a sophisticated tool that amplifies the surgeon's skills, providing greater precision and control during the procedure. Robotic- assisted surgery is often used in minimally

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invasive procedures, where smaller incisions are made, resulting in reduced scarring, less blood loss, and faster recovery times for patients.

Common examples of robotic-assisted surgery include procedures in various medical fields such as urology, gynecology, general surgery, cardiothoracic surgery, and more. Some well-known robotic surgical systems include the da Vinci Surgical System, which is widely used in different surgical specialties around the world.

➢ **Virtual nursing assistants:** Virtual nursing assistants refer to AI-powered or computer-based systems that provide support and assistance to patients and healthcare professionals in a virtual or digital environment. These assistants leverage artificial intelligence and natural language processing capabilities to interact with patients, answer their questions, provide health-related information, and assist with basic medical inquiries.
Virtual nursing assistants can take the form of chatbots, virtual agents, or voice-activated systems. They can be integrated into healthcare websites, mobile apps, or communication platforms to offer round-the- clock support and guidance to patients.

 Administrative workflow assistance: Administrative workflow assistance refers to the support provided by technology, particularly AI-powered systems, to streamline and optimize administrative tasks and processes in various industries, including healthcare. These systems are designed to automate repetitive and time-consuming administrative activities, allowing human workers to focus on more complex and critical aspects of their roles.

 Fraud detection: Fraud detection refers to the process of identifying and preventing fraudulent activities or attempts to deceive and manipulate systems or processes for personal gain or illicit purposes. In various industries, including finance, insurance, e-commerce, and healthcare, fraud detection systems are implemented to analyze data and detect patterns indicative of fraudulent behaviour.

In the context of financial transactions, fraud detection systems analyze transactional data to identify suspicious activities such as unauthorized access, credit card fraud, identity theft, and money laundering. These systems use algorithms and machine learning techniques to detect unusual patterns, deviations from normal behaviour, and indicators of potential fraudulent actions.
In healthcare, fraud detection systems are used to identify fraudulent medical billing, insurance claims, and prescription drug abuses. These systems analyze large volumes of healthcare data to spot irregularities, billing discrepancies, and potentially fraudulent claims.

 Dosage error deduction: The term "Dosage Error Deduction" seems to be a combination of two separate concepts: "Dosage Error" and "Error Deduction." Let's clarify both terms individually:

Dosage Error: A dosage error refers to a mistake or inaccuracy in the administration of medication, particularly regarding the prescribed dosage or amount given to a patient. Such errors can occur in various healthcare settings, including hospitals, clinics, and pharmacies. Dosage errors may result from miscalculations, misinterpretation of prescription instructions, confusion between similar-looking medications, or issues with medication delivery systems.

Error Deduction: Error deduction typically refers to a process in which errors are identified, analyzed, and deducted or subtracted from a total count or score. In various fields, including quality control, data analysis, and assessment, error deduction is used to evaluate the accuracy and reliability of processes or measurements by recognizing and removing errors.

As a combined term, "Dosage Error Deduction" could potentially refer to a system or process that involves identifying and deducting dosage errors from medication administration records or calculations. Such a system might aim to improve medication safety by analyzing medication-related errors, determining their impact on patient outcomes, and developing strategies to reduce or eliminate these errors in the future.

However, without additional context or specific usage in the medical field, the exact meaning of "Dosage Error Deduction" remains open to interpretation. It is crucial to consider the context and intended application when interpreting combined terms like this one.

 Connected machines: "Connected machines" refers to a network of devices or machines that are linked together and capable of communicating and exchanging data with each other through the internet or other communication channels. These machines are equipped with sensors, processors, and connectivity features that enable them to share

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information, receive commands, and collaborate in performing tasks efficiently.

The concept of connected machines is a fundamental aspect of the Internet of Things (IoT), where various devices and objects are interconnected to collect and share data, leading to intelligent and automated processes. Connected machines can be found in diverse industries, including manufacturing, healthcare, transportation, agriculture, and smart homes.

Clinical trail participant identifier: The term "Clinical trial participant identifier" refers to a unique code or identifier assigned to individuals who participate in a clinical trial. Clinical trials are research studies conducted to evaluate the safety, efficacy, and effectiveness of medical treatments, interventions, or drugs in human subjects. Each participant in a clinical trial is assigned a specific identifier to protect their identity and maintain confidentiality throughout the trial.

The participant identifier is used to distinguish individual participants in the study's data and records without disclosing their personal information, such as their name, address, or contact details. This helps ensure the privacy and anonymity of the participants while allowing researchers and healthcare professionals to track and analyze data related to each participant's progress, treatment, and outcomes.

Using participant identifiers is an essential ethical consideration in clinical research to protect the rights and privacy of the individuals involved. It also helps maintain the integrity and validity of the study's findings while adhering to data protection regulations and guidelines.

Clinical trial participant identifiers play a crucial role in maintaining the confidentiality and security of clinical trial data, thereby promoting the ethical conduct of research and ensuring the trust and cooperation of study participants.

Preliminary diagnosis: A preliminary diagnosis refers to an initial or early evaluation of a patient's medical condition based on presenting symptoms, medical history, physical examination, and initial tests. It is the first step in the diagnostic process when a healthcare provider makes an initial assessment or hypothesis regarding the potential cause of the patient's symptoms or health issues.

The term "preliminary" indicates that the diagnosis is not final or definitive at this stage. Instead, it serves as a starting point for further investigation and more comprehensive testing to confirm or refine the diagnosis. The purpose of a preliminary diagnosis is to guide further medical evaluation and treatment planning.

Automated image diagnosis: Automated image diagnosis refers to the use of artificial intelligence (AI) and computer algorithms to analyze and interpret medical images automatically, without the need for human intervention. Medical imaging plays a crucial role in diagnosing and monitoring various medical conditions, and the use of AI in this field has shown significant potential to enhance accuracy, efficiency, and patient outcomes.

In the context of automated image diagnosis, the process typically involves the following steps:

- **Image Acquisition**: Medical images, such as X-rays, CT scans, MRI scans, ultrasound images, and histopathology slides, are acquired from patients using various imaging modalities.
- **Image Preprocessing**: Before analysis, the acquired images may undergo preprocessing steps to enhance image quality, remove noise, and standardize image formats.
- **AI Analysis**: The pre-processed images are then fed into AI algorithms, particularly deep learning models, which have been trained on vast datasets of labelled medical images. These algorithms can automatically detect patterns, features, and abnormalities in the images.
- **Automated Diagnosis:** Based on the AI analysis, the system provides an automated diagnosis or risk assessment. It can detect and identify various medical conditions, such as tumors, fractures, infections, and abnormalities in organs or tissues.Integration with Clinical Workflow:

The automated image diagnosis results can be integrated into the clinical workflow, allowing healthcare professionals to review the findings and make informed decisions about patient care.

- **Cyber security:** Cybersecurity measures include the implementation of firewalls, encryption, multi-factor authentication, intrusion detection systems, regular software updates, and employee training on cybersecurity best practices. Proactive monitoring and incident response plans are also essential components of cybersecurity strategies to detect and mitigate potential threats promptly.

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By prioritizing cybersecurity, individuals and organizations aim to protect their sensitive information, maintain operational continuity, safeguard their reputation, and ensure the safety and privacy of digital assets. Given the continuously evolving nature of cyber threats, cybersecurity remains an ongoing and dynamic challenge that requires constant vigilance and adaptation to new risks and technologies.

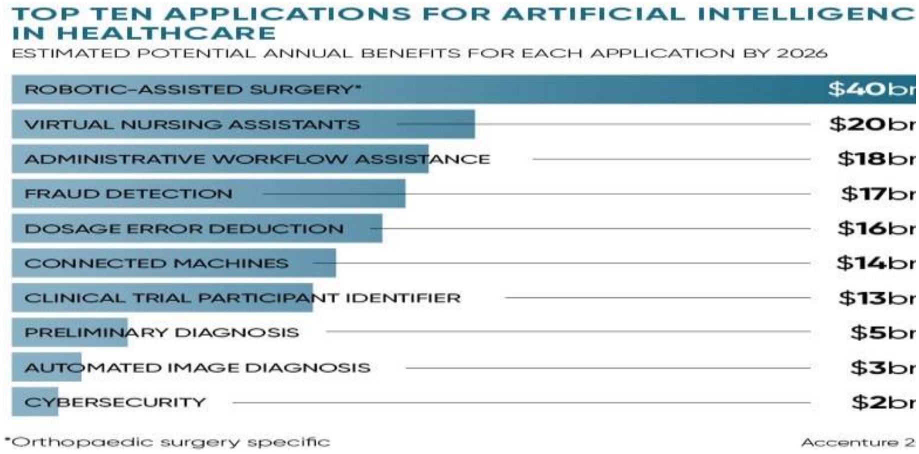


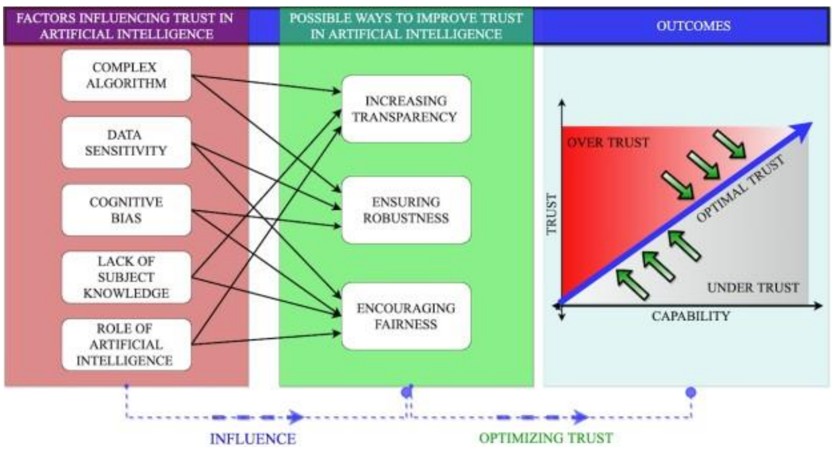
Fig B – Applications of AI for Healthcare

V. LITERATURE SURVEY

The aim of this review is to keep track of new scientific accomplishments, to understand the availability of technologies, to appreciate the tremendous potential of AI in biomedicine, and to provide researchers in related fields with inspiration. It can be asserted that, just like AI itself, the application of AI in biomedicine is still in its early stage. New progress and breakthroughs will continue to push the frontier and widen the scope of AI application, and fast developments are envisioned in the near future.

Manual tasks has been replaced by technological advancements in machines that have progressed human development.Artificial Intelligence is a main importat key technology that has enabled humans to replace manual work with mental capacities and intellectual levels in variety of fields.

➢ **Trust in Human-AI Collaboration:**



As healthcare providers rely on AI,A proper trust relationship ,also referred to as calibrated trust becomes a requirement for effective decision making Currently a lack of trust in AI systems is a significant drawback in the adoption of this technology in healthcare. Trust in AI can be influenced by several human factors such as user education, experiences, perception towards automation and the properties including controllability, transparency and complexity of the model among these factors reliability which refers to whether the AI technology can perform a task predictably and consistently. The reliability is based on the conditioned user and input data this helps to achieve the user's trust on acceptance of AI systems.

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- **Early detection and warning:** The AI is being used heavily in diagnostics space to early detect the development or progression of diseases .AI employs deep learning abilities and analysis critical data sets to map the path of disease inception and progression of diseases like cancer therefore to achieve targeted diagnosis and also predict the progression of the disease.

- **Treatment design:** AI is resulting I advancements in healthcare treatments such as upgrading the organisation of treatment tactics, analyzing data to provide superior treatment strategy, and monitoring treatments. AI has rapid and more accurately recognize signs and symptoms of disease in medical images , such as MRI,CT Scans , ultrasound and x-rays, and therefore permits faster diagnostics reducing the time of patients wait for a diagnosis from weeks to mere hours and expeditiously the introduction of treatment choices.

Now the doctors can search the information a medical assistant used to gather patient information record diagnosis mandate tests and prescriptions and arrange billing information. Furthermore, the aptitude to explore public databases with information from thousands of doctors and patient cases can assist physicians manage better personalized treatments or discover similar cases .

- **Rule-based expert system:**

Expert systems based on collections of 'if-then' rules were the dominant technology for AI in the 1980s and were widely used commercially in that and later periods. In healthcare, they were widely employed for 'clinical decision support' purposes over the last couple of decades[5] and are still in wide use today. Many electronic health record (EHR) providers furnish a set of rules with their systems today.

Expert systems require human experts and knowledge engineers to construct a series of rules in a particular knowledge domain. They work well up to a point and are easy to understand. However, when the number of rules is large and the rules begin to conflict with each other, they tend to break down. Moreover, if the knowledge domain changes, changing the rules can be difficult and time-consuming. They are slowly being replaced in healthcare by more approaches based on data and machine learning algorithms.

- **The Future of AI in Healthcare System:** We believe that AI has an important role to play in the healthcare offerings of the future. In the form of machine learning, it is the primary capability behind the development of precision medicine, widely agreed to be a sorely needed advance in care. Although early efforts at providing diagnosis and treatment recommendations have proven challenging, we expect that AI will ultimately master that domain as well. Given the rapid advances in AI for imaging analysis, it seems likely that most radiology and pathology images will be examined at some point by a machine. Speech and text recognition are already employed for tasks like patient communication and capture of clinical notes, and their usage will increase.

The greatest challenge to AI in these healthcare domains is not whether the technologies will be capable enough to be useful, but rather ensuring their adoption in daily clinical practice. For widespread adoption to take place, AI systems must be approved by regulators, integrated with EHR systems, standardised to a sufficient degree that similar products work in a similar fashion, taught to clinicians, paid for by public or private payer organisations and updated over time in the field.

These challenges will ultimately be overcome, but they will take much longer to do so than it will take for the technologies themselves to mature. As a result, we expect to see limited use of AI in clinical practice within 5 years and more extensive use within 10.

It also seems increasingly clear that AI systems will not replace human clinicians on a large scale, but rather will augment their efforts to care for patients. Over time, human clinicians may move toward tasks and job designs that draw on uniquely human skills like empathy, persuasion and big-picture integration. Perhaps the only healthcare providers who will lose their jobs over time may be those who refuse to work alongside artificial intelligence.

In the artificial intelligence (AI) literature, the top ten disease forms are considered for related work Artificial intelligence is overgrowing, and the last generation relied on the curation of medical experts. Recently, AI research leveraged machine learning approaches that have been used in contemporary to find patterns from data that can account for complicated interactions. AI applications have been implemented in healthcare, helping clinical researchers understand the situation of the patient better

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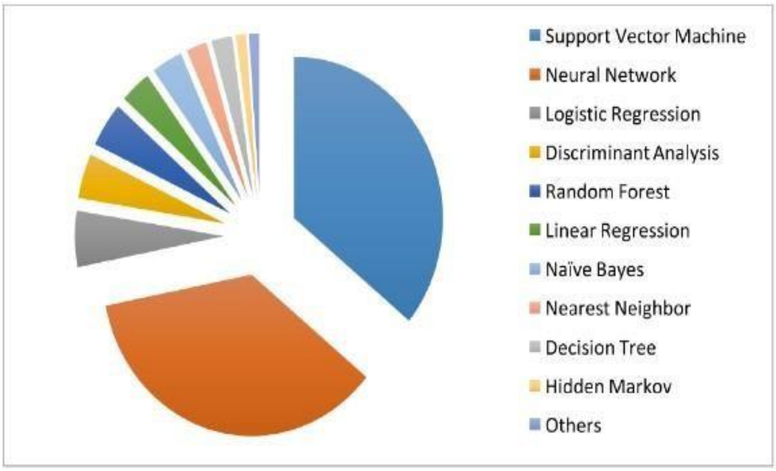
VI. CHALLENGES IN AI DEVELOPMENT

Artificial intelligence in healthcare has several obstacles. To train machine learning algorithms or neural networks, a vast quantity of data is required. However, we usually do not get clean data or unbiased data. Data from different healthcare environments can contain noise, bias, imbalanced medical data, incomplete information, etc. The model trained on one hospital data may not be generalizable to another. As a result, researchers must ensure that the data they collect represents the intended patient group. The few challenges are, data is growing exponentially, providing perfect information at the point of decision making, which is most important.

Accountability of the System is also a massive challenge because the patient's life is at stake if someone dies due to wrong insight given by the AI. Who will be responsible for his death? The medical staff or the AI? This is not easy to answer because medical staff applied the system provided for the better service for patients to take care of them. The doctor-patient connection is based on trust. Medical consequences arise when a patient has complete faith in a doctor and feels that their illness will be healed. When someone is unfamiliar with AI, how will the system earn this trust? Trust between a doctor and a patient is essential since it aids in the patient's treatment.

➢ **Machine Learning:** In machine learning, algorithms are designed to evaluate data and extract information from it. The patient's "characteristics" and, in rare cases, the medical results of interest are fed into the machine learning algorithm. Unsupervised learning and supervised learning are the two types of machine learning algorithms. Although unsupervised learning is well-known for feature extraction, supervised learning is more suited for predictive modelling since it establishes the link between patient data (as input) and the desired outcome. Partially supervised learning is a mix of unsupervised and supervised learning and has recently been proposed as a solution to situations where the outcomes of specific subjects are unknown Unsupervised learning produces more clinically beneficial outcomes;



hence, supervised learning is used more often in AI implementations in healthcare. The prevalence of various supervised learning techniques in medical applications, the most common of which are SVM and neural networks.

 Practical Challenges: If AI and doctor disagree, who will be perceived as 'right'? The degree of relative trust held in technology and in healthcare professionals may differ between individuals and generations — Autonomous health advice and the interface with wearable devices may promote patients' health ownership and supported self-care but could result in increased health anxiety or health fatigue for some members of the public — Reduced face-to-face contact could reduce opportunities for clinicians to offer health promotion interventions – this must be factored into systems.

 Ethical issues: Can a doctor be expected to act on the decisions made by a 'black box' AI algorithm? In deep neural networks, the reasons and processes underlying the decisions made by AI may be difficult to establish, even by skilled developers. Do doctors need to explain that to patients? — Will clinicians bear the psychological stress if an AI decision causes patient harm? They could feel great responsibility for their role in the process without the power to modify or understand the contribution of the AI to the error — Could the ready availability of a tool superficially appearing to 'replace' a doctor's advice diminish the value of clinicians in the eyes of the public and therefore reduce trust and degrade the quality of the doctor-patient relationship?

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- **Public acceptance and trust:** By any measure, the concept of AI – how it works and what it can and cannot do, is complex. But, in the same way that few people need to know how a flight booking app works, so it is safe to assume that patients will not need to know the details of how AI works. They simply need to know that it does work and can be trusted to work reliably for them. Gaining that trust will be one of the most essential steps to the development of AI in healthcare. For this reason, developers should continue to focus on the utility of AI to the individual rather than seek explicit approval from the outset. Health apps, chatbots that focus on young people and their mental health or home monitoring systems that learn our routines are good examples of this in that they are already proving their worth and their use can be easily monitored. As AI embeds itself in our everyday lives through avenues other than health, acceptance and trust in the concept that a machine is making decisions that are in our best interests will increase. That said, the 'social licence' that AI enjoys so far is a precious commodity. Historic controversy over genetically modified food perhaps demonstrates the consequences when the trust between science and the wider public breaks down. It should also serve as a warning to AI developers that they should not take public acceptance and trust for granted.

- **AI in the critically ill and on intensive care** Artificial intelligence has the potential for good in the critically ill, whether on the ward or particularly on the ICU or HDU. It has great potential to help ensure clinicians are aware of or able to prioritise the sickest or the deteriorating patient and make sure they receive optimal and timely treatment. However, there are difficult problems to overcome from sensor error rejection or even calibration error. The system must be able to sense check a differential diagnosis. There are also issues between continuously recorded and intermittently recorded data. There will be learning weaknesses. The data set or programming may make assumptions – for example the system might assume the most common cause of hypotension on ICU is septic shock because of the associations it has learnt, without realising or having the data necessary to detect cardiogenic shock or considering that a fall in cardiac output could be due to another cause such as a pneumothorax. This is sometimes an issue with the original dataset used for learning and the breadth of what the AI was asked to learn about. Artificial intelligence in the critically ill then promises great potential in terms of optimising treatment and providing or stimulating timely interventions. It poses difficulties in a fast changing environment where decisions are needed quickly with rapid implications for care with potential issues with artefact rejection from monitoring, and continuous versus intermittent data sampling. AI may struggle with wider areas of care, may suffer from training datasets providing associations which fall down when the situation lies outside the main areas covered by its learning. Clinical staff may lose faith in AI (sometimes inappropriately) or struggle to cope with what to do when their assessment is not in line with the AI, especially if they are inexperienced. The use of AI in prognostication poses great ethical issues for the influence for AI on human made assessments. That said, none of these reasons are sufficient on their own not to welcome AI – but as with so much in medicine, we need to be cautious and understand the potential shortcomings from the start.

- **Medical Research:** Artificial intelligence is ideally suited to analysing the large and complex data sets used in medical research. Pharmaceutical companies are looking to AI to streamline the development of new drugs, researchers can use predictive analytics to identify suitable candidates for clinical trials and scientists can create more accurate models of biological processes. But there are challenges as well – for example, what dataset do you test new hypotheses against? And, as data linkage is held by many as the key to unlocking our knowledge of disease, would an algorithm be capable of coming to common sense conclusions? There are plenty of questions around how useful machine learning will be in practice. Does this approach lead to the ecological fallacy, where aggregate data provides false answers? Will it overwhelmingly generate multiple instances of correlation without knowledge of causation, wasting researchers' time and resources and misleading the public? In any case, clinical input will be needed for the foreseeable future, to ensure the validity and relevance of research.

- **The regulatory environment** At the heart of the development of AI in healthcare are questions around the regulatory environment. As with all regulation, a balance must be struck between protecting the public, clinicians and the service and promoting growth and innovation. These are not mutually exclusive concepts and there are past examples of good practice – for example, with the development of the appropriate ethical and legal considerations which underpinned the development of In-Vitro Fertilisation. Indeed many point out that it was thanks to early focus on regulation that the science was allowed to flourish. Lessons can be drawn for the development of AI. The challenges to regulators presented by AI are diverse – the impact it is likely to have on medical systems and devices, clinical practice, relationships between clinicians and patients (and between providers of health-related applications marketed direct to patients) mean that regulators will need to work in a complementary way to develop relevant and appropriate regulatory frameworks for AI. While many AI products will meet the definition of a medical device and would therefore fall under the regulatory jurisdiction of the MHRA, there are also implications for: — General Medical Council –
clinicians will need clear guidelines on the appropriate

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use of AI — Medical defence organisations – the nature of negligence claims may change as patients adapt to the availability of AI-generated decisions and recommendations — Care Quality Commission – will need to consider how AI systems are embedded and used in healthcare organisations and their impact on quality of care — NHS Digital – will have a role in clinical risk ma nagement in the development of health IT systems. The advent of AI is a potential game-changer for healthcare and regulatory processes will need to adapt. For example, the current approach to safety relies greatly on a structured approach to foreseeing hazards which can be avoided or mitigated.

In the 'black box' of machine learning, it will not necessarily be possible to foresee potential hazards, so new ways of conducting clinical safety processes may be needed for AI. Similarly, the regulatory framework for medical devices will need to adapt to the world of AI.

The cost of deploying AI in healthcare can vary dramatically depending on several variables. Among the important cost factors are:

Infrastructure**:** Setting up the required hardware and software infrastructure to support AI systems may be costly. This entails purchasing high-performance computer assets, storage platforms, network infrastructure, and, if necessary, specialist AI hardware.

Data Collection: Data collection and management are essential for AI algorithms to learn and generate precise predictions. Large healthcare datasets can be expensive to acquire, clean, and manage, especially if several sources of data need to be combined or
digitized.

Development and Customization: It can be expensive to create AI models and algorithms specifically suited to use in healthcare applications. It employs knowledgeable data scientists, AI specialists, and software developers who can develop and implement AI solutions.

Training and Validation: Training AI models frequently requires a significant investment of time and computer power. Training costs can change depending on the algorithms' complexity and the dataset's amount. Additional resources could be needed to validate and test the AI models to verify their correctness and dependability.

Integration with Current Systems: To ensure compatibility, AI systems may need to be modified or updated to be integrated with current healthcare infrastructure, such as electronic health record (EHR) systems. The costs of integration may increase overall expenditures.
Maintenance and Updates: To guarantee their optimum performance and security, AI systems need constant maintenance, monitoring, and upgrades. This raises the overall expenses and includes routine software updates, bug patches, and handling any potential compatibility problems.
Regulation Adherence: When integrating AI, healthcare systems must adhere to tight regulations and privacy laws. It may be more expensive to comply with laws like HIPAA or GDPR if security precautions, audits, and legal advice are required.

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VII. CONCLUSION

The AI is a best key technology to implement in healthcare system. Because has you seen the above information and it is very essential to implement the AI in the healthcare system as whole world face the pandemic due to covid at that time all the covid patients were in hospitals and it can spread through air in order to protect non-covid patients so Government has took several actions like making separate warehouses for patients and also like this several actions took and this covid is effected to noncovid patients also who are taking treatment for their disease in hospital. So in order to prevent this issue we have to bring AI in healthcare system by this non covid patients can take treatments or checkups through online by using the AI technology. Especially in government hospitals the AI technology and well equipped devices, machines has to be implemented in hospitals.

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