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Artificial Intelligence in Healthcare

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ABSTRACT:

Goal of this systematic search is to offer an description of artificial intelligence's role in healthcare. Artificial intelligence has played a crucial influence in healthcare. A paradigm change in healthcare has take place due to increasing availability of healthcare data and rapid progress of analytics technology. Machine learning technologies such as assist vector machine, deep learning neural networks, and natural language processing manage structured data. Unstructured data is processed using natural language processing.

INTRODUCTION:

Artificial Intelligence (AI) is reshaping healthcare industry, giving innovative solutions to improve patient care and streamline processes. By leveraging advanced algorithms and data analysis, AI has potential to revolutionize medical diagnosis, treatment planning, and operational efficiency. Here, we explore applications of AI in healthcare, its impact on improving patient outcomes, and challenges and opportunities it presents for healthcare professionals and organizations.

LITERATURE REVIEW:

Artificial intelligence has emerged as a promising tool in healthcare, revolutionizing various aspects of industry. Here's a simple literature review highlighting its key applications and impacts:

Diagnostic Assistance: AI-based systems aid healthcare professionals in diagnosing diseases more accurately and efficiently. Studies by Esteva et al. (2017) and Gulshan et al. (2016) demonstrate effectiveness of deep learning algorithms in interpreting medical images such as X-rays and MRI scans, often achieving performance comparable to or even surpassing human experts.

Predictive Analytics: AI algorithms analyze vast amounts of patient data to predict disease progression, identify at-risk individuals, and recommend personalized treatment plans. For instance, Obermeyer et al. (2016) show how machine learning models can predict patient deterioration in clinics, allowing for timely interventions and improved outcomes.

Drug Discovery and Development: AI accelerates drug discovery process by simulating molecular interactions, identifying potential drug candidates, and optimizing clinical trials. Systematic search by Aliper et al. (2016) and Zhavoronkov et al. (2019) demonstrates utility of AI in predicting drug-target interactions and repurposing existing drugs for new indications.

Healthcare Operations and Management: AI streamlines administrative tasks, resource allocation, and workflow optimization in healthcare facilities. Studies by Rajkomar et al. (2018) and Sathappan et al. (2019) illustrate how AI-driven solutions improve patient scheduling, inventory management, and operational efficiency, leading to cost savings and better patient experiences.

Patient Monitoring and Remote Care: AI-enabled devices and wearables monitor patients' health in real-time, enabling remote monitoring and early detection of health issues.
Systematic search by Topol (2019) and Shaban-Nejad et al. (2020) highlights potential of AI in managing chronic conditions, decresing clinic readmissions, and empowering patients to actively participate in ir healthcare.

Ethical and Regulatory Considerations: Despite its immense potential, widespread adoption of AI in healthcare raises ethical, legal, and regulatory challenges. Scholars such as Char et al. (2018) and Price et al. (2019) emphasize importance of ensuring patient privacy, transparency, and accountability in AI-driven healthcare systems to mitigate risks and foster trust among stakeholders.

Overall, literature underscores transformative impact of AI in healthcare, offering opportunities to enhance diagnosis, treatment, and patient care while necessitating careful consideration of ethical and regulatory frameworks to ensure responsible implementation.

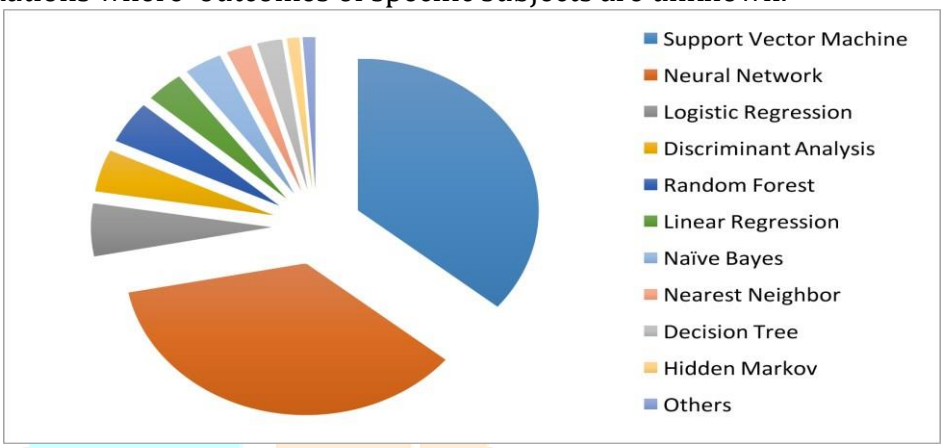
CHALLENGES IN AI DEVELOPMENT:

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. model trained on one clinic data may not be generalizable to anor. As a result, systematic searchers must ensure that data y collect represents intended patient group. few challenges are, data is growing exponentially, providing perfect information at point of decision making, which is most important. Accountability of System is also a massive challenge because patient's life is at stake if someone dies due to wrong insight given by AI. Who will be responsible for his death? medical staff or AI? This is not easy to answer because medical staff applied system provided for better service for patients to take care of m.

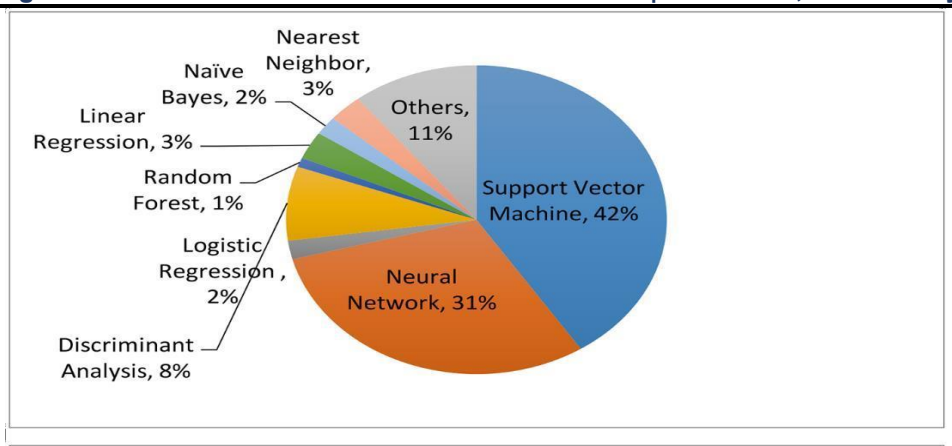
Doctor-patient connection is based on trust. Medical consequences arise when a patient has complete faith in a doctor and feels that ir illness will be healed. When someone is unfamiliar with AI, how will system earn this trust? Trust between a doctor and a patient is essential since it aids in patient's treatment.

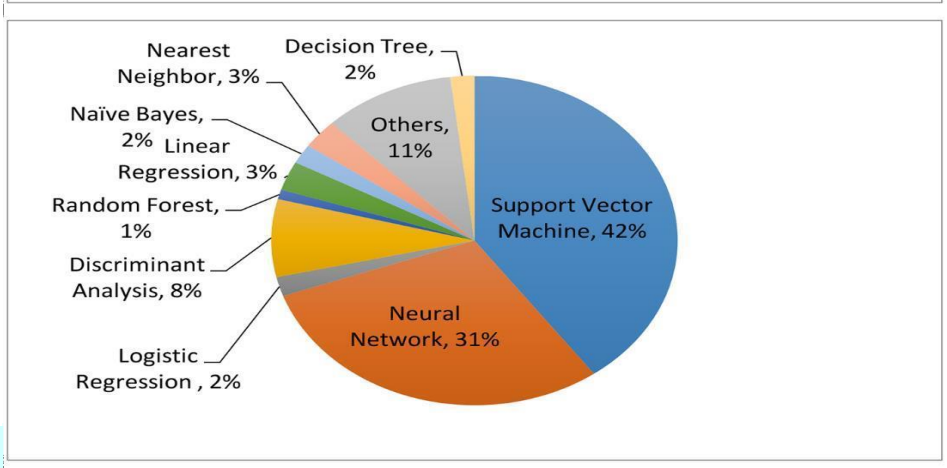
MACHINELEARNING:

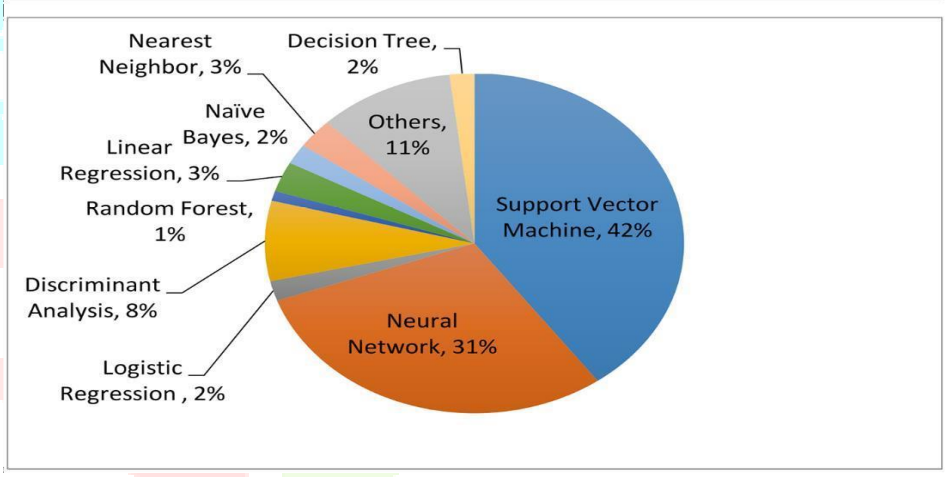
In machine learning, algorithms are designed to evaluate data and extract information from it. patient's "characteristics" and, in rare cases, medical results of interest are fed into machine learning algorithm. Unsupervised learning and supervised learning are two types of machine learning algorithms.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



- Machine learning algorithm used in healthcare





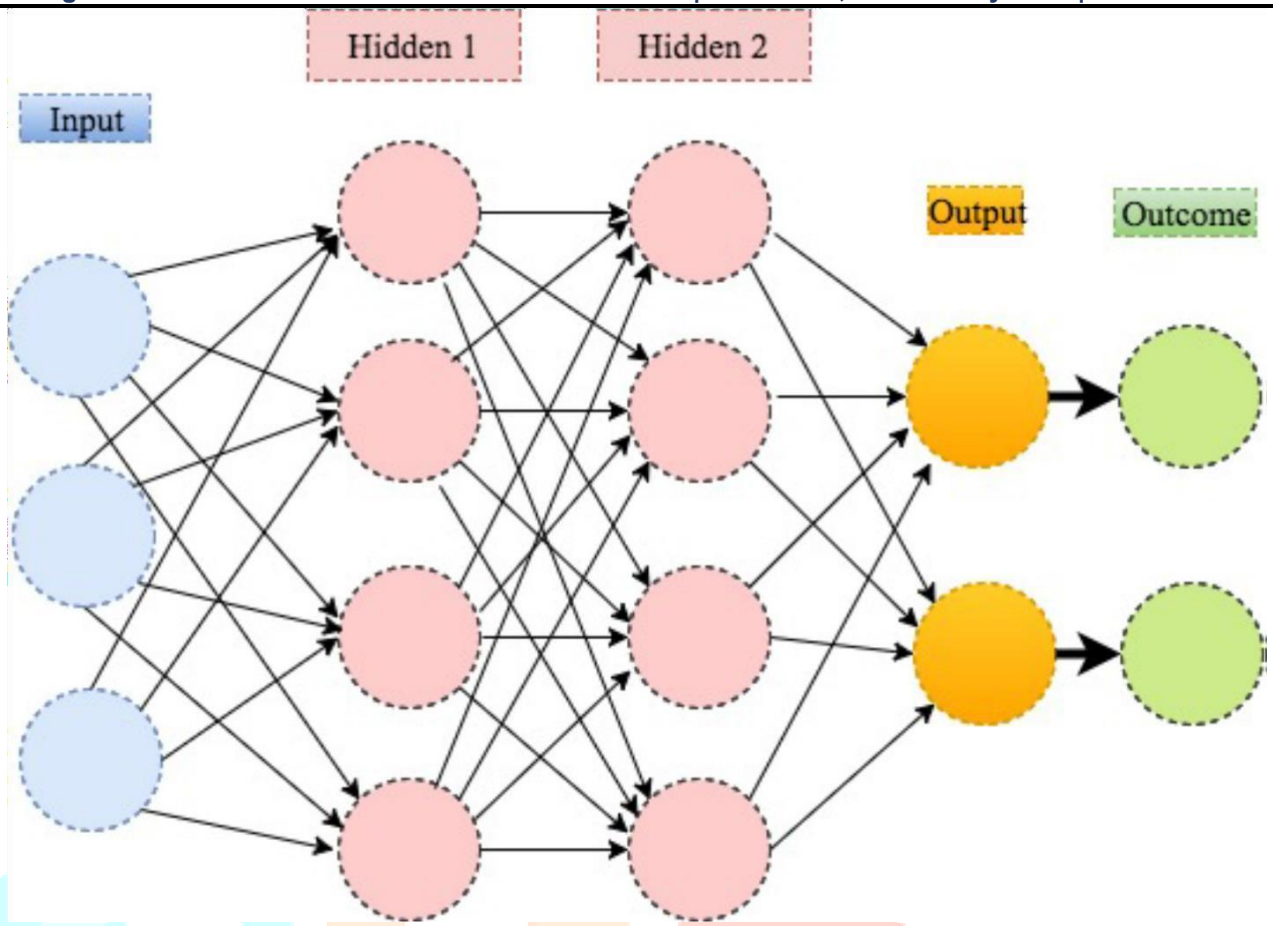


Unsupervised learning produces more clinically beneficial outcomes; hence, supervised learning is used more often in AI implementations in healthcare.

prevalence of various supervised learning techniques in medical applications, most common of which are SVM and neural networks.

NEURALNETWORKS:

Artificial Intelligence is built based on artificial neural networks (AI). Anns are capable of solving issues that would be impossible for a human or mamatical standard to solve. Anns mimic human brain, simulating how humans analyze and process data. Without an explicit curriculum, an ANN will learn on its own. input, hidden, and output layers are three layers in an artificial neural network. input layer neurons in first layer contain input data and transfer it to second layer for furr processing. After moving through second layer's hidden layer, active neurons use activation feature to output result. If issue is more complex, hidden layer may have more layers.



➢ architecture of Artificial Neural Network

Clinical data in textual language, including physical examinations, reports from clinical laboratories, operation papersare unstructured, including discharge summaries and indecipherable to a computer programmer. In this context, NLP tries to extract meaningful information from written texts to help rapeutic decisionmaking. two primary components of an NLP pipeline are text processing and categorization. NLP pipeline is intended to assist clinicians in determining treatment decisions plan notification and side effect tracking.

APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN STROKE:

Artificial intelligence (AI) gives significant potential in stroke care, aiding in early detection, diagnosis, and treatment decisions. AI algorithms analyze medical imaging such as CT scans to swiftly identify stroke indicators, enabling prompt intervention and decresing risk of disability. Additionally, AI-powered predictive analytics assist in assessing stroke risk factors, optimizing preventive strategies, and tailoring personalized treatment plans for stroke patients.

EARLY DETECTION AND DIAGNOSIS:

Only a few patients could receive prompt care due to a lack of recognition of early stroke symptoms. A stage of human activity identification and a stage of stroke onset detection were included in detection process. When patient's movement deviates dramatically from usual pattern, a stroke warning is triggered, and patient is assessed for care as soon as possible.

PREDICTION OF OUTCOME AND ANALYSIS OF PROGNOSIS:

Several factors influence stroke diagnosis and clinical mortality. In terms of enhancing prediction accuracy, ML techniques outperform conventional methods. authors used an ANN and SVM to evaluate data and improveprediction accuracy. Asadi et al. Looked at 107 patients who underwent intra-arterial treatment for a severe anterior or posterior circulation stroke. According to Birkner et al., existing methods for predicting 30-day death rate were surpassed by applying an improved algorithm.

CONCLUSION:

Artificial Intelligence holds immense promise for revolutionizing healthcare, enhancing diagnosis, treatment, and patient care. With applications like medical imaging analysis, predictive analytics, and drug discovery, AI has potential to improve efficiency, accuracy, and accessibility in healthcare services. However, ethical considerations, data privacy, and regulatory frameworks are crucial for ensuring responsible deployment and maximizing benefits of AI in healthcare while minimizing potential risks.

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