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Review on Artificial Intelligence in Healthcare

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Abstract. The goal of this research is to offer an overview of artificial intelligence's role in healthcare. In this field, artificial intelligence has played a crucial influence. A paradigm change in healthcare has occurred due to the increasing availability of healthcare data and the rapid progress of analytics technology. Machine learning technologies such as the support vector machine, deep learning neural networks, and natural language processing manage structured data. Unstructured data is processed using natural language processing.

Introduction

Artificial Intelligence has played a significant role in healthcare recently. AI techniques have been very effective in healthcare. There is also an active debate about it that "Will AI replace Doctors in the future eventually." However, it does not look possible shortly. It can help with settling on better clinical choices in specific regions. The growing accessibility of

medical care information and the rapid development of large data investigation instruments have aided ongoing suitable Artificial Intelligence applications in medical services.Practical AI algorithms may find clinically useful knowledge in massive amounts of data when driven by relevant clinical queries, assisting clinical decision-making. Evolving demographics, logistical needs, faculty deficiencies, and growing morbidity, just as improvements in data innovation interest and standards, put doctors and wellbeing administrations under unprecedented pressure.

The potential uses of artificial intelligence in medical care and clinical research are becoming more apparent. AI-enabled health solutions have been demonstrated in the study to be valuable and promising. As of now, governments and innovation organizations are altogether putting resources into utilizing AI for clinical benefits. The US Food and Drug Administration means to grow the accessibility of AI-helped clinical gadgets. The four regions where AI-empowered medical services conveyance will probably impact are Medical services organization, clinical decision assistance, patient follow-up, and medical care intercessions.

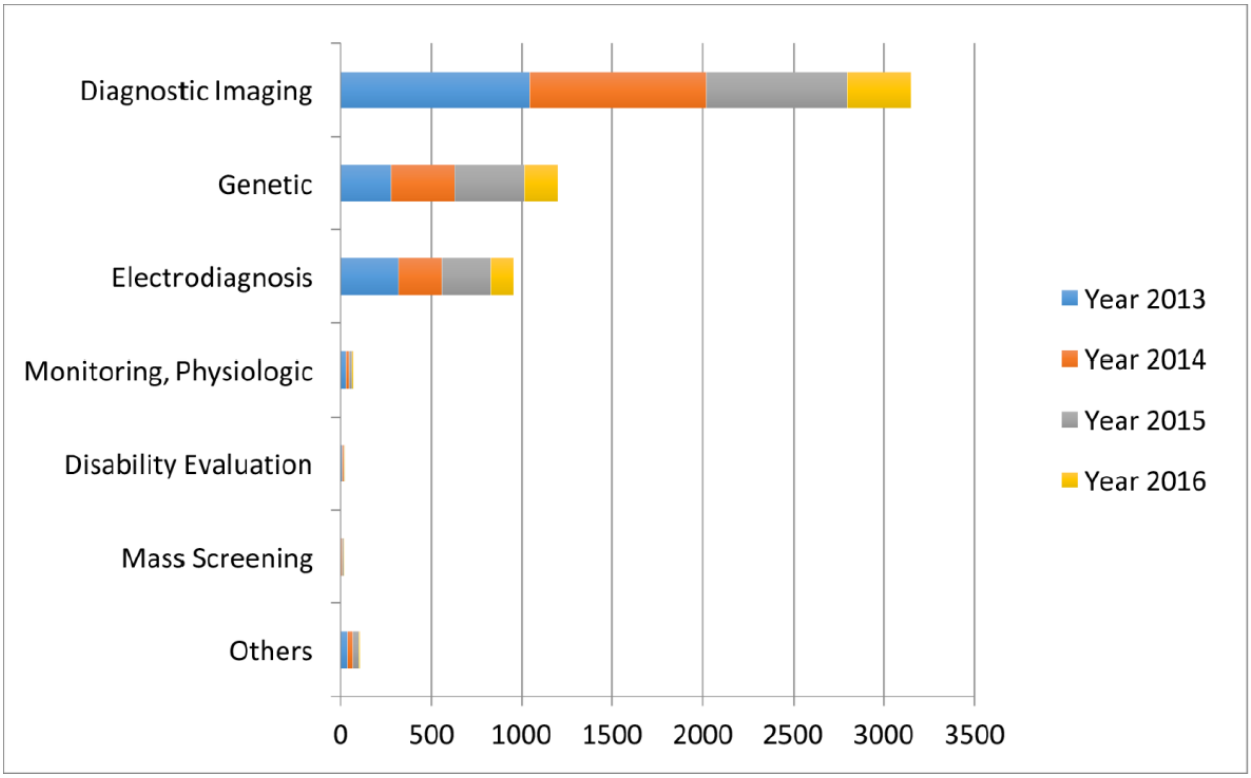
Innovative healthcare services are defined as the application of cutting-edge technologies such as cloud computing, the Internet of Things (iot), and artificial intelligence (AI) to create a more productive, helpful, and personalized
Medical services framework.These advancements give constant well-being observing through cell phone or wearable gadget applications, permitting individuals to assume liability for their wellbeing. When combined with AI, wellbeing information gathered at the patient level might be shipped off clinicians for additional analysis and utilized in wellbeing screening, early illness detection, and treatment plan assurance.

Literature review

The upsides of AI have been widely tended to in the clinical literature. Advanced algorithms might be used by AI to 'learn' information from massive amounts of patient data and then utilize the results to improve medical care. It may also have the ability to learn and self-correct to improve precision based on the data. AI frameworks that offer exceptional clinical data from journals, course books, and medical strategies may assist specialists with conveying adequate patient consideration.Diagnostic and therapeutic errors are unavoidable in human medical care, but an AI system can reduce them.Furthermore, an AI gadget gathers critical data from a vast patient population to make continual deductions for health risk warnings and predictions.

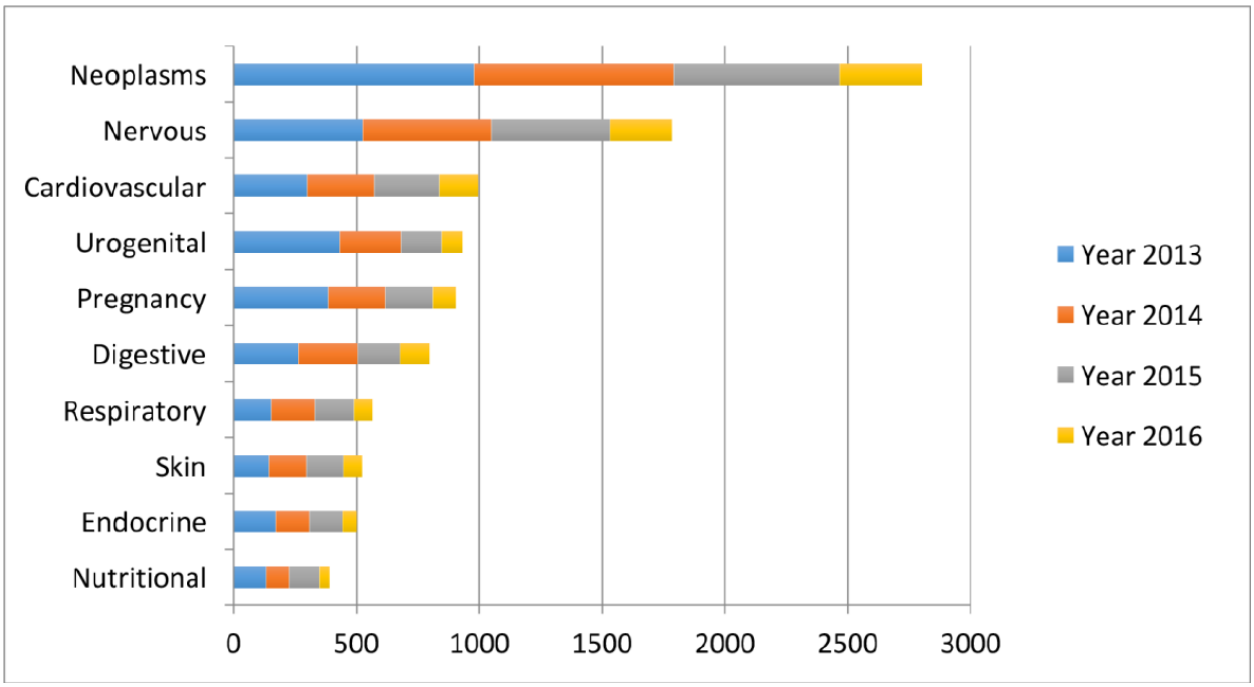
The most basic part of AI is the information made from medical exercises like screening, finding, and treatment tasks, among others. Demographics, medical records, digital recordings from medical equipment, clinical examination, medical laboratory tests, and images are just a few examples of clinical data.

Artificial intelligence devices are divided into two categories. Machine learning (ML) algorithms that evaluate structured data like imaging, genomics, and EP data fall first. Natural language processing (NLP) approaches pull features from unstructured data sources such as clinical notes and medical literature to supplement and improve organized medical data.



1 The types of data considered inailiterature

Despite increasing AI research in medical care, its bulk is focused on three disease types: cancer, nervous system disease, and cardiovascular disease. It is hardly surprising that these three illnesses are clustered together. Because these three illnesses are significant causes of mortality, people must get a diagnosis as soon as possible to keep their health from deteriorating. Furthermore, the capacity of the AI system to improve imaging, genomics, EP, and EMR research techniques may lead to earlier diagnosis.



2 In the artificial intelligence (AI) literature, the top ten disease forms are considered.

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.

Basic biomedical research	Translational research	Clinical practice
Automated experiments	Biomarker discovery	Disease diagnosis
Automated data collection	Drug–target prioritization	Interpretation of patient genomes
Gene function annotation	Drug discovery	Treatment selection
Prediction of transcription factor binding sites	Drug repurposing	Automated surgery
Simulation of molecular dynamics	Prediction of chemical toxicity	Patient monitoring
Literature mining	Genetic variant annotation	Patient risk stratification for primary prevention

3 This is a partial list of present, and future AI uses in medicine.

In the era of assisted living life, AI technologies combined with intelligent robotic systems lead to better life quality for elderly and disabled people. Without the requirement for a controller or sensor systems connected to the body, impaired individuals can manage wheelchair and robot assistance via a man-machine interface (HMI). Disabled individuals are no longer reliant on others. AI empowers such people to be self-sufficient. Blind individuals might exist together with abled individuals and participate in areas like informatics and innovation on RUDO, an "ambient intelligent system." A fall-recognition system can help seniors in staying away from falls and different issues. The computational modelling assistant (CMA) is a shrewd specialist that can help biomedical examiners transform applied models into "executable" reproduction models.

Artificial intelligence (AI) revolutionizes the healthcare sector, assisting with manual jobs to data management and medication development. However, there are benefits and drawbacks to everything. Artificial intelligence's capacity to evaluate data and enhance diagnosis can assist with administrative and regular tasks and monitoring and digital consultations.

Data is growing exponentially, so training the algorithms can be difficult in less time. Due to privacy concerns, sometimes it could be challenging to get some data necessary for the model to predict the desired outcome. The change to artificial intelligence can be problematic in the digital era since the patient's life is at stake. First, we will need proof that AI will be effective, as the plan shows. Moreover, will it be worth the cost as the healthcare industry and investors invest a considerable amount in this?

Challenges in ai development

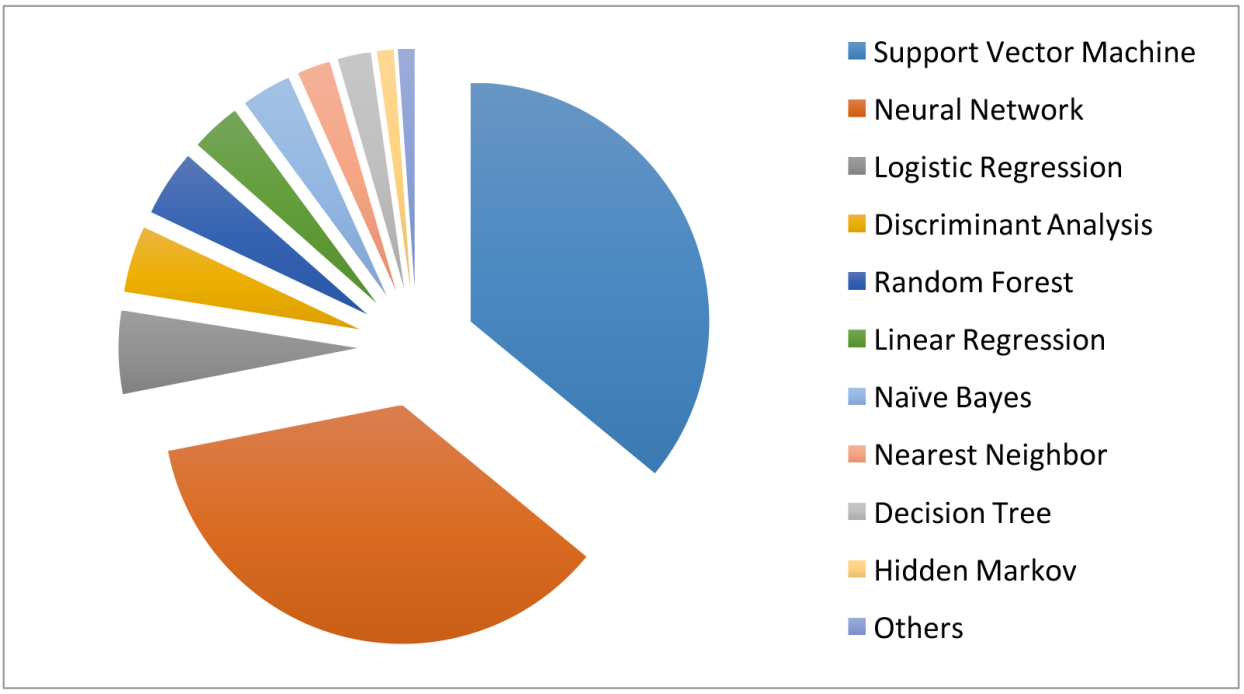
Artificial intelligence in healthcare has several obstacles. To train machine learning algorithms or neural networks, a vast quantity of data is required. However, we usually do not get clean data or unbiased data. Data from different healthcare environments can contain noise, bias, imbalanced medical 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.

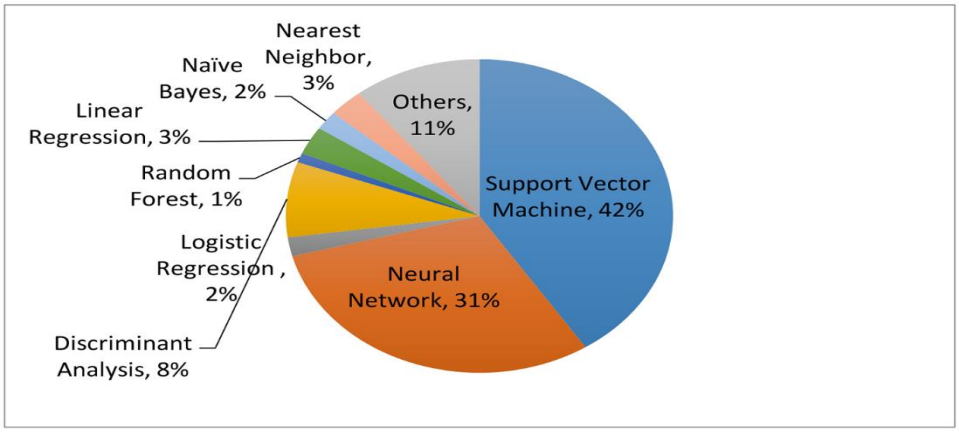
Machinelearning

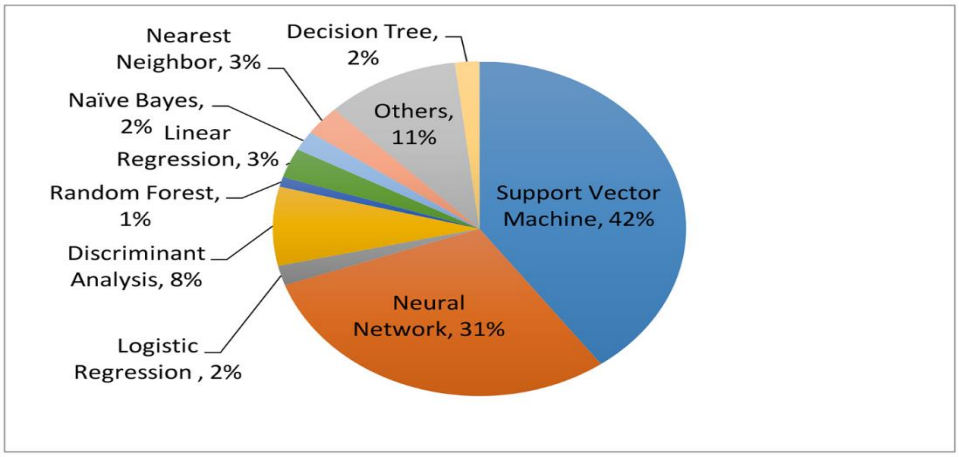
In machine learning, algorithms are designed to evaluate data and extract information from it. The patient's "characteristics" and, in rare cases, the medical results of interest are fed into the machine learning algorithm. Unsupervised learning and supervised learning are the two types of machine learning 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.

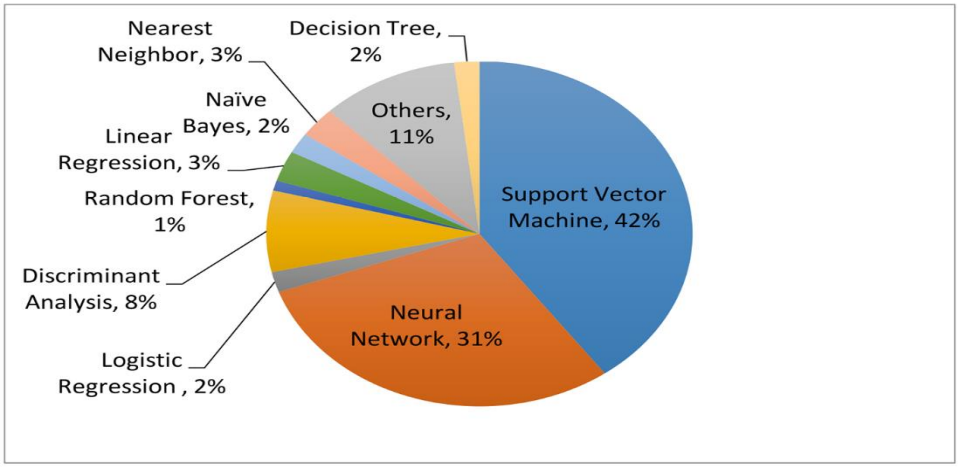


4 Machine learning algorithm used in healthcare

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



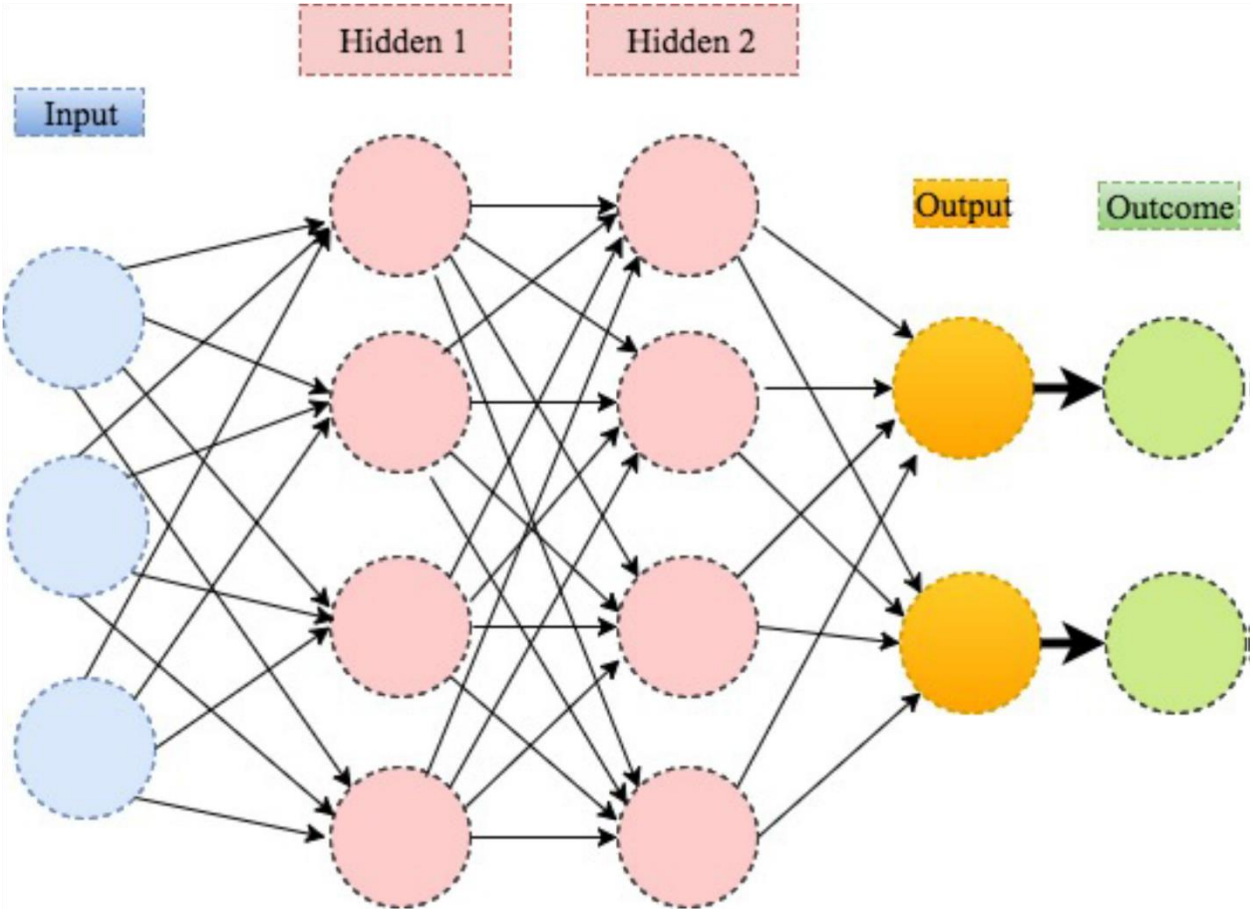




5 Machine learning algorithm used for diagnosis analysis.

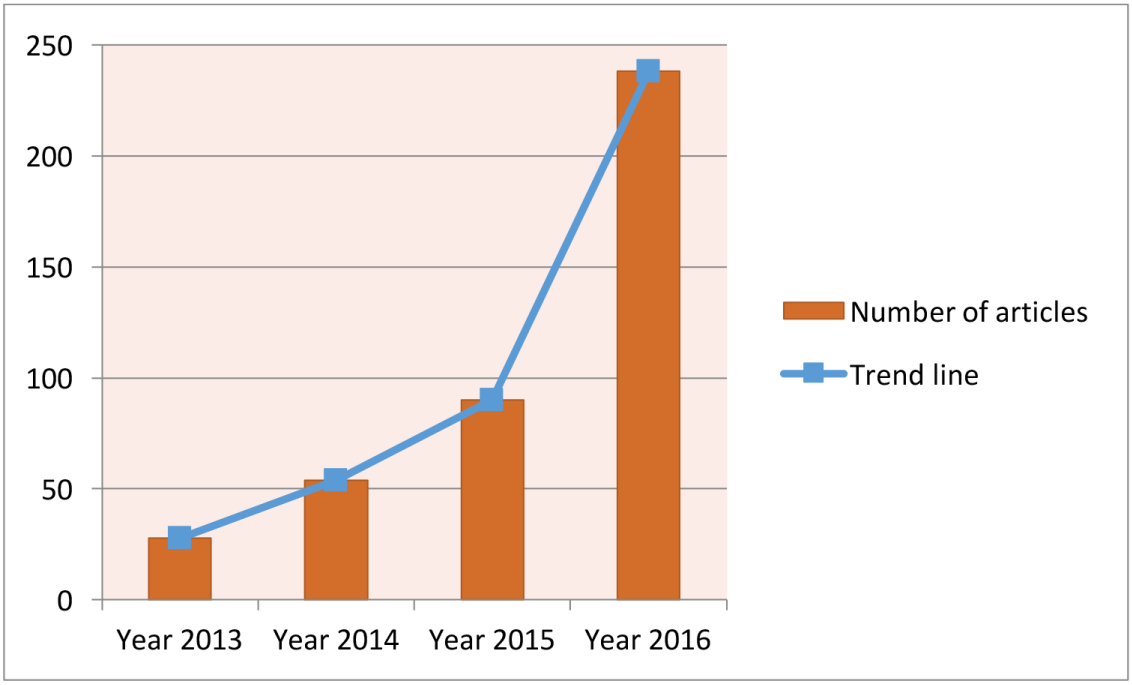
Neuralnetworks

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

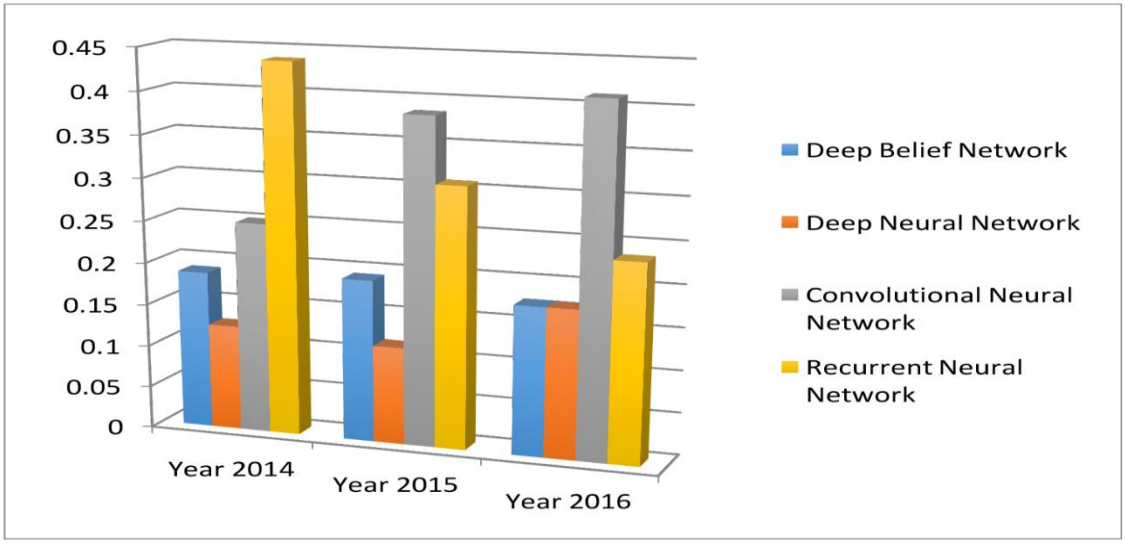


6 The architecture of Artificial Neural Network

Deep learning is a more complex type of neural network. A multi-layered neural network may be conceived of as deep learning. Subsequently, deep learning will dig deeper through data to uncover more complicated non-linear patterns. The imaging researcher applied deep learning to highlight that images are generally diverse and large in scale.



7 The information was gathered by searching pubmed for deep learning in the healthcare and disease categories.



8 The four most common profound deep algorithms, as well as their popularity.

Natural language processing

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 therapeutic decision-making. The two primary components of an NLP pipeline are text processing and categorization. The NLP pipeline is intended to assist clinicians in determining treatment decisions plan notification and side effect tracking.

Applications of artificial intelligence in stroke

Stroke is a condition that affects millions of people globally. It is China's biggest cause of death, while it ranks sixth in North America. As a result, research into stroke prevention and treatment is essential.

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 the detection process. When the patient's movement deviates dramatically from the usual pattern, a stroke warning is triggered, and the 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. The authors used an ANN and SVM to evaluate the 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 the 30-day death rate were surpassed by applying an improved algorithm.

Conclusion

We discussed why AI is being used in healthcare, described the many types of healthcare evidence that AI has looked at, and examined the most prevalent ailment types for which AI has been employed.ML and NLP, the two primary forms of artificial intelligence devices,

have been widely explored. We utilized SVM and neural networks, two of the most commonly used traditional techniques, and a novel deep learning method. An effective AI architecture must include mlcomponents for processing structured data (images, EP data, genetic data) and NLP for unstructured mining text.

The IBM Watson machine is a leader in this field. The system, which includes both ML and NLP components, has demonstrated promising results in oncology. Using a vast volume of data with rich knowledge, AI is supposed to assist in the analysis of even more complex and closer to real-life clinical questions, resulting in improved stroke treatment decision-making. AI systems must be constantly trained by evidence from clinical trials to function correctly. When an AI system is implemented and trained using historical data, keeping the data supply is critical for the system's continuous growth and improvement.

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References

1. *Fei Jiang, Yong Jiang, Hui Zhietc, Artificial intelligence in Healthcare: Past, Present, and Future, 22 June 2017.*
2. *Patel VL, Shortliffe EH, Stefanelli M, et al. The coming age of artificial intelligence in medicine, 2009.*
3. *Neill DB, using artificial intelligence to improve hospital inpatient care, IEEE Intell Syst, 2013.*
4. *Gillies RJ, Kinahan PE, Hricak H, Radiomics: images are more than pictures. They are data, 2016.*
5. *Esteva A, Kuprel B, Novoa RA etc. Dermatologist-level classification of skin cancer with a deep neural network, 2017; 542:115-8*
6. *Bishop CM, Pattern recognition and machine learning, 2007*
7. *Mirtskhulava L, Wong J, etc., Artificial neural network model in stroke diagnosis, modelling and simulation, 2015.*
8. *Ravi D, Wong C, Deep learning with health informatics, 2017*
9. *Saenger Ak, Christenson RH. Stroke biomarkers: progress and challenge for diagnosis, prognosis, differentiation, and treatment. 2010; 56:21-33*

10. *Villar JR, Gonzalez, etc. Improving human activity recognition and its application in early stroke diagnosis, 2015.*
11. *Bently P, Ganesalingam, etc. Prediction of stroke thrombolysis outcome using CT brain-machine learning. 2014;4:635-40.*
12. *Donhee Lee and Seong No Yoon. Application of Artificial Intelligence-Based Technologies in the Healthcare Industry: Opportunities and Challenges - 1 January 2021*
13. *Kun-Hsing Yu , Andrew L. Beam, and Isaac S. Kohane, Artificial intelligence in Healthcare – 2018.*
14. *Guoguangrongab, arnaldomendezc, Elie Bou Assic Bo Zhaod, and Mohamad Sawan, Artificial Intelligence in Healthcare: Review and Prediction Case Studies - Volume 6, Issue 3, March 2020*