REVIEW PAPER
Volume 1 Issue 1 (2023), E-XXXX-XXXX
Electrical and Computer Experiences
https://jurnal.tintaemas.id/index.php/ECE

A Review on Disease Prediction Using Artificial Intelligence

Pallavi Patil[1], Kirankumari Patil[2]

[1]School of Computer Science and Engineering, REVA University, India.
[2]Poojya Doddappa Appa College of Engineering, Kalaburagi, India

Abstract

Artificial Intelligence (AI) can be used for disease prediction in various ways. AI can analyze medical images such as X-rays, MRI scans, CT scans, and mammograms to detect abnormalities and identify potential diseases. This can help in early detection and diagnosis of diseases such as cancer, cardiovascular disease, and neurological disorders. AI can analyze electronic health records (EHRs) to identify patterns and correlations in patient data. This can assist identify patients who are at risk of developing certain diseases and enable proactive intervention.AI can analyze data collected from wearable devices such as fitness trackers and smart watches to monitor health parameters such as heart rate, blood pressure, and sleep patterns. This can help identify early signs of diseases such as hypertension, diabetes, and sleep apnea.AI can analyze patient symptoms and medical history through natural language processing (NLP) to identify potential diseases. This can help healthcare professionals to make a more accurate diagnosis and recommend suitable treatments. Overall, AI has the latent to revolutionize disease prediction by enabling early detection and proactive intervention, which can mend patient outcomes and moderate healthcare costs.

Keywords: Artificial Intelligence, Convolution Neural Networks, Disease Prediction, Machine Learning.

Article Info:

Submitted: 12/01/2023 Accepted: 29/01/2023 Approve: 22/04/2023 Published: 28/05/2023

INTRODUCTION

Artificial intelligence (AI) is a significant area of computer science that has several active application areas and research hotspots. AI is an endeavour to create intelligent machines that process information. Developing devices that resemble brains is its main goal [1]. Several domains, including robotics, NLP (natural language processing), expert systems, image processing, etc., have incorporated AI. Convex analysis, approximation, probability, and complexity theory are just a few examples of the various fields that make up machine learning (ML), which serves as the foundation for artificial intelligence (AI). Computers now have the ability to perform calculations without any pre-programming thanks to machine learning technologies. Machine Learning makes use of both synthesis and induction ideas to enhance computer performance [2]. Machine learning is used in a variety of fields, particularly bioinformatics and the diagnosis of diseases. In the world of computers, machine learning and deep learning technology are crucial. They serve as experts in forecasting and making choices. Machine learning technology includes deep learning technology [3]. Data extraction and processing are done using these methods. The core principle of deep learning is to acquire data representations by raising the level of abstraction. Many other deep learning designs, such as Convolutional Neural Networks (CNN) [40], Deep Auto-Encoders, Deep Neural Networks (DNN), etc., have been proposed [4,39]. The medical industry is increasingly embracing the idea of image processing. Decision-making information from image processing is significant. Before getting an outcome, different types of processes are taken in the medical area [5]. To focus on key areas, the medical image is segmented before being provided as input to deep learning. Following that, these segments are used to retrieve important information using information retrieval techniques [6]. Next, using noise removal techniques, the necessary features are acquired without noise. Predictions are made using the classifier classification of the obtained data. For each machine learning and deep learning experiment, these steps are followed [7]. The machine learning algorithms are typically divided into the following categories [8]. Reinforcement learning, unsupervised learning, semi-supervised learning, supervised learning, and active learning.

Correspondence Address
E-mail: pallavipatil@gmail.com

Deep learning uses advanced machine learning ideas to reliably predict future outcomes by classifying data using neural networks. [9]. A sizable neural network was constructed using a substantial amount of data. Disease diagnosis in the medical field is a difficult task. For the examination of medical diagnostics, patient information, treatment modalities, prescriptions, and other data, the health care department provides a vast amount of data [10]. These data are linked to inappropriate or irrelevant data, which is seen as the most obstacle to get rid of. In order to process the report effectively and efficiently, mining is necessary. Machine learning provides a variety of algorithms for use with various classifiers [11]. The data is distributed by this classifier in accordance with its properties or nature. To locate data sets, machine learning techniques are employed [12]. The fundamental idea behind machine learning, which extracts data from medical images to identify diseases and provide therapies, is pattern recognition [13]. The machine learning and deep learning approach steps are depicted in Figure 1.

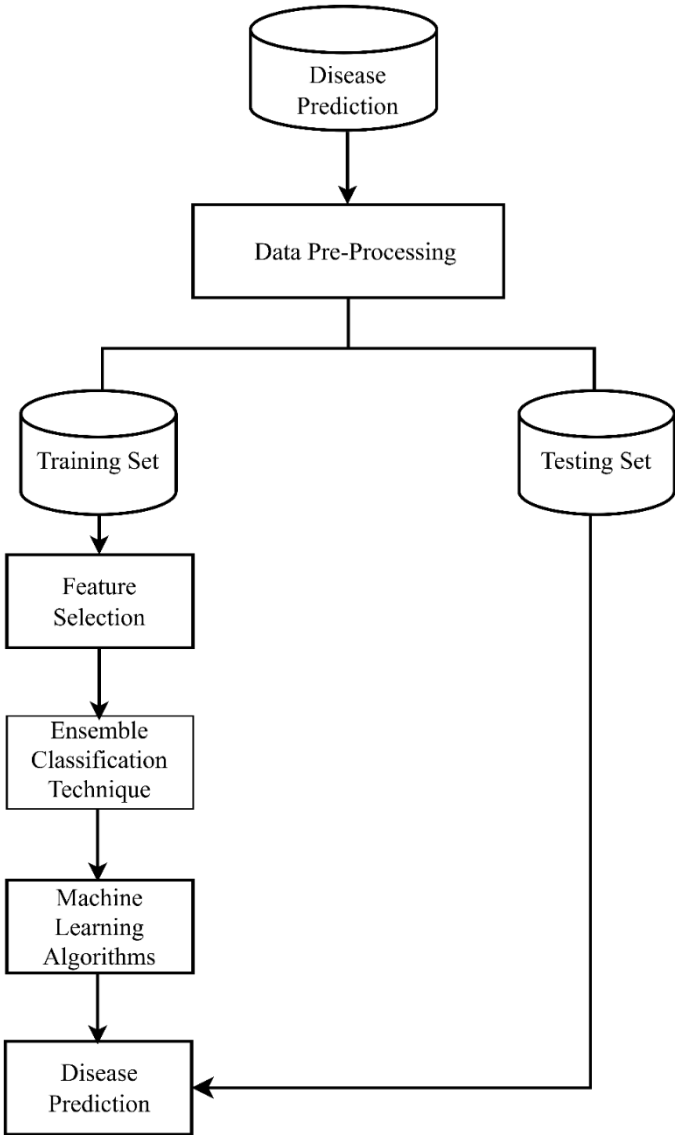

Figure 1: Architecture of Disease Prediction Model

MATERIALS AND METHOD

The data collection technique for this research will involve gathering information from various reputable international journals. This will be done through a systematic literature review approach. The initial step will be to identify relevant keywords and search terms related to disease prediction and artificial intelligence. These keywords will be used to conduct searches in reputable academic databases and journal repositories.

The selection criteria for the literature will be based on relevance to the research topic and the quality and reputation of the journals. Only peer-reviewed articles from reputable international journals will be included in the review. The identified articles will then be screened based on their titles and abstracts to determine their suitability for inclusion. Full-text articles meeting the inclusion criteria will be obtained for further analysis.

The data collection process will involve reading and critically analyzing the selected articles to extract relevant information related to disease prediction using artificial intelligence. This information may include the methodologies employed, the datasets used, the AI algorithms implemented, the performance metrics evaluated, and the findings and conclusions of the studies.

By utilizing this technique of gathering data from reputable international journals, the research will ensure that the information obtained is from reliable and credible sources. This will contribute to the validity and robustness of the review on disease prediction using artificial intelligence.

RESULT AND DISCUSSION

There are several literary works that address the topic of disease prediction, ranging from scientific articles and medical texts to works of fiction. Table 1 shows the some of the disease prediction works review. These works offer different perspectives on the challenges and importance of disease prediction, and provide insights into the science and history of epidemic outbreaks.

Table 1: Literary works

Author	Paper Title	Remarks	
		Contributions	Future Work
Zeenat Tariq, SayedKhushal Shah and Yugyung Lee	Classification of Lung Disease Using Deep Convolutional Neural Network [14]	1. In order to create our 2D CNN strategy, firstly extracted the spectrogram features and labels from the annotated lung sound samples. 2. Next, in order to reduce noise and peak values, the lung sounds were standardized. 3. To produce a deep learning model with high performance for diagnosing lung diseases, the Lung Disease Classification (LDC) model was developed. It combines advanced data normalisation and data augmentation techniques. 4. The accuracy achieved was around 97% after normalisation and augmentation.	To train the model using more data sets and adjust certain parameters to make it run more quickly.
Muhammad Nazrul Islam, Toki TahmidInan	A Major Review on the Application of AI and ML for Fighting the COVID-19 Pandemic [15]	1. The disease which is taken for the study is seasonal flu and COVID-19. 2. By emphasizing their accuracy in categorization and prediction, the algorithms. Categorized the objectives into four groups: (a) disease detection-CNN,SVM and GANs network, (b) Models using machine learning and epidemiology to predict epidemics, (c) Regression analysis and group methodology through data handling are examples of sustainable development, (d) Disease diagnosis: CNN and grad CAM, XGBOOST ML algorithm neural network, random forest, decision tree.	1. Use of a large set of data in research. 2. Investigate the impact and variety in research findings based on various data sources. 3. Examine the impact of context and the range of research findings.
Elene FirmezaOhata, Gabriel Maia Bezerra	Using the chest X-ray scans, transfer learning is used to automatically identify COVID-19 infection [16]	1. The disease which is taken for the study is COVID-19, Pneumonia. 2. Techniques employed CNNs that have been trained on ImageNet can be modified to function as feature extractors for X-ray pictures. 3. CNNs are integrated with consolidated machine learning techniques like the multilayer	1. The primary goal is to suggest a technique employing a dataset that is imbalanced. 2. To include our technique into an

		Perceptron (MLP), k-Nearest Neighbor, Bayes, Random Forest, and support vector machine (SVM). 4. MobileNet method with SVM (Linear) blend had the best performance achieving a mean accuracy and mean F 1 -score of 98.5%. 5. The performance matrix used to evaluate the given diseases using different CNN classifies are training time, test time, accuracy, f1 score and FPR & it is observed that MLP have highest FI score.	open-source online image classification tool like LINDA. 3. To evaluate the suggested strategy against techniques that rely on fine-tuning and start-up network training.
Ali Serener and Sertan Serte	Using deep learning, COVID-19 may be detected from other lung infections, pleural conditions, and lung diseases [17].	1. Several deep learning methods and chest radiographs are discussed in this paper. 2. Diseases included for study are from where pneumonia, pleural effusion and lung mass are discussed. 3. Mobile Net-V2 assists in distinguishing COVID-19 from pleural effusion illness and Alex Net techniques are used and Pneumonia –ResNet-18 and Alex Net techniques are used similarly Lung mass using DenseNet-121 and ResNet-18 techniques are used. 4. Performance matrix used to evaluate the given diseases using different deep methods classifies are AUC, Accuracy, sensitivity and specificity metrics and it is observed that pneumonia have Alex Net & RESNET-18 have highest performance and for With respect to pleural effusion, MobileNet-v2 and Alex Net have performed. Similarly for Lung mass have DenseNet-121 model have highest performance. 1. ResNet-18 method is the best overall performance across its 3 different conditions.	
Nazmus shakib shadin, silvia sanjana and Nusrat jahan lisa	CNN and Inception V3 are used to determine Covid-19 from chest x-ray data. [18]	1. Damage to a lungs and respiratory system can result with covid-19. 2. Chest X-ray has emerged into one of the recognized diagnostic technologies integrated with AI methods. 3. To identify COVID-19 situations from typical cases, two models have been proposed: a CNN model based on deep learning and an Inception V3 model based on transfer learning. 4. The Inception V3 model, which is based on transfer learning, exhibits highest efficiency than the Deep Learning CNN model, based on the author's research.	To improve the performance of both models, different deep learning models will be implemented, and these models would be examined.
Hamed Tabrizchi, Amir mosavi, Akos Szabo-Gali, Imre Felde and Laszlo Nadai	Rapid COVID-19 Diagnosis Using Computerized Tomography Scans and Deep Learning [19]	1. Covid-19 may be convoyed by mild illness indications such a dry cough, muscle ache, etc. 2. The signs of this disease show that COVID-19 seems to have a noticeable negative impact on the lungs. 3. X Ray and CT scans can be used to diagnose COVID-19 infections by considering the condition of the lungs. 4. SVM, Naive Bayes, Gradient boosting, Decision trees, AdaBoost, CNN, and Multilayer	To implement by using CNN and SVM & compare the highest Accuracy rates.

		Perceptrons are some of the techniques employed in identifying COVID-19. 5. The performance matrix used to evaluate the given diseases using different ANN, ML, Ensemble learning Classifies are Accuracy, Precision, Recall, FI-Score & MCC & it is observed that CNN & SVM have highest accuracy 6. Among the 6 techniques its proved that SVM with RBF Kernel gives more accuracy	
Sammy V. Militante, Nanette V. Dionisio and Brandon G. Sibbaluca.	CNNs for detection of COVID-19 and pneumonitis [20]	1. Disease which is taken for the study is COVID-19, Pneumonia. 2. To find out if the patient has this disease examine with the lung biopsy, chest X-ray, or ultrasound. 3. CNN method is used for predicting & detecting a patient affected or unaffected using a chest X-ray image to identify the disease. 4. 4. Performance matrix used to evaluate the given diseases using CNN method classifies are Precision, Recall and FI-Score & it is observed that VGG-16 CNN have highest accuracy. 5. 5. Data Augmentation techniques were employed to increase the testing data in the investigation. 6. 6. Based on chest X-rays, the testing results from the research study can identify and forecast ailments.	1. Improved CNN method performance through transfer learning and hyper-parameter adjustment. 2. The best model for a disease detection system might be chosen in order to improve the complex network structure system.
Hayat O.alasasfeh, Taqwa Alomari, and MS Ibbini Irbid	A Deep Learning Technique for COVID-19 Identification Using X-Ray Images. [21]	1. Deep learning techniques using CNN that can distinguish between COVID-19, viral pneumonitis, and normal cases in chest X-ray images. 2. A novel CNN model (COV-X) that's been created completely from scratch has been released and boasts a 94% classification accuracy rate. The accuracy of the pre-trained models VGG16, VGG19, RESNET50, XCEPTION, and MOBILENET, that are each of the Visual Geometry Group Networks, is 95%, 95%, 33%, 65%, and 77%, respectively. 3. The performance matrix used to evaluate the given diseases using different CNN classifies is Precision, Recall, FI-Score and it is observed that The highest accuracy rate and least loss are found in VGG19 and VGG16.	It involves large datasets and utilizes patient history of infections.
Dr. Shakti Kundu, Dr. Ashok Kumar, and Akshay Kumar Siddhu	Review Paper on COVID-19 Detection from Medical Images and/or Patient Symptoms Using Machine Learning Methods [22]	1. Covid-19 may cause a moderate respiratory illness having signs such as a dry cough, fever, exhaustion, etc. 2. Using X-ray or CT images with the results of a PCR, the disease is accurately detected. 3. Instead of COVID-19, the PCR results indicate pulmonary tuberculosis as a type of lung disease. 4. To detect, segment, and forecast the spread of COVID-19, cutting-edge Deep Learning techniques are used.	
Dr Rajesh Doss	Lung ultrasound images are used in the design of a deep learning-based Covid	1. Different Deep Learning techniques are used ANN, CNN, SVM, RVM, and Supervised feed forward, Stochastic tactic. 2. The performance matrix used to evaluate the given disease using different deep learning	Try to improve the accuracy, sensitivity and specificity by using CNN and ANN algorithms.

	diagnosis structure [23]		algorithms are accuracy, sensitivity and specificity and it is observed that RVM have 100% accuracy, sensitivity and specificity.	
D.Haritha, Ch.Praneeth and M.Krishna Pranathi	X-ray image prediction using Covid [24]	3. 4.	1. Novel Covid 19 disease to predicate x-ray images by using CNN and VGG model. 2. The performance matrix used to evaluate the given disease by using transfer learning methods are Recall, accuracy, precision, and F1-Score, it is observed that transfer learning have highest accuracy for recall.	Train the model by using larger dataset and increase the accuracy, In machine learning, more data is used during training that increases performance of the models.

Deep learning research on disease prediction has been active recently and has produced promising result. A type of machine learning termed as "deep learning" employs neural networks [34] with several layers to learn and extract features from input. The first step in disease prediction using deep learning is to collect and preprocess data. This can involve obtaining medical records, images, and other relevant information for patients who have been diagnosed with the disease of interest, as well as for healthy individuals who can serve as a control group. Once the data has been collected, it is typically split into test, training, and validation sets. The validation set is used to modify hyper parameters and over fitting while the training set is used to train the deep learning tactics. The performance of the finished model is assessed using the test set.

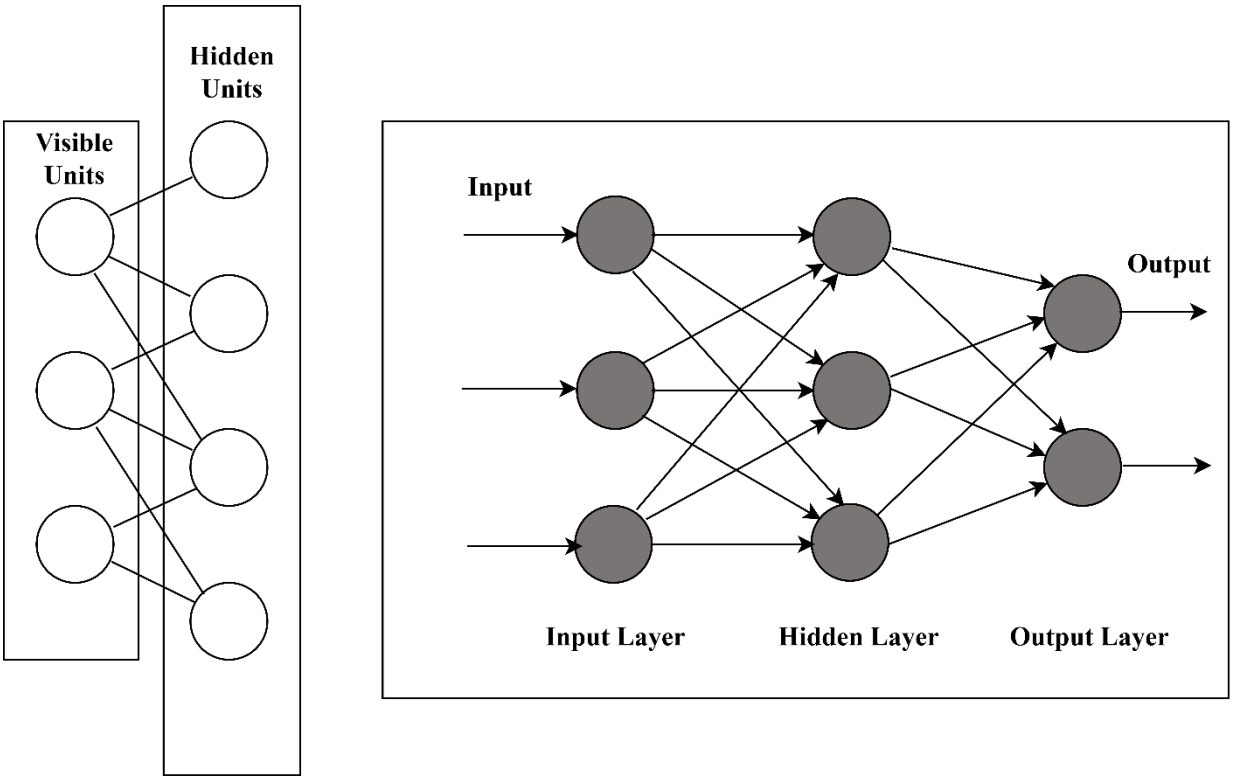

Figure 2: the generic design of deep learning

Figure 2 shows the general architecture of deep learning. There are various deep learning architectures that can be used for disease prediction, including CNNs, RNNs, and hybrid models that combine both CNNs and RNNs. CNNs are commonly used for image-based tasks, while RNNs are used for sequential data such as time-series or text. One important consideration in disease prediction using deep learning is the choice of features to use as inputs to the model. Deep learning models can learn features automatically from raw data, but it may also be beneficial to preprocess the data and extract relevant features manually.

Overall, disease prediction using deep learning has shown promise in various areas of healthcare, including early detection of cancer, prediction of patient outcomes, and diagnosis of rare diseases. However, it is important to note that the performance of Deep learning tactics highly depend on the integrity and quantity of training data, as well as the model's creation and choice of hyper parameters.

TOOLS REQUIRED FOR DISEASE PREDICTION

The three main groups in machine learning are as follows: (1) Supervised Learning, (2) Unsupervised Learning, and (3) Reinforcement Learning. Unsupervised learning learns its data structure from observation, as supervised learning requires guidance. Reinforcement learning interacts with the environment directly and utilizes the hit-and-miss method. Tools in machine learning are artificial intelligence-based techniques that provide systems the capability to understand and expand without a considerable measure of human input.

Tools for machine learning include (1) preparation and data collection, (2) constructing models, (3) training and application deployment.

Machine learning tools can be sketchily categorized on platforms and libraries. Machine Learning Libraries offer capabilities to accomplish a part of a machine learning project, whereas a Machine Learning Platform offers capabilities to accomplish a machine learning scheme from beginning to end. Predictions can be made in supervised learning while using data history. These predictions are more accurate. Algorithms like regression and classification fall under supervised learning. The hidden patterns were discovered by unsupervised learning. This kind of learning includes clustering [33] and association rule mining algorithms. Reinforcement learning can be used when a system's efficiency has to be increased. Table 2 shows the Comparison of various Tools in Machine Learning.

Table 2 Comparison of Machine Learning Tools

Tools name	Features	Techniques	Benefits
Scikitlearn [25]	Data mining and data analysis use it along with the machine learning development libraries for the Python programming language.	Classification, Clustering, Regression, and Dimensionality reduction	Clear documentation, any specific algorithm's parameters can be changed.
Pytorch [26]	• Pytorch is a Python machine learning library based on the torch framework that is used on cloud computing platforms. • It is utilized with in auto grade module for the construction of neural networks. • It offers neural network optimization algorithms [33-38].	Neural Network	It has a hybrid front end and makes use comfortable and aids in the construction of computational graphs.
Google Cloud Mlengine [27]	It is a machine learning tool for building and running the highest-quality models, and it offers two services: Prediction and Training	Naïve Bayes Classifier	It can be used to train a complex tactic and is most suitable for enterprises.
Tensor Flow [28]	Tensor flow is a machine learning library for Java script. Since it is used to execute existing models, it serves as a model converter.	Libraries for Dataflow Deep learning	It supports human pose estimation and may be installed by NPM or as script tags.
Amazon Machinelearning [29]	The primary modes in Amazon Machine Learning are ML models, real-time prediction, evaluations, and batch predictions	Linear Regression, Logistic Regression and Multi nominal Logistic Regression	Enables users to create data source objects from MySQL.

Knime [25]	• KNIME is a platform for reporting, data analytics, and integration. The data pipelining idea is used. • It is used to integrate programming languages like C, C++, R, Python, and Java. • It has a graphical user interface.	Text Mining and Image Mining	• It serves as an alternative to SAS. • Simple to deploy, install, and learn.
Rapidminer [30]	• Rapid Miner is a platform for deep learning and machine learning, and it supports the development of analytical workflows through a graphical user interface (GUI). • Validation and improvement of the model are carried out.	Logistic Regression, Linear Regression and LARS	• Plugins allow for extension. • Simple to use. • doesn't require any programming knowledge.
Keras [25]	• Neural networks, a subset of machine learning, have an API called Keras. • Recurrent and Convolutional networks are supported. • Both CPU and GPU can be used to run it.	Convolutionalnet and Recurrent net works	It is easy to use, extensible, and modular.
Shogun [25]	• It offers a range of machine learning techniques and data structures. • It helps with the execution of Hidden Markov models. • It works with vector machines.	Classification, Clustering, Regression, Support Vector Machine and Dimensionality, Reduction	It is a user-friendly machine learning library that is integrated and efficient, can manage massive amounts of data, and provides good customer support.
Weka [25,32]	• Weka, which stands for Waika to Environment for Knowledge Analysis, is a piece of software that may be used to carry out data mining operations. • It is a Java-based open-source platform. • A visualization tool is included for data analysis and predictive modeling.	Classification, Clustering, Regression, Association Rule Mining and Visualization	- The three components, such as feature selection, data preparation, and data mining methods, are integrated into the WEKA package. - It is open source for the GPU. Since it was written in Java, it can be portably used.

CONCLUSION

The most of fields, like computer vision, natural language processing, and signal processing, are applied deep learning to an excessive level. Deep learning algorithms have been widely used in healthcare applications for electronic health record analysis, signal processing, and medical imaging applications. Classical deep learning models have some drawbacks despite their success, such over fitting and evaluating the output level of confidence.

Author declaration

Author contributions and responsibilities

The authors made major contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation and discussion of results. The authors read and approved the final manuscript.

Funding

This research did not receive external funding.

Availability of data and materials

All data is available from the author.

Competing interests

The authors declare no competing interests.

REFERENCES

[1] Valiant, L.,G.A theory of the learnable commn,ACM, 27(11): 1134-1142,Nov 1984.
[2] K.Elaiyaraja&M.Senthil Kumar, Fusion Imaging in Pixel Level Image Processing Technique-A Literature Review, 2018.
[3] K.Elaiyaraja, M.Senthil Kumar &L.Karthikeyan, An Amplifying Image Approach: Non-iterative Multi Coverage Image Fusion, Springer, 2019.
[4] S.Sandhya, M.Senthil Kumar &L.Karthikeyan, A Hybrid Fusion of Multimodal Medical Images for the Enhancement of Visual Quality in Medical Diagnsis, Springer, 2019.
[5] Doi,K., Computer-aided diagnosis in medical imaging:Historical review, Current status and future potential Computerized medical imaging and graphics, 2007.
[6] Aiken, A.Moss:A System for detecting software plagiarism. http://www/.cs.berkley.edu/~aiken/moss.html,2004
[7] S. Rohith, L. Jahnavi, S. C. Bhuvaneshwari, S. Supreeth and B. K. Sujatha, "Image Encryption and Decryption Using Key Sequence of Triple Logistic Map for Medical Applications," 2020 Third International Conference on Advances in Electronics, Computers and Communications (ICAECC), Bengaluru, India, 2020, pp. 1-5, doi: 10.1109/ICAECC50550.2020.9339529.
[8] Jankoswki, N and M.Grochowski. Comparison of instances selection algorithms i.algorithms survey, International conference on artificial intelligence and soft computing, 2004.
[9] Schmidhuber,J.Deep learning in neural networks: An overview, Neural networks, 2015.
[10] Norris,D.J., Machine //learning:Deep Learning in beginning Artificial Intelligence with the Raspberry Pi., 2017.
[11] Warwick, W et al., A framework to assess healthcare data quality, The European journal of social &behavioural sciences, 2015.
[12] Ghassemi, M., et al., Opportunities in machine learning for healthcare. arXiv preprint arXiv:1806.00388.2018
[13] Dua,S.U.R, Acharya &P.Dua, Machine learning in Healthcare informatics, 2014.
[14] 14.Zeenat Tariq, SayedKhushal Shah, Yugyung Lee "Lung Disease Classification using Deep Convolutional Neural Network" 2019 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)978-1-7281-1867-3/19/$31.00 ©2019 IEEE.
[15] Muhammad Nazrul Islam , Toki TahmidInan , Suzzana Rafi , Syeda Sabrina Akter, Iqbal H. Sarker , and A. K. M. Najmul Islam "A Systematic Review on the Use of AI and ML for Fighting the COVID-19 Pandemic" IEEE TRANSACTIONS ON ARTIFICIAL INTELLIGENCE, VOL. 1, NO. 3, DECEMBER 2020.
[16] EleneFirmezaOhata, Gabriel Maia Bezerra, João Victor Souza das Chagas, Aloísio Vieira Lira Neto "Automatic Detection of COVID-19 Infection Using Chest X-Ray Images Through Transfer Learning" IEEE/CAA JOURNAL OF AUTOMATICA SINICA, VOL. 8, NO. 1, JANUARY 2021.
[17] Ali Serener "Deep learning to distinguish COVID-19 from other lung infections, pleural diseases, and lung tumors" IEEEXplore. Downloaded on May 14,2021 at 11:28:38 UTC from IEEE Xplore
[18] Nazmusshakib, silviaSanjana" Covid-19 diagnosis from chest x-ray images using Convolutional Neural Network (CNN) and inception V3.
[19] HamedTabrizchi, "Rapid COVID-19 Diagnosis Using Deep Learning of the Computerized Tomography Scans" IEEE 3rd International Nov. 18-19, 2020.
[20] Sammy V. Militante, Nanette V. Dionisio "Pneumonia and COVID-19 Detection using Convolutional Neural Networks" 2020 (ICVEE).
[21] Hayat O.alasasfeh, TaqwaAlomari, MS Ibbini "Deep Learning Approach for COVID-19 Detection Based on X-Ray Images" 2021 18th International Multi-Conference on Systems, Signals & Devices (SSD'21).

[22] Akshay Kumar Siddhu, Dr. Ashok Kumar and Dr. Shakti Kundu "Review Paper for Detection of COVID-19 from Medical Images and/ or Symptoms of Patient using Machine Learning Approaches" IEEE Conference ID: 50582 9th International Conference on System Modeling & Advancement in Research Trends, 4th–5th, December, 2020.
[23] Dr Rajesh Doss "Design of Deep Learning Based Covid 19 Diagnosis Framework Using Lung Ultrasound Images" IEEE 2022.
[24] D.Haritha, "Covid Prediction from X-ray Images" IEEE Xplore.
[25] https://www.softwaretestinghelp.com/machinelearning-tools/.
[26] https://hub.packtpub.com/what-is-pytorch-andhow-does-it-work/.
[27] https://towardsdatascience.com/10-most-popularmachine-learning-software-tools-in-2019 678b80643ceb.
[28] https://www.tensorflow.org/js/guide/conversion
[29] https://docs.aws.amazon.com/machinelearning/latest/dg/what-is-amazon-machinelearning.html
[30] https://rapidminer.com/products/studio/featurelist/
[31] https://towardsdatascience.com/data-mining-toolsf701645e0f4c
[32] https://www.cs.waikato.ac.nz/ml/weka
[33] G., S., Mundada, M. R., & S., S. (2022). Resource Allocation Using Weighted Greedy Knapsack Based Algorithm in an Educational Fog Computing Environment. In International Journal of Emerging Technologies in Learning (iJET) (Vol. 17, Issue 18, pp. 261–274). International Association of Online Engineering (IAOE). https://doi.org/10.3991/ijet.v17i18.32363.
[34] S, S., & Kirankumari Patil. (2022). Hybrid Genetic Algorithm and Modified-Particle Swarm Optimization Algorithm (GA-MPSO) for Predicting Scheduling Virtual Machines in Educational Cloud Platforms. International Journal of Emerging Technologies in Learning (iJET), 17(07), pp. 208–225. https://doi.org/10.3991/ijet.v17i07.29223.
[35] G. Shruthi, Monica R. Mundada, B. J. Sowmya, S. Supreeth, "Mayfly Taylor Optimisation-Based Scheduling Algorithm with Deep Reinforcement Learning for Dynamic Scheduling in Fog-Cloud Computing", Applied Computational Intelligence and Soft Computing, vol. 2022, Article ID 2131699, 17 pages, 2022. https://doi.org/10.1155/2022/2131699.
[36] S. Supreeth, Kirankumari Patil, Shantala Devi Patil, S. Rohith, Y. Vishwanath, K. S. Venkatesh Prasad, "An Efficient Policy-Based Scheduling and Allocation of Virtual Machines in Cloud Computing Environment", Journal of Electrical and Computer Engineering, vol. 2022, Article ID 5889948, 12 pages, 2022. https://doi.org/10.1155/2022/5889948.
[37] S. Supreeth and K. Patil, "VM Scheduling for Efficient Dynamically Migrated Virtual Machines (VMS-EDMVM) in Cloud Computing Environment," KSII Transactions on Internet and Information Systems, vol. 16, no. 6, pp. 1892-1912, 2022. DOI: 10.3837/tiis.2022.06.007.
[38] S. Supreeth, K. Patil, S. D. Patil and S. Rohith, "Comparative approach for VM Scheduling using Modified Particle Swarm Optimization and Genetic Algorithm in Cloud Computing," 2022 IEEE International Conference on Data Science and Information System (ICDSIS), Hassan, India, 2022, pp. 1-6, doi: 10.1109/ICDSIS55133.2022.9915907.
[39] R, R., Supreeth S, Ramya R, M, G. P., & Chaitra Lakshmi L. (2019). Password Processing Scheme using Enhanced Visual Cryptography and OCR in Hybrid Cloud Environment. Zenodo. https://doi.org/10.5281/ZENODO.7027753.
[40] Gaurav Dhingra, Supreeth S, R, N. K., Amruthashree R V, & Eshitha D. (2019). Traffic Management using Convolution Neural Network. Zenodo. https://doi.org/10.5281/ZENODO.7027893.