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Deep learning for classification and progration of Alzheimer disease: Literature Review

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ABSTRACT

Objective: Alzheimer disease (AD) is memory loss and another severity is dementia, this kind of syndrome reduces the memory power and thinking capabilities. We aimed to conduct an organized literature review of studies that applied Machine Learning and deep learning methods on data to detect progression of AD dementia.

Method: We review some of the recent articles on Alzheimer disease considering machine learning and deep learning approaches. Some deep learning techniques are also discussed and a brief overview of different feature extraction techniques that are used in diagnosing Alzheimer disease is provided. Finally, key findings from the reviewed articles are summarized and a number of major issues related to machine learning and deep learning based brain disease diagnostic approaches are discussed. Through this study, we aim at finding the most accurate technique for detecting different brain diseases which can be employed for future betterment.

Keywords—Alzheimer Disease, Dementia, Machine Learning, Deep learning

I. INTRODUCTION

Alzheimer's disease (AD) is the most common and a leads to progressive loss of neurons in the brain with Indiscernible Appearance [1 -3] accounting for 50–60% of all patients. Due to Alzheimer's disease changes in memory, cognitive function and behavior of patient. The damage to the brain is usually irreversible in AD. After about 3-5 years, the patient will die [4]. This disease has gradually attracted people's attention and become a hot issue in society. According to the development of cognitive model and the degree of impaired function, the onset of Alzheimer's disease can be divided into four stages: normal (control), mild (incipient), moderate (moderate) and severe.

Artificial Intelligence (AI) has many applications in computer vision, Natural Language Processing and speech recognition .in medical image processing also AI has a vast application, AI also made brain disease prediction and detection more accurate and precise that is why we can say Artificial Intelligence leading to 4th Industrial Revolution.

Revenues from AI will be increases day by day, The global AI market is expected to grow to $1.81 trillion by 2030 (Grand View Research),As of 2022, the global AI market is worth $136.6 billion. This figure is set to increase by over 13 times over the next decade and AI market is predicted to increase by a CAGR of 38.1%.

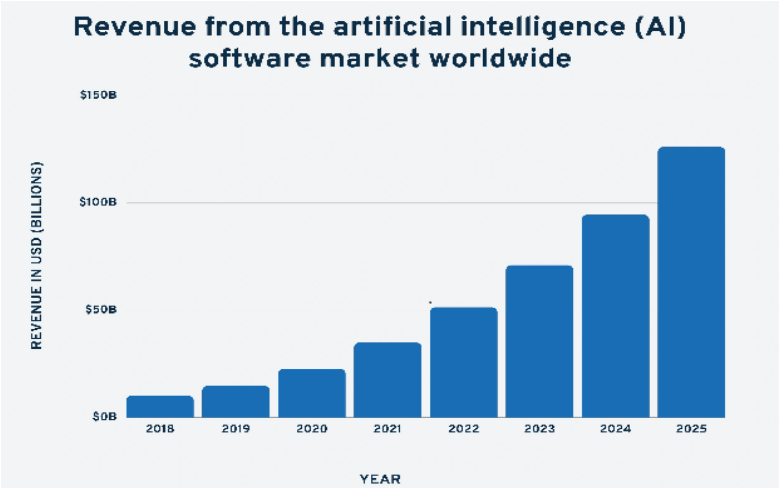

Fig No.1

Machine learning (ML) is one of the applications of Artificial Intelligence (AI) that is provide us statistical tool to explore the data and analyze the data, in Machine learning three different approaches Supervised Machine learning , unsupervised Machine learning and Reinforcement Machine learning .

Deep learning (DL) is the subset of Machine learning (ML) it is one of the effective domain of AI where the medical imaging and its development is possible [5]. Deep learning is a general mathematical model which helps with various kinds of data such as images, voice, and video content datasets that have different levels of quality matching the features. Medical recognition and its identification of complexity are mostly relying on the Brain and its severity. Deep learning helps to assist the rapid growth of medical problems to overcome difficulties. Medical reports are based on images where the diagnosis is suggested based on the affected portion and modalities. Deep Learning significantly deals with medical imaging for surgeons, specialists to point according to the type of diseases. [6]. There are several processes in finding the medical procedure where input data can be in the form of many different types of images. The main imaging considered for focusing on complications is, first of all, Magnetic Resonance Imaging (MRI) which can be able to represent the deviations and irregularities in the human body [7]. Not only MRI imaging but there are also various types such as Computer Tomography (CT) which takes input from X-ray that implies the cross-sectional way. Major processes such as scanning the patient's affected region can be considered in all angles such that all degrees of complication can be examined [8]. Muscles, bones, and stomachs can be viewed with ultrasound images that can be experimented on the human body with the help of extreme frequency waves to recognize the patient's health. Almost all the brain parts affected with tumors, dementia, and Alzheimer's can be dealt with Positron emission tomography (PET) [9]. These PET scans can be done with radio waves by tracing the affected place for spotting the diseases. Based on the imaging inputs from the dataset Deep learning can be classified and treated for various kinds of diseases [10].

II. OVEVIEW OF ML AND DL

ML is a process of training a computer to apply its past experi- ence to solve a problem given to it. The concept of application of ML in different fields to solve problems faster than human has gained significant interest due to the current availability of cheaper computing power and inexpensive memory. This makes it possible to process and analyze a very large amount of data to discover insights and correlations amongst the data which are not so obvious to human eye. Its intelligent behavior is based on different algorithms which enable the machine to make abstractions based on experience, in order to produce salient judgments. On the other hand, DL is a sub-field of ML, however, a more advanced approach which enables computers to automatically extract, analyze and understand the useful information from the raw data by imitating how humans think and learn [11]. Precisely, deep learning is a group of techniques that is neural data driven and based on automatic feature engineering processes. The automatic learning of features from inputs is what makes it so accurate and of excellent performance [11]. A quick overview of the difference between artificial intelligence (AI), ML, and DL is provided in Fig. 1. Success in making the right decision in ML and DL relies on the classification algorithm. There are different classification algorithms available in ML which are specially designed for classification purposes and the performance is quite decent. Even though performance of ML is quite up to rank, it is currently being replaced by DL in most classification applications. The principle difference between ML and DL is in the technique of extracting the features on which the classifier works on. Extracted features of DL from several non-linear hidden layers makes its classification performance far better than ML's classification which relies on handcrafted feature. In order to understand the difference between ML and DL, let us refer to Fig. 2.

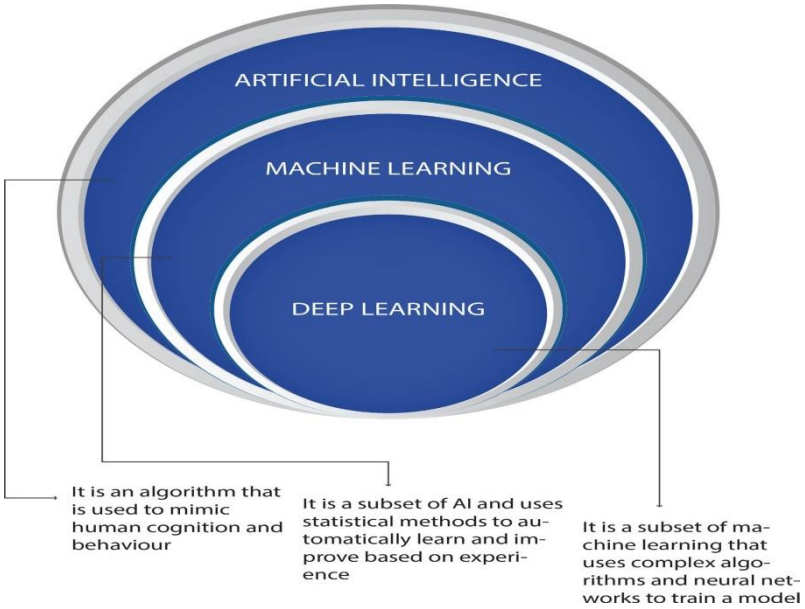

Fig No 2

First, confirm that you have the correct template for your paper size. This template has been tailored for output on the A4 paper size. If you are using US letter-sized paper, please close this file and download the Microsoft Word, Letter file. Deep Learning consists of several features including Images, Audio, Video, raw data, and text data which can be extracted for classification and segmentation. Deep learning's basic idea is to achieve accuracy in performance rather than Machine learning (ML) [12]. Though it may be a subset of ML, it has the

popularity to train a large amount of medical data, stock market, education information, and so on. AI has its empowerment which has collaborated with DL to increase its productivity. Learning develops on a hierarchical basis using DL that has highly flexible methods such that abstraction can be represented for computations [13].

III. DEEP LEARNING

Artificial intelligence and its emerging goal with deep learning discovered many driving approaches that can be applied in various kinds of datasets [14]As deep learning has a framework that can be designed for many patterns that can have support with neural networks to build patterns. Neural Network (NN) is the term that follows many improved algorithms that are similar to human brain behavior [15]. Patterns can be identified with the pattern matching from the Neural Network that can be interpreted from the labels that are clustered as various classes [16] Numerical datasets such as MNIST, Image dataset as object detection, Video dataset as traffic analysis, etc. are main clusters along with classification that data are gradually marked as data labelling [17]. Train the data label is important; unlabeled data might be a challenge for feature extraction. Such deep neural network (DNN) architecture can be introduced. Though Machine learning applications have the same strategies for solving

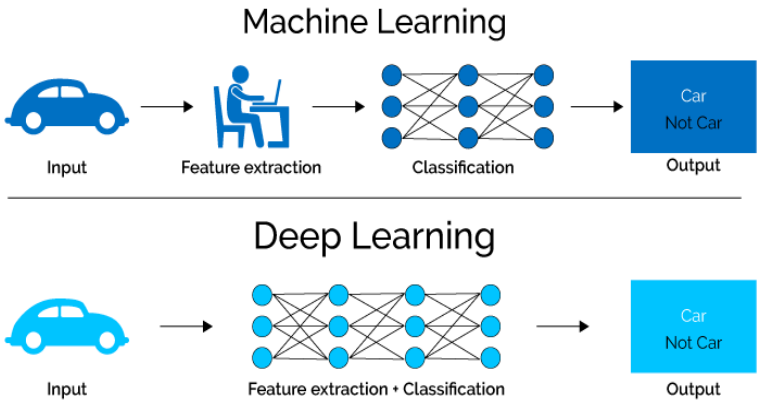

Fig No.3

many real-time problems in the same aspects there were many gradients and vanish problems that occurred [18]. The outcome which was achieved for related prediction was also not up to the standards [19]. Neural networks are formed with nodes for each layer. As there are three layers such as Input layer, Hidden layer, Output layer to mimic the brain patterns and computations, they are defined neurons [20]. The basic idea of a neuron model is that an input, x, together with a bias, b is weighted by, w, and then summarized together. The bias, b, is a scalar value whereas the input x and the weights w are vector valued, i.e., $x \in R^n$ and $w \in R^n$ with n ∈ N corresponding to the dimension of the input. Note that the bias term is not always present but is sometimes omitted. The sum of these terms, i.e. $z = w^T x + b$ forms then the argument of an activation function, φ, resulting in the output of the neuron model, y = φ(z)= φ($w^T x + b$). Considering only the argument of φ one obtains a linear discriminant function . The activation function, φ, (also known as unit function or transfer

function) performs a non-linear transformation of z. These neurons have to increase the ability to approach the stimuli that can receive the input from the N number of nodes. When the set of nodes are managed with their weights, they can react according to the classification, which can avoid summation errors during learning duration.

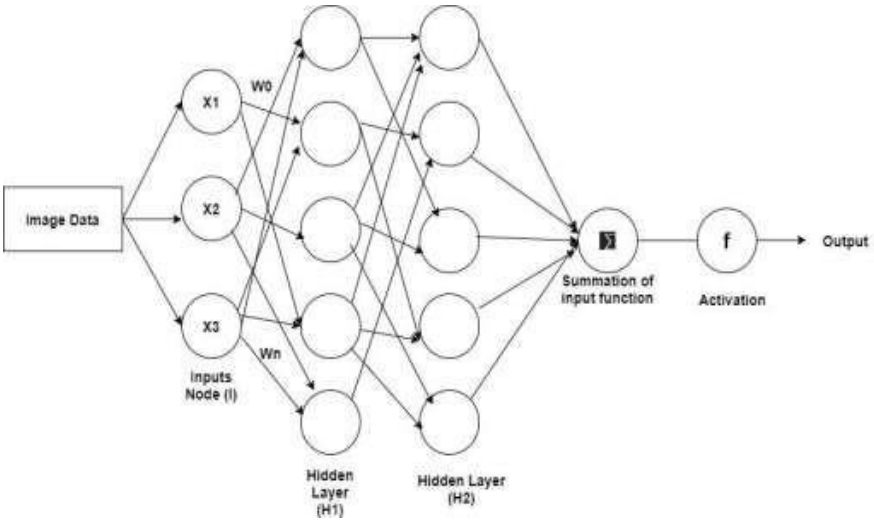

Fig No.4

In figure No. 4 the node and its communication through various neurons are initialized from the beginning where hidden layers can share the data to be received as the output. Weight can be modified and adjusted based on the number of features assigned to predict the classified region [21]. Deep Neural Networks basic steps to make the neuron into the available network which can represent the entire input, for example, if image recognition such as the face, object, is considered a node or neuron that can pass through the hidden layer based on the variation of its weight or relationship between the nodes are matched. The first step is to learn the number of pixels or required shapes according to the provided algorithm. The next step is to recognize the complexity of the nature of the image and its features .And the final level of the Deep Neural Network is to bring the matching shapes or features for prediction with the help of an activation function [22]

A. **Convolutional Neural Network (CNN)**

CNN has been introduced in the 1980s for various applications where it has taken a drastic growth in the late 2000s in various developments. Towards many datasets, there was an excellent performance by computations of classes and labels to improve the standards [23]. CNN also involves neural network concepts to increase the early stage of identification to make the number of attempts to be less for time consumption.[24]. Machines are mandatory for the day to day life where humans enable all their necessary tasks to be done by them. Almost all activities which can replace humans are highlighted using various multitasking for real-time scenarios such as natural language processing, health care analysis, image processing in-hospital data, media data, and so on are classified based on the requirements [25]. Time-based computer vision activities can be handled by a particular algorithm named convolutional neural network that also supports the learning process in deep learning. After the image is classified based on the weight, biases are separated according to the classification and clusters [26].

Convent also makes the input to pre-process for prediction. The next step in CNN is to filter based on the nature of neurons or nodes that can collect features according to the clusters [27]. Once an image is filtered, CNN acts exactly like the human brain by following the patterns from the received images where the Neurons can be visualized as the pair as visual cortex stored in the brain. The retina captures the image stimuli the object/affected region to react based on the responses. While the collective information overlaps to make visible the entire region, they can get connected to individual neurons. Images can be considered as a group of pixels values in matrix form, where the image needs to be in height, width, and stride for flattening that can be fed into the classification process. Perceptron is the other name for neural networks which can be classified as linear types or binary types for known clusters [28]. For example, an image that has 3 * 3 matrices is now converted into vector form of 9 * 1 to complete the flattening procedure as shown in Fig.5

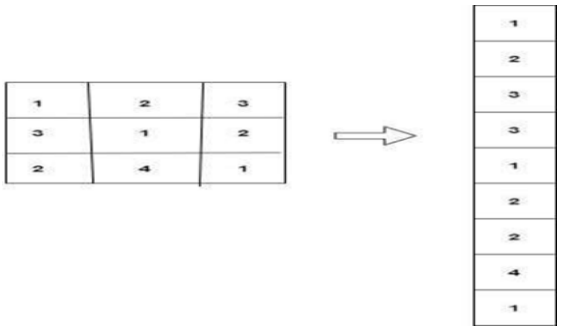

Fig No.5

After multiple filters, the features have been reduced which also utilize the weight of the same networks to reuse the specific features. When the mentioned convent architecture has taken the input as an RGB image (Red, Green, and Blue (RGB)) that has these planes for highlighting the number of spaces in between input images.

When the maximum image size is reached, then the dimension loses the features at first, scalability can also be changed. Certain layers are important to bring the performance and accuracy for learning the parameters based on huge image datasets [29]. They are

i. Convolution layer
ii. Pooling layer
iii. Connected layer.
- Fully connected layer
- Dense layer

iv. Training Phase
v. Testing Phase

In layer 1, Feature extraction from images is mapped towards its correct weight which can have a sum of inputs. Nonlinear activation functions such as ReLu, Sigmoid are used to equalize the located weights.The second layer is the pooling layer where the resolution mapping and average values according to the pixel will be identified. By using the size, filters and strides are applied to the width and height that can develop the region's accurate matches [30]. Max pooling is the form of subsampled location that helps to satisfy the feature analysis

in this layer. Layer 3, working as a stack operation that can make the network follow the movement of each neuron. The fully connected layer depicts the standard and its operation according to the activation .Also, classifiers are improved to achieve accuracy. Also, dense layers work similarly in image classification using CNN. Finally, training and testing steps are to adjust the features according to the variation of weight, biased that can correlate according to the input which can avoid more time consuming and poor performance during different adjustment in features.

B. Artificial Neural Network (ANN)

The Computation algorithms have many scopes in neural networks to mimic the human brain to do things efficiently.The dataset such as images that are recognized in various places such as traffic, health care, etc.to predict the right activities [31]. Biological neurons which process as perceptron's can consume less time and faster in complex data. Similar to all neural networks there are three layers as the Input layer, Hidden layer, and output layer where hidden layers are otherwise called Multi- layered perceptron's. Information sharing between all these three layers results inaccurate in prediction based on adjusted weights and biases. The main theme of ANN is that information is transferred to interconnected nodes. When the combination of both the nodes passes through the next stage of function to activate the final output, it matches the right pattern [32].

C. Deep Neural Network (DNN)

Deep Neural Network (DNN) is another neural network model that works with similar procedures such as ANN, CNN in complex data. When mathematical computations are calculated in neurons to transfer data from one layer to another layer for better performance DNN is the best choice [33]. Basic Evolutions such as AI, ML, and ANN were followed in all Perceptron such that the DNN framework can be a better statistics model for making an accurate prediction [34]. Some of the weights are used to calculate the framework to avoid a computational error. Based on ANN and its hidden neuron communication based on information retrieval, the hidden layer can make effective combinations [35]. In the image, processing multi-tasking was done for many real-time functions such as signal processing, speech conversion, and embedding are performed with the support of DNN [36]. From the source, functions are masking the data to implement the trained epochs which can separate the neurons that are irrelevant to the input features.

D. Recurrent Neural Network (RNN)

RNN is also a deep learning algorithm that works on continuous data that can remember the information from the input. The algorithm has three gates as input gate, output, and forget gate suitable for large memory storage and real-time problems that deal with the internal reference [37]. This is also a powerful Neural Network algorithm that can be more potential to compute

a huge amount of data. Internal memory is the key to its success which can predict the value more precisely than any other algorithm. This algorithm is extended from Feed-Forward Networks which acts like the human brain and follows the network accordingly.

E. Feed Forward Neural Network (FNN)

FFN is also a deep learning model which works similar to RNN that flows in one-way direction from every three layers. Each unique node or neuron passes or transfers data without touching any nodes repeatedly [38]. FFN has no memory like RNN to get the input, so that is not preferred for prediction models. When RNN has Short term memory (STM) to remember the last reached node, they achieve the output exactly Whereas FFN takes neurons in one way that has no input memory which leads to bad internal memory. Loops were identified to find the output layer due to the less process in the individual layer.

F. Multi-Layer Perceptron (MLP)

FFN is the major technique in deep learning where RNN, CNN has followed a similar pattern for successful prediction. Multi-layer perceptron (MLP) is one more class generated from FFN. An artificial neuron that has deep knowledge of a neuron or node to compute the mathematical model efficiently using many neural network algorithms. MLPs are one such form of the deep neural node that has multiple communication layers such as fully connected nodes [39] .Now in the learning methods, after several repeated computations, the nonlinear functions based on layered connections are overcome with the lack of summation issues. Weights from the different nodes using a fully connected layer activate the right function to achieve the prediction [40].

G. Transfer learning (TL)

Transfer learning (TL) is one of the algorithms following the same as machine learning that can reuse the model for performing a similar second performance. To involve the image in a pre-trained model, TL can be utilized [41]. From the initial starting point, the task can be reused according to the computation. Domains such as NLP, Computer vision are performing these combinations of Deep Learning with TL are together known as inductive knowledge same for time-consuming resource utilization [42]. Whenever the Neural Network needs to make the network models to plan for massive data or related challenges, TL can be suggested. Training is the task for modelling the data which can perform the task that comes as a second stage. Optimization based on the faster transfer and knowledge development for pre- trained models is one of the main tasks that can manage features lastly [43]. The transfer models according to the scope are adjusted for bias that can perform the second task more than learning in a more precise way. The hypothesis can perform the steps for searching the source for the problem [44].

IV. REVIEW ON IMAGE CLASSIFICATION

For effective classification of any images, numerous steps are involved. The initial task for classification is pre-processing which includes removal of noise etc. Then appropriate methodology is invoked for effective feature extraction. The distinct features are selected for the appropriate classification and a common methodology for the same is shown in figure1

To understand the steps involved in dementia pattern recognition the following are described as each step,

Image preprocessing.

Feature extraction from neuroimaging.

Classification and segmentation.

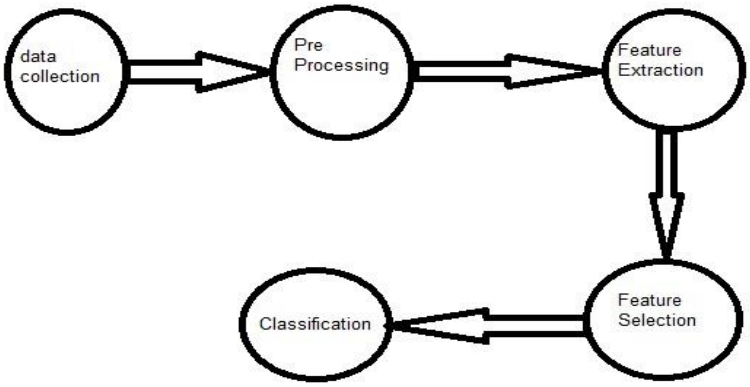

Fig.No.6

Based on all the mentioned steps and techniques used in the research were evolved and elaborated in the survey. Moreover, tabulation of each work with its performance is also provided as comparison studies on AD and dementia [41]. [45] proposed an image processing technique using a Deep Neural Network (DNN) that can focus on accuracy. In terms of image, steps in initial layer steps such as classification are initialized; the author has used different clusters of flowers for choosing the correct image from the datasets. There are two options as training and testing phase for analyzing the DNN model in a better way for producing accurate results in prediction.

V. REVIEW ON ALZHEIMER'S DISEASE AND DEMENTIA

[23] Proposed a model for detecting AD's using MRI datasets by applying Convolutional Neural Networks (CNN) which can find the states. The author also implemented and investigated the deep learning models that can work on different dimensions such as two-dimensional (2D), three-dimensional (3D). For processing 2D on images from MRI volumes for splitting the scanned slices to combine RNN model. Based on the sequence the issue from the features is arranged for taking decisions. From the sequence and its decision that was prepared from 3D and clinical information.

Table 1.Comparison table for research challenges and its main objective

Sr. No	Research articles	Type of dataset	Observation of techniques
1	Morteza Amini and Mir Mohsen Pedram (2021)	EEG dataset	The time-dependent power spectrum descriptor (TD-PSD) method is utilized for feature extraction.
2	Amir Ebrahimighah andnavieh Suhuai Luo (2020)	ADNI dataset with MRI	The Mini-Mental State Examination (MMSE) and the Clinical Dementia Rating (CDR)

3	Jong Bin Bae and Subin Lee (2020)	ADNI dataset with MRI	Proposed a classification deep learning model for achieving accuracy and less processing duration using CNN
4	Shaik Basheera and M.Satya Sai Ram (2019)	ADNI dataset with MRI	CNN classifier for auto- matic classification of AD from MCI and CN using GM(Gray matter)
5	C.R. Adityaa and M.B. Sanjay Pandeb (2017)	OASIS data	An exploratory data analysis approach is proposed to carry out affiliation analysis of AD subjects. The explicit need was to cognize a reference knowledge base(KB) which could be used in the recognition stage, for an accurate discrimination of the test subject as being ND or AD

VI. REVIEW ON SEVERITY PREDICTION IN ALZEIMER'S DISEASES

Applications such as patterns and patches of neuroimaging data were used in most of the researches. Algorithms such as support vector machine (SVM) or k-nearest algorithm (KNN) were mostly involved in classifying multiple data. By achieving accuracy as major results other classifiers were also used. SVM Involvement in state-of-art as the impact of feature selection it produced 67% of accuracy only. Lately, other machine learning algorithms such as independent working algorithms also produced less accuracy in classification. So, the deep learning model was introduced for image processing [46].[47]proposed a model in Comparison with various image classification stages and their severity. The author proposed a CNN architecture that has taken the functional comparison with various image classification stages and their severity. The author proposed a CNN architecture that has taken the functional Magnetic resonance imaging for extracting features. These fMRI helps to perform multiple tasking to learn the class and it's labeled to determine the scores on parameters such as MMSE. Accuracy is also compared based on KNN, SVM, and DT which has less with less performance in comparison with the proposed architecture. The author implemented a classifier to set the model for AD's severity stages to locate the correct stage and diagnose at the earliest.

[48] Discussed the main aim of this work is to classify and predict the neuroimaging images of the affected brain and deal with Mild cognitive impairment. The combination of various machine learning algorithms and stacked encoder algorithms were also extracted similar features to extract the exact location from the pre-processed images. And final stages of severity are to be converted to classify for knowing the deep learning model's ability. Almost the transparency based on the data types is also examined to diagnose the AD's increases in the patient.

Weiming Lin and Tong Tong (2018) proposed a model using CNN for finding prodromal stages of AD and dementia. The author focuses his research on finding age-based MRI scan reports for predicting the MCI to AD

conversion. Also, he has discussed his work based on extracted features from brain images fetched from the ADNI project. These approaches have shown higher accuracy to manage the sensitivity. Also includes the specificity for age corrections according to the performance of the proposed model.

VII. REVIEW ON IMAGE PROCESSING AND PREDICTION USING CNN

Image classification and its phases are focused on feature extraction to train and test according to the model used. Even though the network is eventually shallow which can be implemented on major complex information that can transform according to a deep neural network. Input is given into the first layer as the image can represent the nonlinear capability that shifts to the next layer are implemented. Based on the reliable method images are computed for producing an optimized classifier which can reduce the gradient descent problem. Research almost involved based on image classification is 90% of medical data as of survey exhibits. Medical images a necessary experiment to diagnose or treat the severity in various parts of human health conditions. As many models have been created using CNN that works along with the base of the deep neural network, classifications are underlined processes to take care of these techniques which can achieve the targeted outputs can be represented for computations [49].

VIII.CNN AN EFFICIENT TECHNIQUE FOR IMAGE ANALYSIS

One of the important types of neural networks is ConvNets which has proved its efficiency of working in several fields including recognition of speech as well as image processing [50]. The image sample taken as input will pass through the layers and finally be classified. Fig.7 shows the CNN architecture with few significant operations. The main operations in ConvNets are as follows.

i. Convolution Step.
ii. Rectified Linear Unit (ReLU) Activation function.
iii. Pooling Step.
iv. FC layer with Classification function.

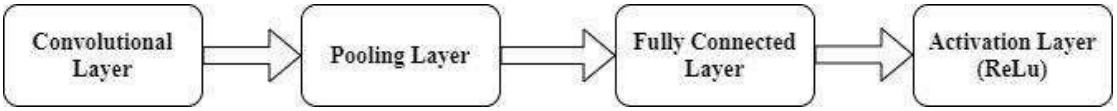

Fig No.7

The input to the ConvNets is a matrix of pixel values of an image. The convolution step is derived from the operator named convolution. Extracting features from the image given as input is the significant purpose of this layer. Kernels or filters used here to identify the feature map may vary based on operations such as image blurring, sharpening, and so on. Parameters associated with the feature map are shifting pixels of the image using stride function as well as padding function.

Followed by the operation of convolution is the Rectified Linear Unit (ReLU) which is the operation performed on each pixel. The introduction of non-linear features is the basic objective of ReLu. Compared to other functions like sigmoid, ReLu is more effective due to its non-linearity [51].Reducing the dimensionality of

feature maps is the main function of the pooling step. The types of down sampling include max-pooling (choosing the largest component), average pooling (all components average) as well as sum pooling (all components sum). Pooling helps in the reduction of spatial size when doing representation of input among datasets. So far, these layers have helped in extracting features from the input, introducing non-linearity as well as reduction of dimensionality in the feature of the image. The above three steps are considered to be the building block of ConvNets. Following these layers is the FC (Fully Connected) layer. The activation function used in the FC layer can be a softmax function or SVM (Support Vector Machine). The significant objective of this layer is to classify the data given as input from the dataset into several classes. The FC layer performs the function of a classifier .Process of training includes,

- Parameter and filter initialization with values chosen randomly.
- All the four operations mentioned above are performed to find the probabilities.
- Squaring of error values to eliminate negative values.
- Incorporating gradient descent to reduce the error.
- Repeat the above process for every image given in the trainingdataset

Sr. No	Research articles	Type of dataset	Observation of techniques
1	Belmir Jesus Jr and Raymundo Cassani (2021)	EEG and MRI dataset	Mini-Mental State Examination (MMSE) Electroencephalography (EEG) magnetic resonance imaging (MRI)
2	Iman Beheshti and Hasan Demirel (2017)	ADNI dataset , pMCI, HC, mPCI.	Novel computerized developed diagnosis
3	Heung-Il Suk and Seong WhanLeeb (2014)	ADNI Neuroimaging with MRI and PET	Modalities,Deep Boltzmann Machine (DBM) with 3D CNN Framework

Table 2 Comparison table for research challenges and its main objective

I. CNN and its Architecture Model

As stated in CNN in detail, several architectures have been used from the late 1980s for image classification. The focus on CNN, one of the emerging techniques that can be efficiently applied in medical image processing for excellent performance and accurate prediction. CNN architecture with a fine example is described with various

applications .There is various pre-trained model which works for different architecture in an image are highlighted in Fig.No.8

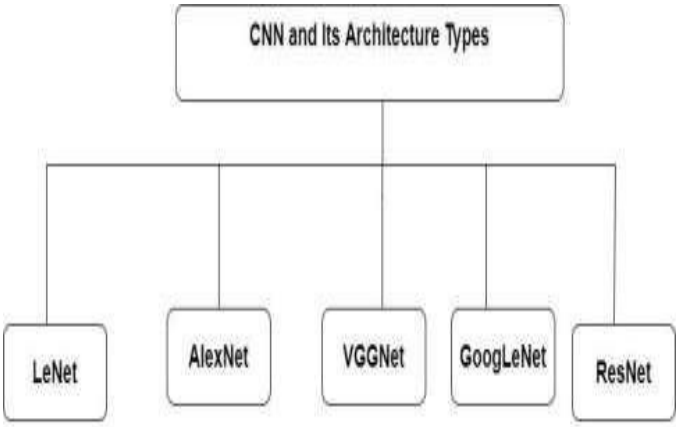

Fig No.8

II. LeNet

In 1998, LeNet architecture was developed by research groups to support CNN architecture. There are seven layers used for fetching the input image with its height and width dimension. Also, it applies six filters for varioussizes along with strides to adjust the feature region. Based on the results tobe predicted, the filter is utilized in the pooling layer. As well, all the remaining layers as per the reduction of noise and fully connected layers may be applied on input. Classes and their labels are summations for flattening the input according to the feature's probabilities. Thus, the LeNet was a good choice when it has a traditional model and fewer image data .

III. AlexNet and VGGNet

Alex found the CNN architecture and named the neural network framework with his name as AlexNet. High-pixel images were examined in the same way as LeNet since it has the same layers in filtering, flattening patterns. Also, to avoid over fitting in training from different layers using data augmentation techniques which results in a lower error rate. In comparison with AlexNet, the variant CNN model VGGNet is also identified [Shaojuan Li and Lizhi Wang (2021)]. VGGNet is also the same depth of architecture that deals in the same framework with RGB colour and various pixels.

IV. GoogleNet and ResNet

GoogleNet is an advanced version of CNN architecture where there are many deep neural networks combined with invariant models from the Google team. Here in the Deep Convolutional Neural Network classification of real-time Object recognition is performed. ReseNet is expanded as Residual Network one of the Deep CNN architecture that was proposed for Image recognition. The main drawback of this architecture is training a huge deep neural network that was processed in many blocks. Based on weight adjustment the blocks are connected. According to the feature extraction

V. CONCLUSION

In this paper, we provided an introductory review for Deep Learning and Machine Learning and Deep Learning Models Including Convolutional Neural Networks (CNN), Recurrent Neural Network (RNN), Feed Forward

Neural Network (FN N), Transfer Learning (TL) and Multi-Layer Perceptron (MLP) .These models can be considered the core architectures that currently dominate Deep Learning. In addition, we review on Image Classification Techniques In Deep Learning and in detail discussed concepts needed for a technical understanding of these models. and we review on Alzheimer's Disease and Dementia And their observation techniques also we review on severity prediction in Alzeimer's Diseases and compare different techniques of AD's Image Processing and Prediction Using CNN and Explain how CNN is Efficient technique for image Analysis hence, a basic understanding of these elements is key to be equipped for future developments in AI.

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