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Alzheimer's Disease Detection Using Mobile Net And Decision Tree

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Abstract- It is believed that an aberrant accumulation of proteins in and around neurons is what causes Alzheimer's disease. Alzheimer's illness (AD) is an illness of the brain with a protracted incubation period that often affects the elderly. Alzheimer's disease is the type of dementia that occurs most frequently. It is a progressive condition that starts with minor memory loss and progresses to loss of ability to communicate and react to environmental cues.
A small deep learning network called the principle component evaluation net (PCANet) makes multi-facet channel banks consider test learning by using principal component analysis (PCA). Blockwise histograms are used to obtain photo attributions after binarization. Given that some multi-facet channels banks are created using test data, PCANet results in highlights with tens, hundreds, or even thousands of different characteristics, which makes it less flexible. We offer the information-free not negative matrix factorization with tensor breakdown network (NMF-TDNet) to address these problems., which depends on PCANet. The proposed work aims to improve the accuracy by using the concept of NMF-TDNet features as input. As an extension, we have applied MobileNet, decision tree, and voting classifier, in which MobileNet got 94.84% with 5 epochs and to increase, we can increase epochs to 97-98%. So with MobileNet, we build the model that is used for detecting the result with MRI Images.

Keywords: Alzheimers disease, PCA Net, Mobile Net, NMF-TD Net, Decision tree, voting classifier**.**

I. INTRODUCTION

A neurological disorder with a protracted incubation period known as Alzheimer's disease (AD), it frequently affects the elderly. As the patient's condition worsens, their memory and mental abilities decline, their neurons are gradually destroyed, and eventually the patient passes away [1]. 50 million people worldwide suffer from Alzheimer's disease. By 2050, it is predicted that the number of Alzheimer's patients will have doubled due to the aging of the global population [2, 3]. Although a number of medications exist that just slow the development of dementia rather than treating it completely, their efficacy is limited [4]. Early cognitive impairment in a patient is classified as mild cognitive impairment, according to numerous studies. (MCI), which is between cognitive normal state (CN) and Alzheimer's disease (AD) condition.. In order to carry out the proper intervention and stop the condition from getting worse, several researchers are working very hard to identify those who are at the MCI stage [5]. Early diagnosis of Alzheimer's disease is therefore essential, and current research has mostly concentrated on identifying the illness's stage.

Recent years have seen a considerable advancement in medical imaging technologies. Its objective is to offer academics and medical professionals a distinctive viewpoint on sickness diagnosis through analysis of medical images, confirm the correctness of medical experts' diagnoses, and provide extra information to inspire future research and analysis. Positron emission radiography (PET), single-photon emission registered tomography (SPECT), and appealing reverberation imaging (X-ray) are a few examples of clinical imaging techniques that can be utilized to obtain clinical images. These numerous imaging techniques may make it easier to find biomarkers for Alzheimer's disease and painlessly spot changes in the structure and function of the brain. Numerous studies have shown that MRI is one of the imaging modalities that is often used in clinical practice and is most frequently standardized. Neuronal loss is the most visible symptom of Alzheimer's disease pathogenesis. The hippocampus and amygdala, which are particular to AD, then begin to recede into the general cortical area. An MRI might reveal these changes. These evident physical alterations occur prior to a major decrease in cognitive function. The majority of current research is concentrated on how to employ computer-aided diagnosis (CAD) based on an MRI to identify a patient's AD stage.

II. RELATED WORK

C. Ballard, A. Corbett, and A. Khan, among others[1], As the world's population ages, more and more people are receiving dementia diagnoses, notably Alzheimer's disease. Some Alzheimer's sufferers' symptoms are only momentarily relieved by current therapies. the main factors to consider Despite research efforts, Alzheimer's disease, appropriate therapy targets, and the lack of a medication that could cure the disease still exist. Currently being studied are amyloid and tau, two major pathology markers about The condition Alzheimer's. Anyhow, there are several examinations in various progressive phases some of which are mostly centered on various adverse reactions & cycles linked with condition some places about now being studied. The study's focus is on novel and repositioned

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medications that aim to block non-tau and non-amyloid pathways that are currently being explored in clinical studies. This covers cognitive and neuropsychiatric therapies as well as conceivable drugs taking condition into consideration. Clinical research & PubMed databases searches were utilized to locate the articles used in this inquiry. More diligently than at any other moment in recent memory, medical professionals are searching for a cure for Alzheimer's disease while taking into account the societal adverse effects of existing treatments as well as new ones. Analysts are looking for elective courses after medications that considered amyloid and tau in clinical preliminary studies failed. The development of biomarkers will provide fresh resources for clinical trials of potential treatments for Alzheimer's disease suggestive treatment and disease modification.

S. G. Papageorgiou, K. G. Yiannopoulou, and others [2], Therefore, studies on current Alzheimer's disease (Promotion) therapy emphasize collaborative goal-setting, navigation toward areas of strength, and restraint-focused psychoeducation while taking the collaboration between the patient, clinician, and parent into consideration**..** When included in a comprehensive treatment strategy, cholinesterase inhibitors (ChEIs), an antagonist of N-methyl-d-aspartate (NMDA), and other FDA-supported Promotion medications like memantine may have subtle "sickness course-changing" advantages by enhancing perception and reducing freedom misfortune. Combining pharmacologic and nonpharmacologic therapies has the potential to considerably reduce signs, halt clinical progression, and lower total healthcare costs. The initial step in pharmacotherapy for Alzheimer's disease is to identify and remove any possibly dangerous medicines and supplements. The most popular type of treatment when it comes to neuropsychiatric symptoms and troublesome behaviors is nonpharmacological therapy. A fraction of the techniques used include psychoeducation, trigger-recognizable evidence & executives, iterative evaluation, and changes to social and natural interference. A lot of study is being done to create more effective treatments, therapeutics, and reliable & practical diagnostic biomarkers for Alzheimer's disease.. Various restorative goals are discussed in developing research articles that consider Alzheimer's disease essential and optional treatment options, and also clinical preliminary assessments of suggestive and illness-changing remedies in individuals with Alzheimer's disease. These therapeutic targets include neurochemicals, pathogenic amyloid and tau processes, the mitochondria, inflammatory processes, neuroglia, and multimodal lifestyle therapies.

According to a study by T. Tong, R. Wolz, Q. Gao, R. Guerrero, et al.[3], machine learning approaches have been widely used to identify specific architectural anomalies in structural magnetic resonance imaging of the brain data and neurological diseases like dementia. In this study, we offer a method for early detection of mild cognitive impairment (MCI) and Alzheimer's disease (Promotion), which definitely makes use of an alternate case learning (MIL) approach**.** In our study, we retrieve local intensity patches as features. Regrettably, not every dementia patient's patch is afflicted in the same way, and some may not show the typical morphology of the disease. It may be difficult to determine whether these patches are spreading any particular diseases as a result. When considering weakly managed learning systems like MIL, dubious preparation names might not be a problem. In our study, we retrieve local intensity patches as features. Regrettably, not every dementia patient's patch is afflicted in the same way, and some may not show the typical morphology of the disease. It may be difficult to determine whether these patches are spreading any particular diseases as a result. When considering weakly managed learning systems like MIL, dubious preparation names might not be a problem. As a result of the suggested method's ability to yield findings that are equivalent to or better than those of two cutting-edge methodologies that employ the same dataset, a new paradigm regarding detection and prognosis of neurodegenerative illnesses may emerge.

III. METHODS

A. The implementation of the suggested task and the study's materials are covered in this part. A. Dataset

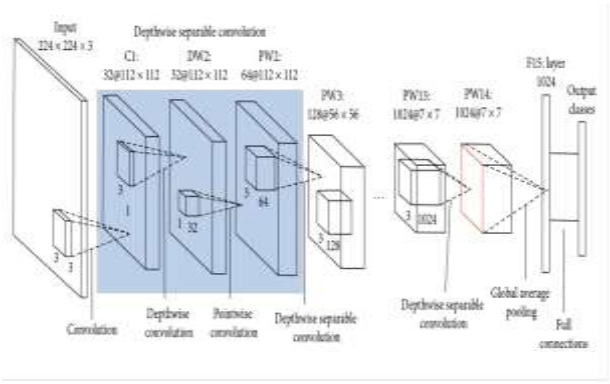
The data collection for this investigation contains 5121 photos for diagnosing Alzheimer's disease. It has each of the four classes. They range from non-demented to moderately demented to slightly demented. Alzheimer's disease detection is being carried out using machine learning approaches. The choice tree, mobility net, and vote classifier are the three. Accuracy performance is improved by this technique. The dataset consists of a training set and a testing set. Eighty percent of the data are in the training set, while only twenty percent are in the testing set.

B.Proposed Method

The suggested study uses the idea of NMF-TDNet characteristics as input in an effort to increase accuracy. As a modification, we used MobileNet, a decision tree, and a voting classifier; MobileNet obtained a score of 94.84% with 5 iterations, and we can raise the epoch count to 97-98%. Therefore, using MobileNet, we create the model for MRI image result detection.

Mobilenet:

Convolutional brain organizations, like MobileNet, have been made particularly consideirng use in implanted & portable vision applications. They depend on a powerful plan certain utilization depthwise divisible convolutions towards create minimal profound brain networks with low inertness consideirng implanted & cell phones.



ISSN: 2278-4632
Vol-13, Issue-08, August 2023

Fig.1: Mobilenet architecture

Fig.1. shows the structure of the mobile net model.

Workflow of the mobile net.

1.Import all required layers from the TensorFlow library.
2.Creating a MobileNet block helper function
3.Creating the model's stem
4.To construct the major element of the model, use the helper function.

Voting Classifier:

A variety of base models are combined in the voting classifier, an ensemble learning method, to get the best outcomes. A variety of techniques, including as KNN, Random forests, Regression, and others, may be used to predict specific outputs using the underlying model. Heterogeneous assembly—the process by which different output is produced—is the result of this. Homogeneous ensembling, on the other hand, happens when fundamental models employ the same strategy to forecast various outcomes.

A neural network model called the Fig. 2 Shows Vote Classifier learns from a wide array of models and forecasts an output (class) using the class which has the highest likelihood of becoming the result.

To predict the result of a category according to the vast majority of votes cast, it merely averages the outcomes of each classifier supplied into the voting classifier.

Instead of creating and validating individual specialized models, we create one model that trains on numerous models and makes predictions based on the overall majority of the vote for each output class.

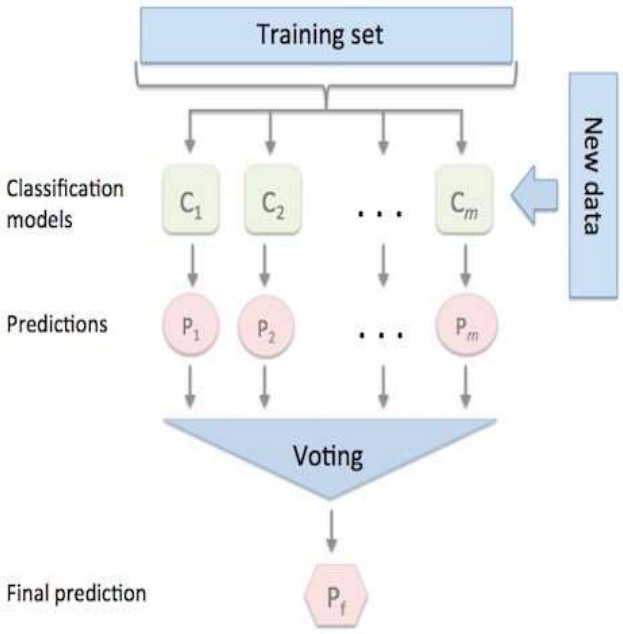


Fig.2 Voting Classifier

Decision tree:

The family of supervised learning algorithms includes the decision tree algorithm. Like other algorithms for supervised learning, the decision tree technique may address regression and classification problems.

In order to create a model for training which can predict the value or class of a target variable, a decision tree is used to learn basic choice rules from historical data (training data).

In decision chains, we start at the base of the structure in order to guess a record's class label. We compare root causes and record characteristics' values. By following the branch that corresponds to that value, we go on to the subsequent nodes based on the comparison.

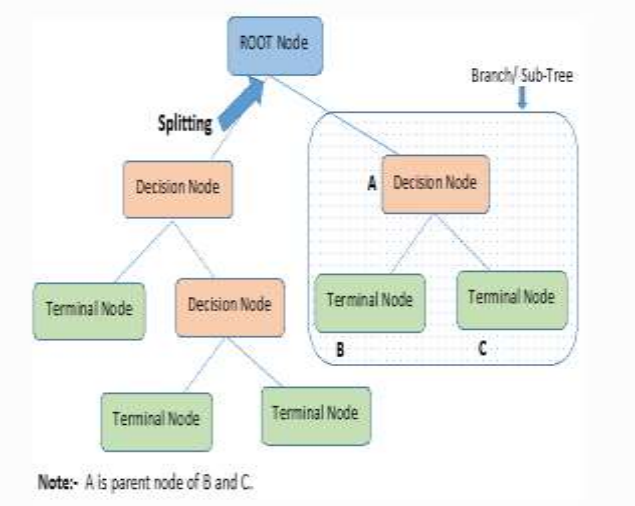


Fig.3 Decision tree

IV. RESULTS AND DISCUSSIONS

To detect items in the present study, Mobile Net, Vote Classifier, and Decision Trees are utilized. Python decision tree algorithm for diagnosing Alzheimer's disease. Here is where you can obtain the decision tree repository. Visit Decisiontree's GitHub page at https://github.com/decisiontree. The official home page for the repository. It is employed in the instruction of

Photographs have been used to educate people about specific illnesses. Depending upon the situation. Once the training is complete, the system checks for any modifications in the confidence rating. Each experiment described in this paper has been done.

4GB of RAM, an Intel Core i5 5th generation processor, and The Google Collaborator GPU has a memory capacity of 4GB.

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Vol-13, Issue-08, August 2023

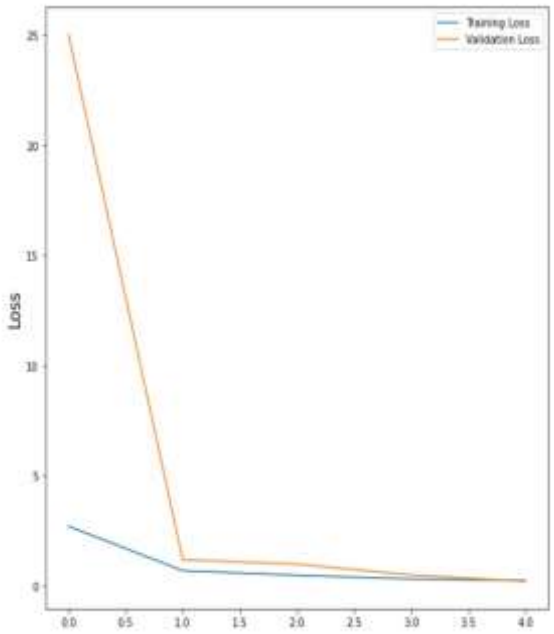

Fig.4 The Loss function of mobile net

Fig.4 Shows that the loss function between the training loss and validation loss.

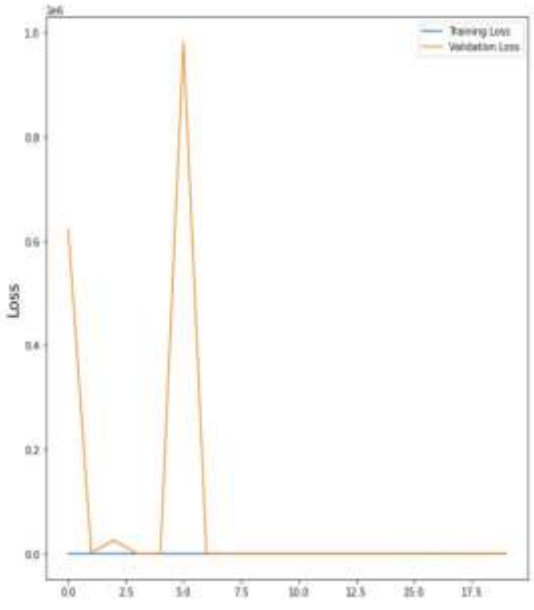

Fig.6 The Loss function of PCA net

Fig.6 Shows that the loss between the training loss and validation loss.

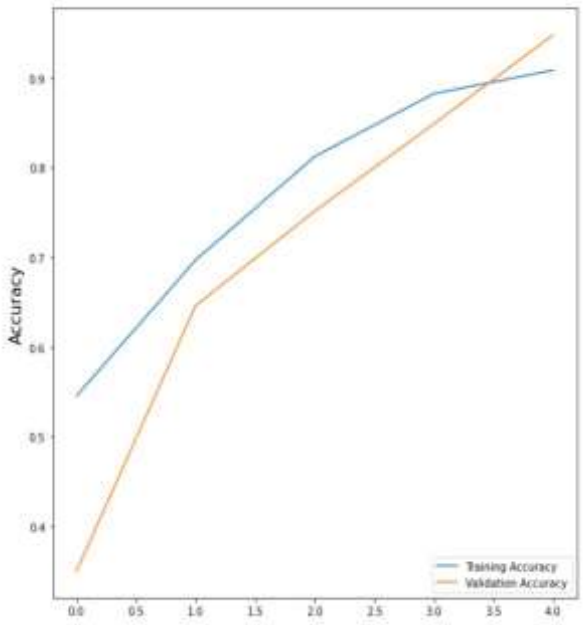

Fig.5 The accuracy of mobile net

Fig.5 Shows that the accuracy between the training accuracy and validation accuracy.

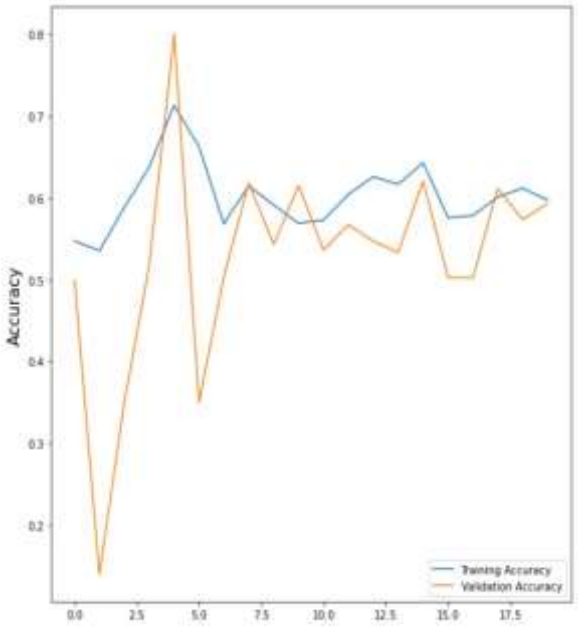

Fig.7 The accuracy of PCA net

Fig.7 Shows that the accuracy between the training accuracy and validation accuracy.

ISSN: 2278-4632
Vol-13, Issue-08, August 2023

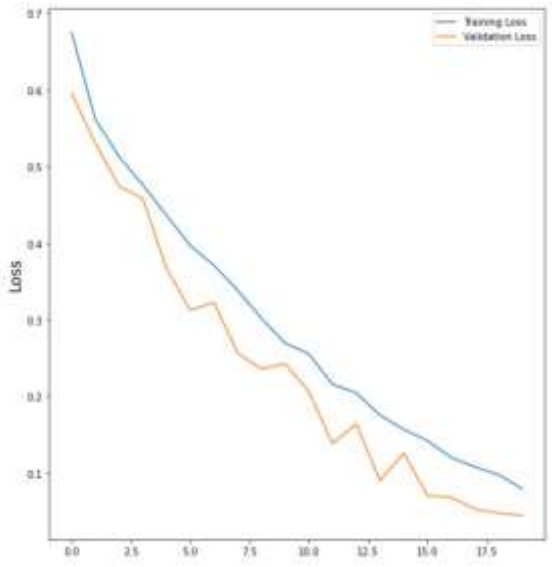

Fig.8 The Loss function of NMF-TD net

Fig.8 Shows that the loss between the training loss and validation loss.

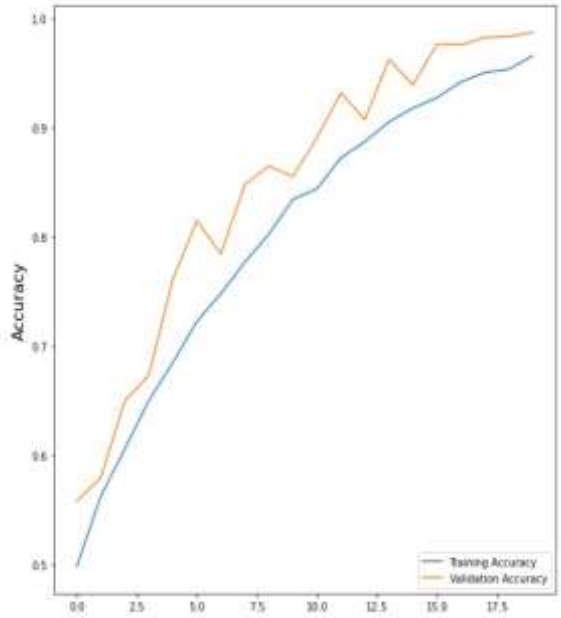

Fig.9 The accuracy of NMF-TD net

Fig.9 Shows the accuracy between the training accuracy and validation accuracy.

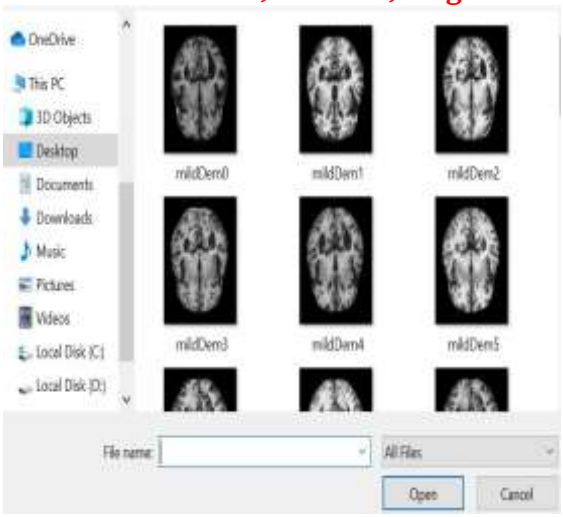

Fig.10 Input for Alzheimer's disease detection

Fig.10 Shows that to give the inputs for Alzheimer's disease detection. The input is in the form of an image in the dataset.

Fig.11 Shows the output of Alzheimer's disease detection. The result of the given input. The given input image is the diagnosis of mild demented.

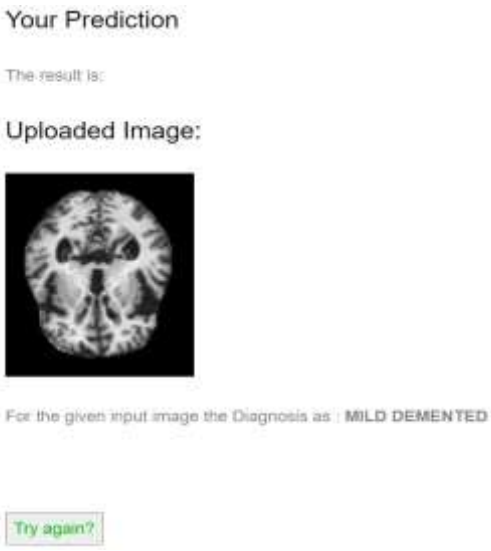

Fig.11 Output for Alzheimer's disease detection

V. CONCLUSION & FUTURE WORK

The system for detecting Alzheimer's disease has been suggested in this paper. There are four categories: non-demented, moderately demented, very mildly demented, and mildly demented. These classes are used in this Alzheimer's detection. The implementation of the decision tree, mobile net, and voting classifier improves the accuracy level. For all kinds of images, the models achieved an accuracy of 100%.

More information on the attack of the brain at whatever point in Alzheimer's disease will be released in the future to improve performance.

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Vol-13, Issue-08, August 2023

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