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# ALZHEIMER DISEASE PREDICTION USING DEEP LEARNING

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**ABSTRACT:** Alzheimer's disease is a neurological brain disorder that progresses and is incurable. Early diagnosis of Alzheimer's disease can aid in effective care and stop brain tissue destruction. Researchers have used a number of analytical and machine learning models to diagnose Alzheimer's disease. Clinical research routinely uses magnetic resonance imaging (MRI) analysis to identify Alzheimer's disease. Because Alzheimer's disease MRI data and typical MRI data of older persons are comparable, diagnosing Alzheimer's disease can be challenging. In many disciplines, including medical image processing, cutting-edge deep learning approaches have recently effectively proven performance at the level of a human. By analyzing brain MRI data, we suggest a deep convolutional neural network for diagnosing Alzheimer's disease. Our model performs better for early-stage diagnosis and can recognise different phases of Alzheimer's disease than most existing techniques, which mostly do binary classification.

## INTRODUCTION:

Short-term memory loss, anxiety, and delusional thoughts are symptoms of Alzheimer's disease. It is a degenerative neurological disorder that is often misdiagnosed as stress or aging-related symptoms. Over 5.1 million Americans are afflicted by this disease. AD does not receive adequate medical care. AD must be treated with medication consistently. Because AD is a chronic condition, it might persist for a long time or your entire life. Consequently, in order to prevent significant brain damage, it is crucial to deliver medication at the right time. Early diagnosis of this disorder is a time-consuming and expensive process since we need to gather a lot of data, apply advanced algorithms for prediction, and include an expert physician. Because automated systems are immune to human mistakes, they can be employed in medical decision support systems and are more efficient than human assessment. As a result, they could tell whether a person was insane or not. Automating Alzheimer's diagnosis will decrease further human interaction in addition to cutting down on diagnosis time. Automation also lowers overall expenses and yields more precise results. For example, by examining MRI scans and using prediction tools, we can determine whether a patient has dementia. A person is regarded as

having dementia if they have early-stage Alzheimer's disease. Even though Alzheimer's disease remains in its early stages, most people can still operate independently by classifying the stages of the disease. Hence, we can improve accuracy.

## LITERATURE SURVEY:

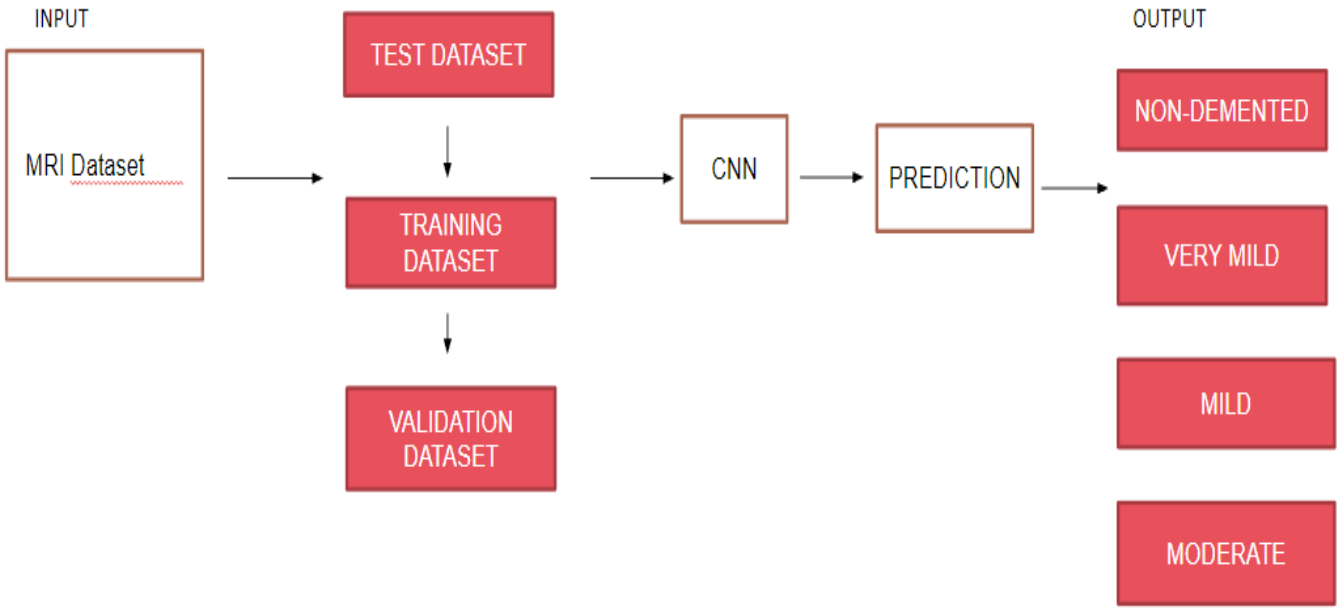
[1] .Title: Deep ensemble learning for Alzheimer's disease classification[2020]:
Author:An,N., Ding , H., Yang, J., Au, R., & Ang, T. F. A - It is possible to offer adequate coverage for more precise diagnostic services.Neural network is used as a meta classifier. In our system, base classifiers act as holds for doctors with various levels of clinical experience. They can draw on the knowledge of experts and data from a variety of sources to produce accurate outcomes that can be used as a guide in clinical situations.
[2] .Title: Machine learning framework for preventing Alzheimer's Disease[2020]:
Author:R.Sivakani, Gufran Ahmad Ansari - Alzheimer's disease is predicted using the ML algorithm by using feature selection and extraction techniques. Feature Extraction is one of the issues in the prediction using a large dataset.
[3] .Title:Classification of Alzheimer's Disease from MRI Data Using an Ensemble of Hybrid Deep Convolutional Neural Networks[2019]:
Author:Jabson, E., Ahmad, M.O.,& Swamy, M. N. S - Applying the suggested algorithm to the OASIS dataset demonstrates that the proposed classification framework outperforms some common techniques. Accuracy is 95.23%.
[4] .Title:Deep Convolutional Neural Network based Classification of Alzheimer's Disease using MRI Data[2019]:
Author:A.Naz,S. M. Anwar, R.Liaqat, J. Iqbal, U. Bagci and M. Majid-In this paper, based on a two-dimensional deep convolutional neural network (2D-DCNN) and an imbalanced three-dimensional MRI dataset, we have suggested a smart and precise method of detecting AD. The suggested 2D-DCNN model is superior in terms of accuracy, efficiency, and stability, according to experimental results on the magnetic resonance imaging (MRI) dataset from the Alzheimer Disease Neuroimaging Initiative. Experiments using the National Alzheimer's Coordinating Center's clinical dataset. The suggested framework's accuracy is 4% higher than that of six well-known ensemble techniques.

## Methodology:

Our proposed system is that earlier detection of Alzheimer's disease can help with proper treatment and prevent brain damage. Improving the early diagnosis of Alzheimer's disease. An early Alzheimer's disease provides you with a better chance of benefiting from treatment. The method can incorporate longitudinal multiple domain data and take variable-length longitudinal data to capture temporal features at multiple time points. In particular, non-overlapping samples as well as overlapping samples from each data can be used to build a prediction model. It is quite possible that due to

human error there could be cases where early detection could be missed that may lead to major problem eventually.Our project uses deep learning techniques such as convolutional neural network to build a model that detects the classification of the disease into stages where early and mild symptomatic patients may have chances to get treated. The results of the classified stage will be visible .

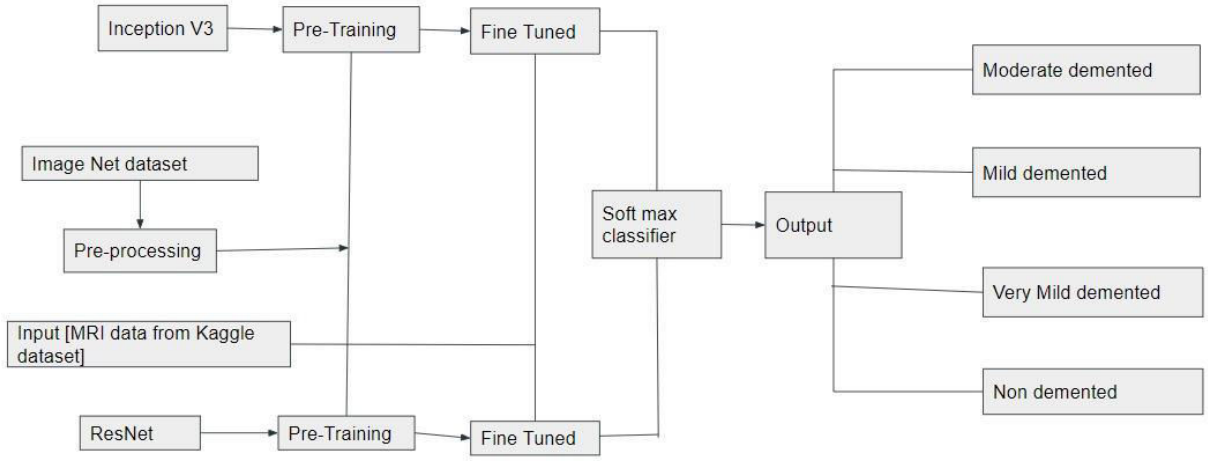
**BLOCK DIAGRAM:**




**DATASET :**

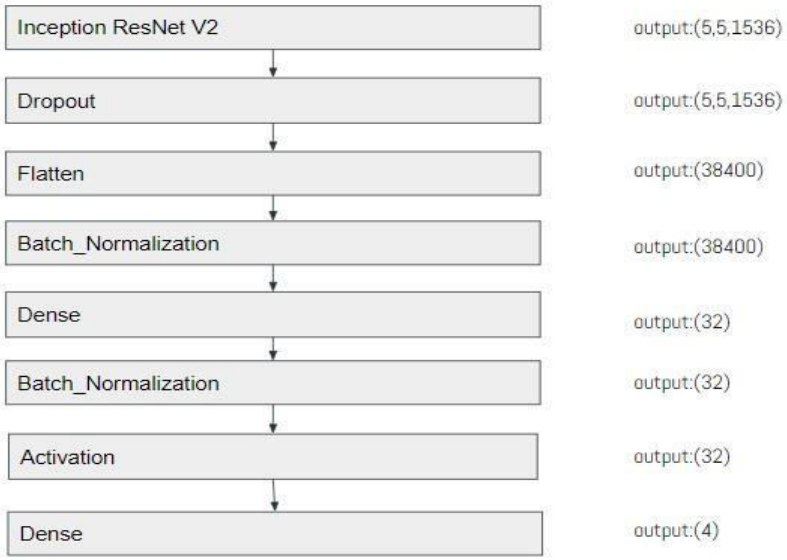
We have taken a dataset and augmented the data according to the training and testing model. And the output is classified as four stages such as Non demented,Very mild demented, Mild demented and Moderate demented. Based on the stages we have taken the dataset for training the total dataset taken is 5121 and for testing 1279 is taken. Total training and testing data is 6400.

## PROPOSED SYSTEM:

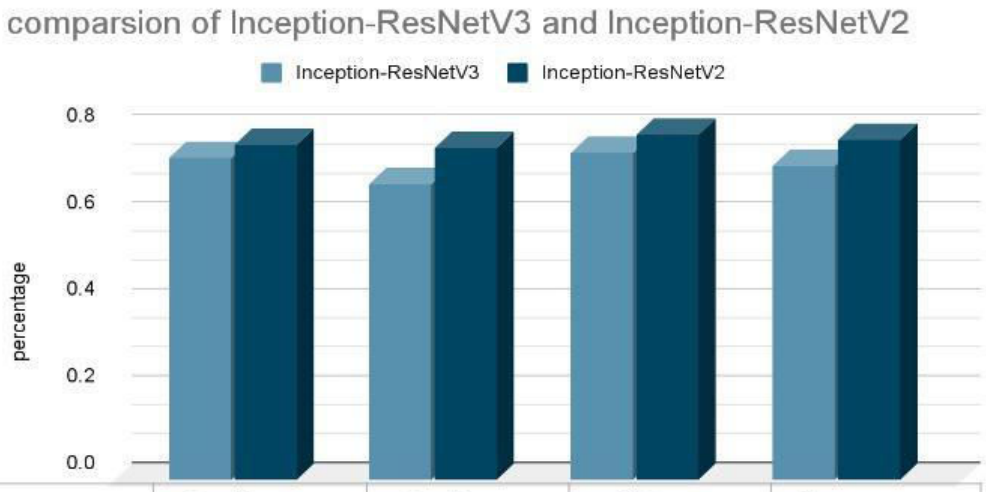



## CNN ALGORITHM:

Inception ResnetV2 is a Convolutional neural network that is trained on more than a million images from the ImageNet database.The network is 164 layers deep and can classify images into 1000 object categories. Inception Resnet V2 is used for feature extraction and CNN is used for classification.



## COMPARISON OF CNN ARCHITECTURE:




| | Precision | Recall | AUC | F1 score |
|---|---|---|---|---|
| Inception-ResNetV3 | 0.74 | 0.68 | 0.75 | 0.72 |
| Inception-ResNetV2 | 0.77 | 0.76 | 0.79 | 0.78 |

## RESULT:

| MODEL | | PRECISION | RECALL | AUC | F1-SCORE |
|---|---|---|---|---|---|
| INCEPTION-RESNET V3 | 74.52 | 0.74 | 0.68 | 0.75 | 0.72 |
| RESNET 50 | 75.07 | 0.75 | 0.76 | 0.76 | 0.73 |
| INCEPTION-RESNET V2 | 78.97 | 0.77 | 0.79 | 0.79 | 0.78 |

Comparison of inception ResnetV2 with existing methods

From the above It is clear that the Inception-ResNetV2 provides more accuracy than the Inception-ResNetV3 and ResNet 50 in predicting the disease in its early stage. In this proposed work, 20 epochs are used to train the model to get better performance than compared with existing algorithms like Inception-ResNetV3, ResNet 50.

## CONCLUSION:

The proposed model on Inception- ResNet V2 architecture to capture the rich feature using the MRI input images. According to the experimental effects the proposed method plays better at categorizing Alzheimer's disease and its stages, the CNN model's performance will be increased. The accuracy of the proposed work is 79%.

## FUTURE WORK:

By increasing the number of images in training and testing it achieves above 85 % accuracy. From this perspective, the future work may be continued to work on combining different architectures to get better accuracy and efficiency.

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[6].https://www.sciencedirect.com/science/article/pii/S1532046420300393#:~:text=An%20ensemble%20learning%20method%20for%20Alzheimer's%20disease%20classification.&text=Using%20DBN%20to%20combine%20predictions%20and%20cope%20with%20their%20dependences.&text=Leveraging%20the%20wisdom%20of%20experts%20and%20multisource%20data%20to%20make%20better%20outcome.&text=Points%20out%20a%20new%20way,primary%20care%20of%20Alzheimer's%20disease.

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