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Detection of Alzheimer's disease using Magnetic Resonance Images Based on VGG19 & DenseNet169

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Abstract: ***Alzheimer's disease is a fatal degenerative brain condition. It is a neurological condition that primarily impacts seniors. The disease of Alzheimer's is the main factor in mental illness. Early detection and the right kind of therapy can greatly aid in controlling the complaint because this is a progressing sickness. This design suggests a model that analyses brain MRI sample images to determine whether or not a person has Alzheimer's disease. For this type, we employ the VGG19 and DenseNet169 architectures, providing a comparative study of which frame exhibits promising outcomes.***

I. INTRODUCTION

The most prevalent progressive, dementing neurological ailment affecting the elderly is Alzheimer's disease, which affects countless people every year and is expected to continue to rise as the population ages. The complaint has a significant emotional impact on the carers and families of people who were tortured in addition to the financial burden it places on the health care system.

II. LITERATURE SURVEY

1) Alzheimer Disease prophecy using Machine Learning Algorithms

Authors: Neelaveni and M.S.G. Devasana

The most common neurodegenerative disorder is Alzheimer's disease. Initially innocuous, the symptoms gradually worsen over time. A prevalent form of insanity is the Alzheimer's complaint. Because there is no cure for this issue, it is a difficult one. A complaint review is conducted, but only at a later stage. Therefore, if the complaint is anticipated beforehand, the symptoms or progression of the complaint may be slowed down. This study makes use of cognitive factors like age, the number of visits, the MMSE, and education to predict Alzheimer complaints.

2) Diagnosis of Alzheimer Disease using Classification Algorithms,

Authors: M. S. Roobini and M. Lakshmi

Alzheimer's disease is typically recognised as a brain disorder that affects thinking, memory, and thinking. Many scientists have used different classification algorithms in the past, with an average accuracy of 69%. This paper includes the implemented algorithms provide greater accuracy than previous work. Pre-processing is done to identify duplicate data and null values for patients arriving for evaluation. The number of patient visits is regarded as a key factor in this application of various classification algorithms, including SVC, Random Forest Classifier, Logistic Regression, Neighbour Classifier, and Decision Tree Classifier, for predicting the presence of Alzheimer's in the patients.

III. PROPOSED SYSTEM

This design suggests a strategy to assess whether a person has mild, moderate, or no Alzheimer's complaint as an affair using brain MRI sample images as input. For this type, we employ the VGG19 and DenseNet169 designs, providing a comparative analysis of which architecture exhibits promising outcomes.

IV. PROPOSED ALGORITHM

1) *VGG19:* The number "19" in VGG19 refers to all of the weight layers that are present in the network. 16 convolutional layers and 3 fully connected layers make up this design. The fully connected layers use the features that the convolutional layers have extracted from the input images to produce predictions. It is a development of the VGG16 architecture and was created especially for jobs involving picture categorization.Three-channel (RGB) images with a fixed input size of 224x224 pixels are supported. To preserve spatial dimensions, it uses 3x3 convolutional filters with a stride and padding of 1. The feature maps are down sampled and their spatial dimensions are decreased using max pooling layers with 2x2 filters and a stride of 2.

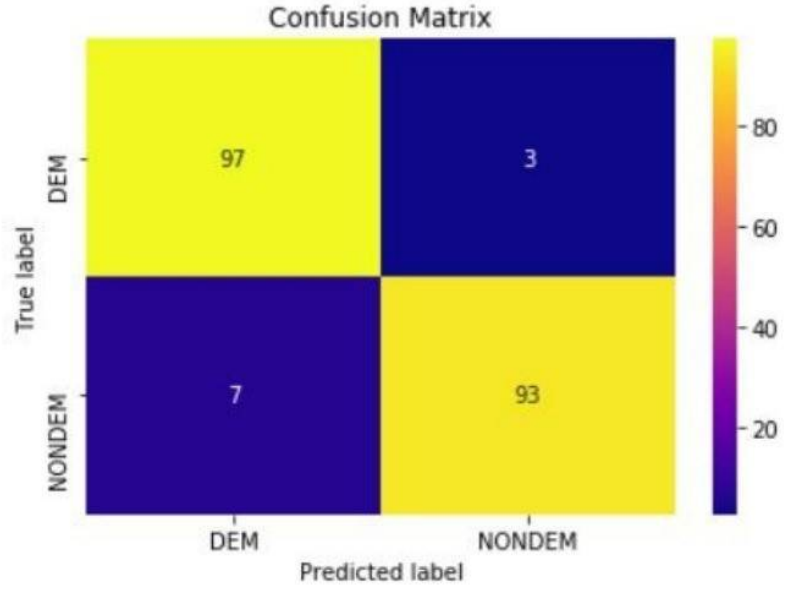
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2) DENSENET169: The DenseNet is a variant of the conventional CNN model. With the use of ImageNet weights, we approximated the utilisation of DenseNet-169, and we updated the final subcaste as will be explained later. DenseNet is made up of substantial blocks. The layers in those blocks are closely interconnected, and every subcaste can access the affair point maps from the previous caste. A group of layers joined to all of their previous layers is referred to as a thick block.

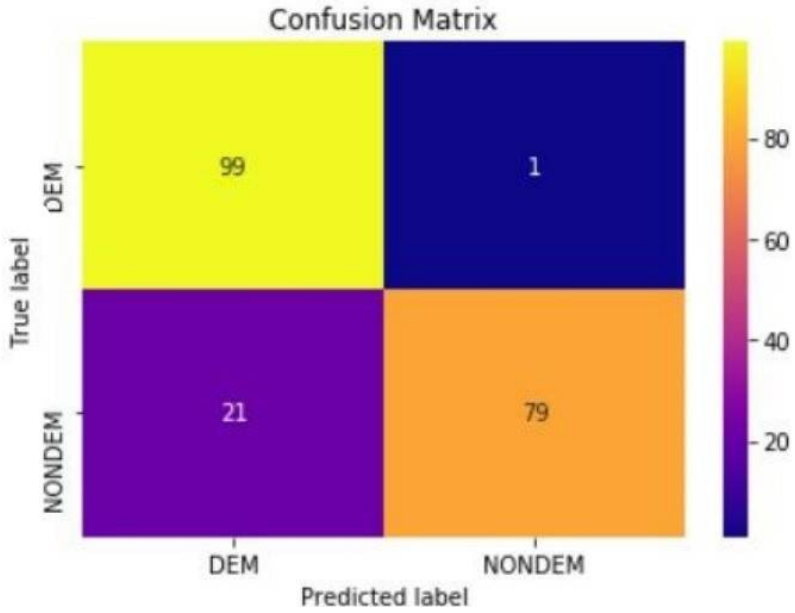
V. RESULTS

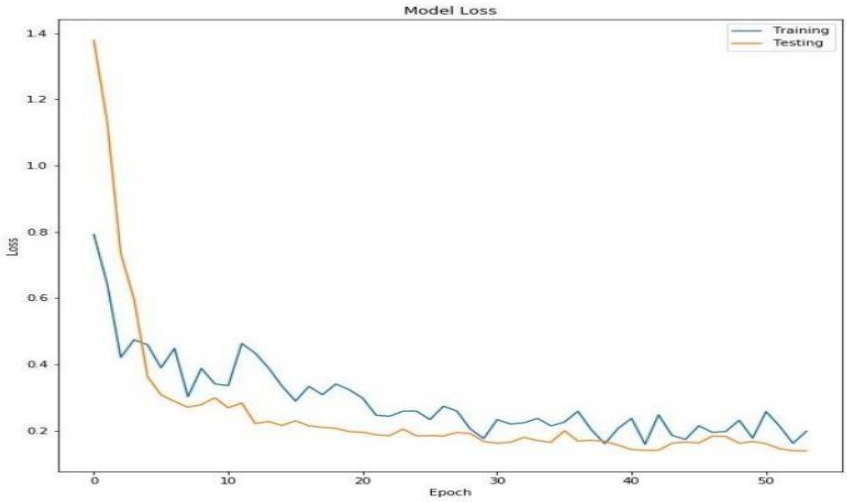
A. Output Screens

1) Confusion Matrix Densenet169

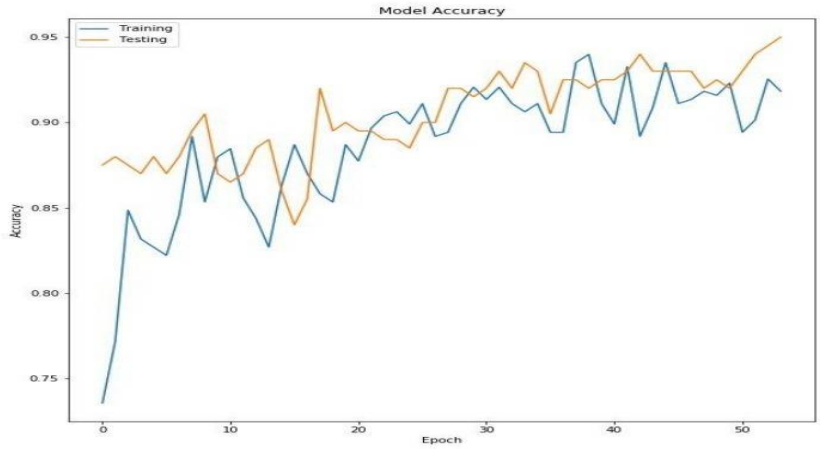


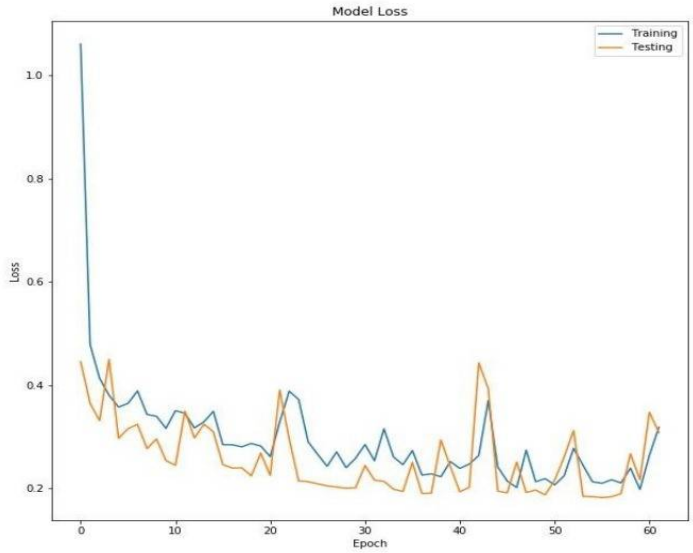
2) Confusion Matrix VGG19





DenseNet169





VGG19

	precision	recall	f1-score	support
0	0.82	0.99	0.90	100
1	0.99	0.79	0.88	100
accuracy			0.89	200
macro avg	0.91	0.89	0.89	200
weighted avg	0.91	0.89	0.89	200

DenseNet169

	precision	recall	f1-score	support
0	0.93	0.97	0.95	100
1	0.97	0.93	0.95	100
accuracy			0.95	200
macro avg	0.95	0.95	0.95	200
weighted avg	0.95	0.95	0.95	200

VI. CONCLUSION

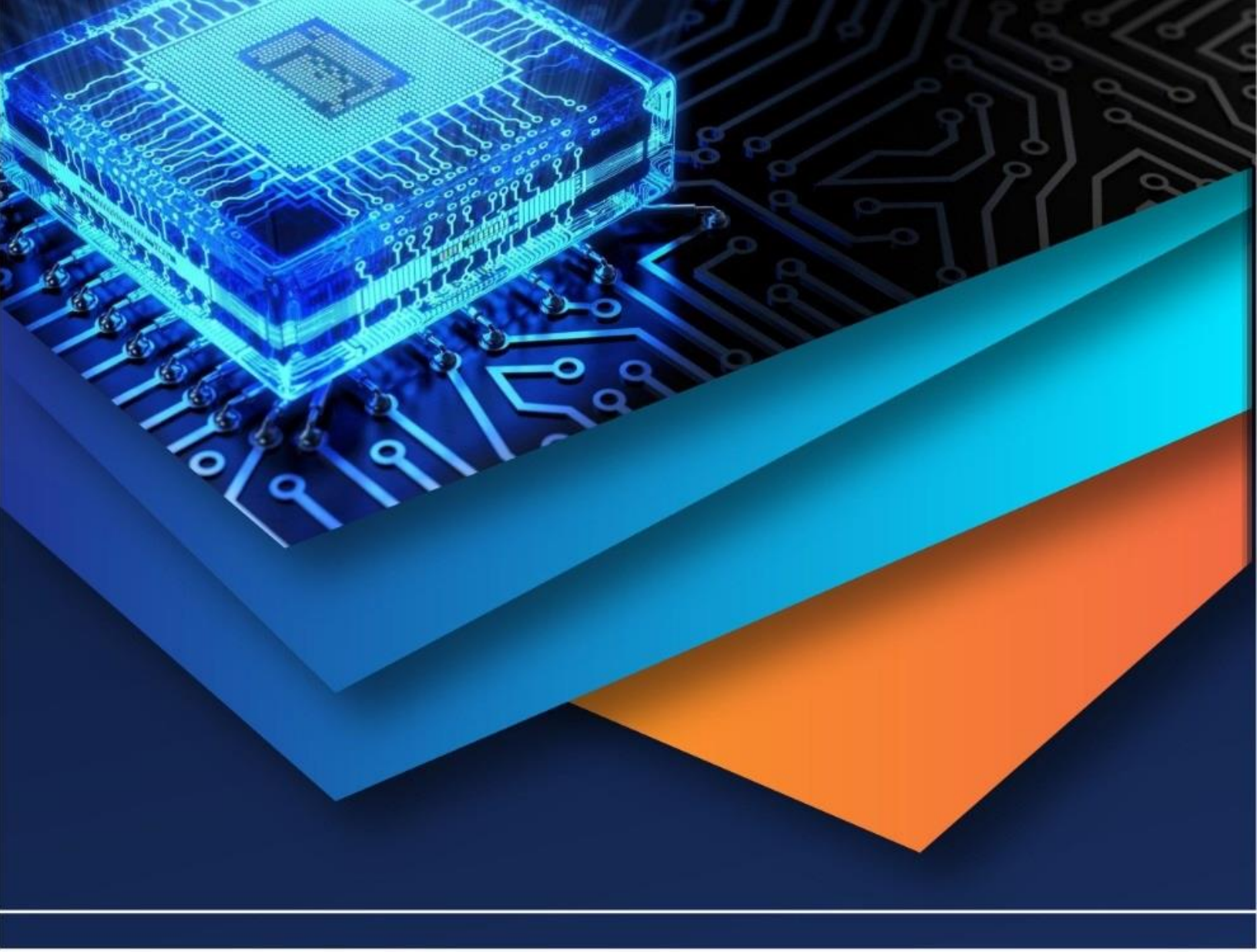
Dementia's main cause is Alzheimer's disease. Machine learning techniques can identify subtle and spatially complicated hippocampal deformation patterns between AD patients and healthy control subjects. The goal of this initiative is to identify a potential remedy for early disease detection. The models utilised in this study correctly divided the images into the proper two groups, and they gave us results that were quite encouraging. The accuracy of DenseNet169 is 95%, whereas that of VGG19 is 89%, according to the results. demonstrating a 6% improvement in accuracy over the current VGG19 model over DenseNet169. This means that the DenseNet169 model outperforms the VGG19 model with our dataset. To ensure that this particular model can be used in clinical settings, more study is necessary.

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