ALZEHEMIR DETECTION AND CLASSIFICATION USING DEEP LEARNING CONVOLUTIONAL NEURAL NETWORK

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Abstract
Alzheimer's disease is a progressive disease that affects the memory and overall functioning of the brain. Unfortunately, no one test can yet diagnose this condition. Cerebral examinations alone cannot be used to determine whether or not a person is suffering from it. As of today, the physician has concluded that an individual has Alzheimer's disease based on complaints from relatives regarding social proclivity and a review of the past clinical record. Artificial intelligence combined with Machine Learning algorithms may be able to improve this model. Big processing is required due to the fact that data is collected from a variety of sources and is subjected to a variety of conditions that are bound to arise in the future. Along these lines, we'll consider the effects of how many patients get sick as positive and negative statistics. In terms of data mining, the proposed arrangement demonstrates a large processing model. This research discusses the work of constructing Alzheimer's rate and attributes as a disarray framework utilizing multiple machine learning methods using classifiers. An earlier study found that employing a Support Vector Machine classifier to detect Alzheimer's disease yielded very low accuracy. As a result, accuracy must be improved. So, this study presents many algorithms for classifying data in order to increase the efficiency in diagnosing the disease in question, and it is discovered that the Support Vector Machine with linear kernel model provides superior accuracy than other models.

I. INTRODUCTION

Various state-of-the-art mothods have been used to diagnose this condition, including the following:
The Gaussian Mixing Model was utilized by Nair and Mohan. segmentation of gray matter (this model is utilized for the classic).The difficulty of categorization, as well as the problem of estimating the density). The features are then retrieved using the Partial Least Squares method.Support Vector Classification using the Squares Algorithm Machine. Ben Rabeh, Benzarti, and Amiri also spoke classification approach based on Level segmentation Our technique begins by retraining four learning samples.Using four distances, determine the closest to the new input.

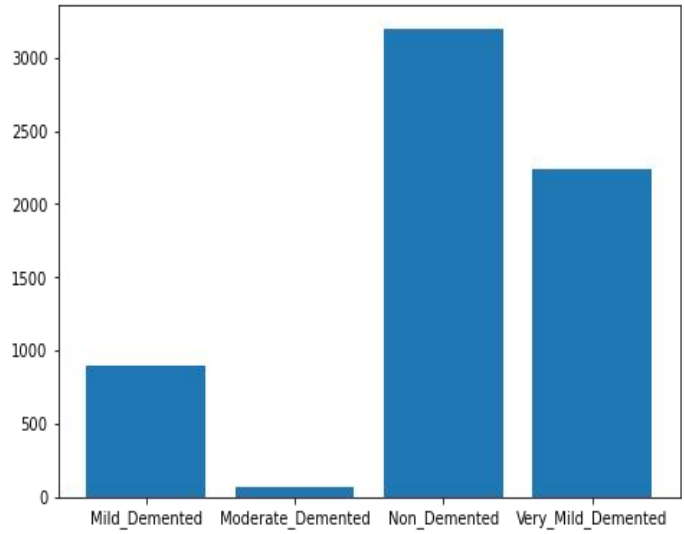
This method use the Bayes algorithm to classify photos. theorem.
Medical imaging is a crucial field of study. It has lately evolved as a result of its utility in diagnosis and therapy. Magnetic resonance imaging (MRI), ultrasound, X-ray scanners, and radiography are among the most frequent imaging procedures. These techniques are complementary, and each has its own distinct properties. They enable users to contribute additional details about the human body, such as the brain. For example, an MRI is a very useful scan for obtaining a high-contrast image of the brain. It is required for the detection of abnormalities in a specific organ, blood clots, and brain malignancies. It can also be used to detect issues in other areas of the brain, such as Alzheimer's disease . Alzheimer's disease is a multifaceted neurological illness. One of the most well-known cases of dementia among the elderly is Alzheimer's disease. Among the signs of dementia include difficulty in expressing oneself, memory problems, and a variety of handicaps that make the patient's daily life extremely difficult.

The rapid and accurate diagnosis of Alzheimer's disease (AD) using structural magnetic resonance imaging (MRI) has piqued researchers' interest, thanks to a growing number of recent studies fueled by deep learning techniques that have achieved state-of-the-art performance in a variety of fields, including medical image analysis. Convolutional neural networks (CNNs) are commonly used for picture data processing because of their capacity to handle vast amounts of unstructured data

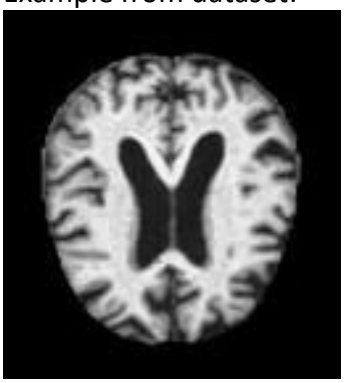
The main motive behind sharing this dataset is to design/develop an accurate framework or architecture for the classification of Alzheimers Disease.

II. DATASET

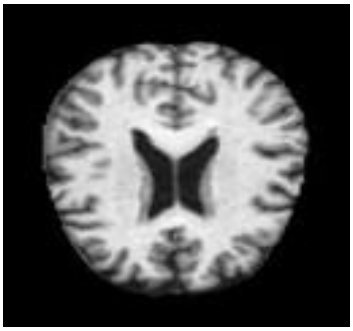
Alzheimer MRI Preprocessed Dataset (128 x 128) The Data is collected from several websites/hospitals/public repositories. The Dataset is consists of Preprocessed MRI (Magnetic Resonance Imaging) Images. All the images are resized into 128 x 128 pixels.The Dataset has four classes of images. The Dataset is consists of total 6400 MRI images.
Class - 1: Mild Demented (896 images)
Class - 2: Moderate Demented (64 images)
Class - 3: Non Demented (3200 images)
Class - 4: Very Mild Demented (2240 images)



Example from dataset:


Mild Demented


Moderate Demented


Non Demented


Very Mild Demented

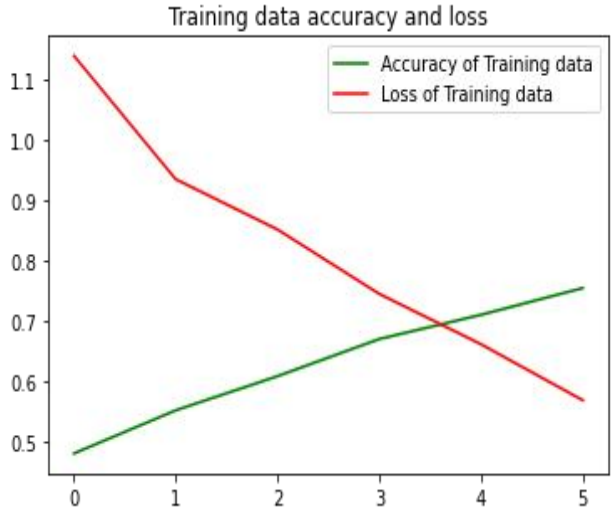
III. METHODS

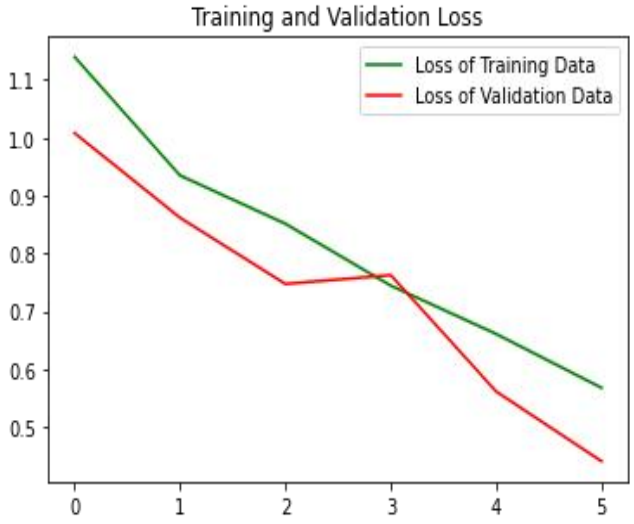
CNN: The CNN is a multilayered network structure that originated from the multilayer perceptron, a classic neural network approach. It is divided into two parts: the first is the convolutive portion, which serves as an image feature extractor. The image is put through a series of filters to create convolution maps, which are new images. Some intermediary filters use a local maximum operation to degrade image resolution. The convolution maps are then combined to form a feature vector. This vector is coupled to the input of a second element, the classification section, which is made up of completely connected layers (multilayer perceptron) that allows images to be classified into two classes.

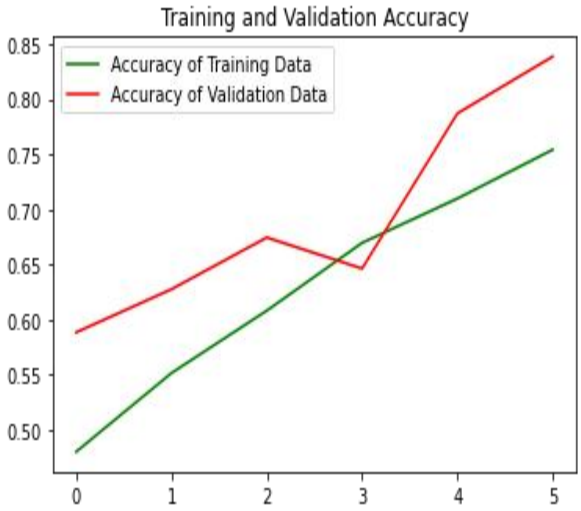
Layer (type) =================================	Output Shape	Param #
rescaling (Rescaling)	(None, 128, 128, 3)	0
conv2d (Conv2D)	(None, 128, 128, 16)	448
max_pooling2d (MaxPooling2D)	(None, 64, 64, 16)	0
conv2d_1 (Conv2D)	(None, 64, 64, 32)	4640
max_pooling2d_1 (MaxPooling 2D)	(None, 32, 32, 32)	0
dropout (Dropout)	(None, 32, 32, 32)	0
conv2d_2 (Conv2D)	(None, 32, 32, 64)	18496
max_pooling2d_2 (MaxPooling 2D)	(None, 16, 16, 64)	0
dropout_1 (Dropout)	(None, 16, 16, 64)	0

1) Preprocessing:
We prepocessing dataset from directory output/train include 5119 .jpg files belonging to 4 classes which are ['Mild_Demented', 'Moderate_Demented', 'Non_Demented', 'Very_Mild_Demented']. Output/test include .jpg 642 files belonging to 4 classes. Output/test include 639 .jpg files belonging to 4 classes.

2) Predictions:
As we set given epoch 6 and batch size 64, we measure: loss: 0.4663 - accuracy: 0.8162







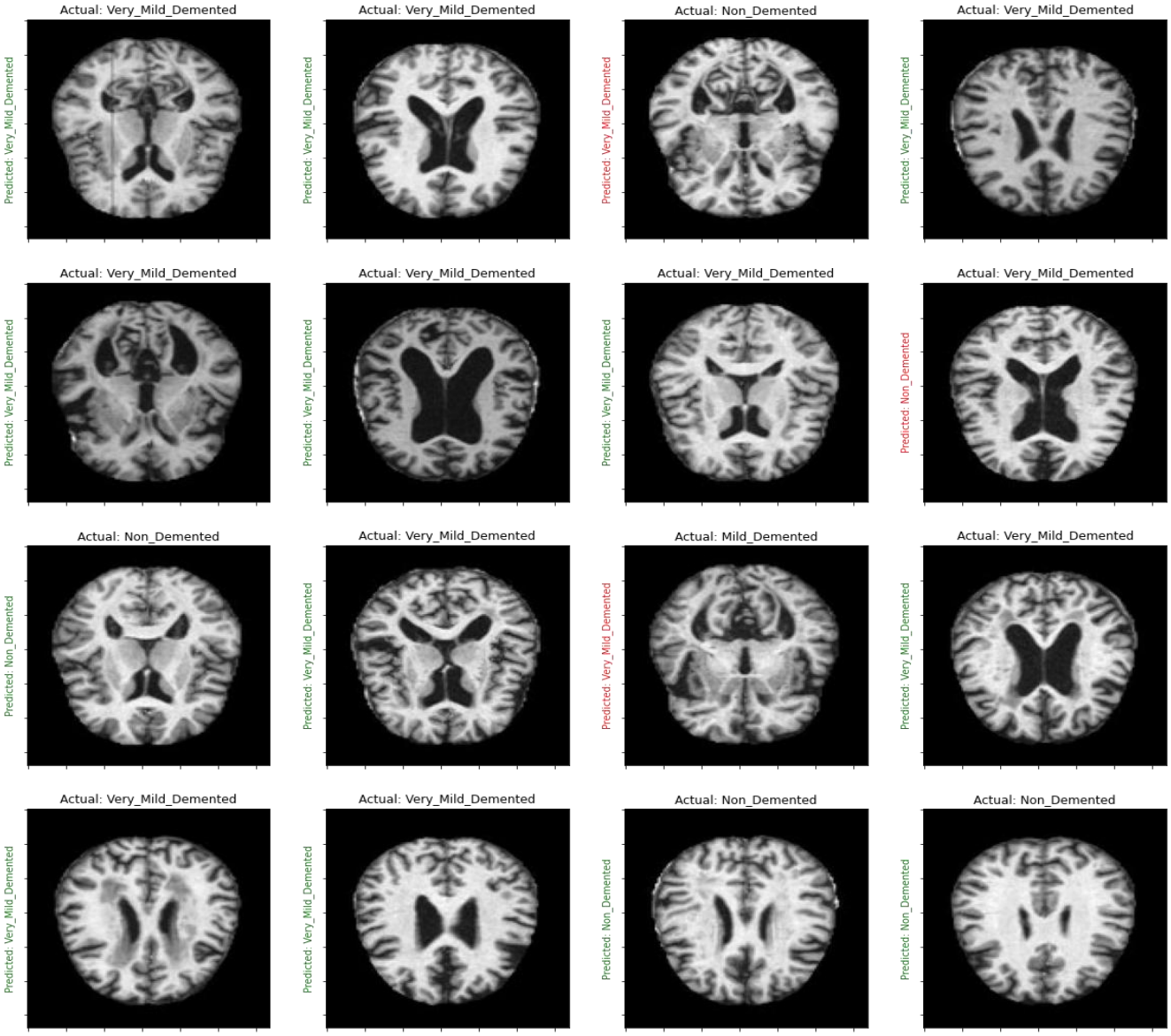
3) Classification:

```
class_names = train_ds.class_names
print(class_names)
train_ds
```

['Mild_Demented', 'Moderate_Demented', 'Non_Demented', 'Very_Mild_Demented']

The classification of photographs entails a classifier putting the various objects into multiple classes based on several classification criteria. We have four classes in our situation (Mild_Demented', 'Moderate_Demented', 'Non_Demented', 'Very_Mild_Demented). After the blocks have been retrieved, the classification step will be completed using CNN , in order to compare classification rates.
Using different populations, we built and extensively validated an AD classification CNN-based system. Regardless of a subject's demographic features, our strategy using 2D slices matching to the early neurodegeneration sites of AD has practical advantages in terms of processing speed and accuracy.

IV. EXPERIMENTAL RESULTS



As we set epoch to 6 and batch size 64, we observe 13/16 true predicted values which is 0.81 accuracy.

V. CONCLUSION

The use of Machine Learning algorithms to detect "of" Alzheimer's infection using datasets of medical reports speeds up Alzheimer's detection. This prediction can assist patients in taking the necessary responsive measures to assist the patient. Although no cure for this condition has been discovered, the patient may be offered therapy to help them combat the sickness. It's easier to figure out what stage they're at with the help of prediction algorithms, so therapy can begin. If a cure for Alzheimer's disease is discovered in the near future, this prediction could assist them in determining what stage of the disease they are in and whether or not therapy would help them.

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