Ifti Yeamin
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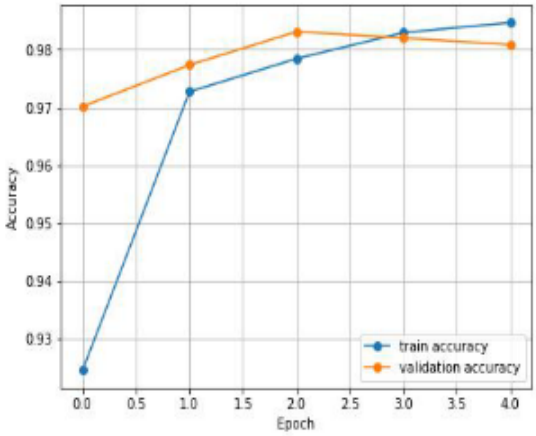
Abstract

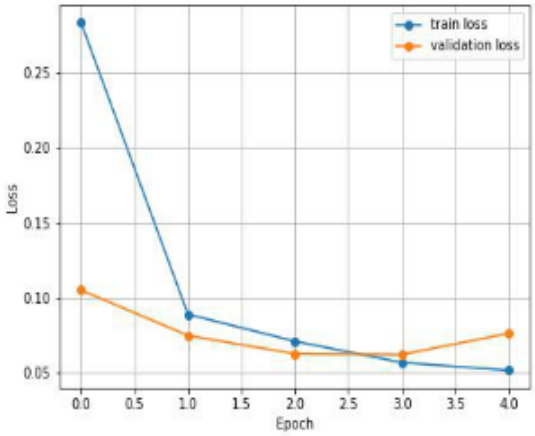
The Convolutional Neural Organize picked up notoriety through its utilize with picture information, and is as of now the state of the craftsmanship for recognizing what an picture is, or what is contained within the image.The essential reason for a convolutional layer is to distinguish highlights such as edges, lines, blobs of color, and other visual components. The channels can distinguish these highlights. The more channels that we provide to a convolutional layer, the more highlights it can distinguish properly.In this report, I have composed subtle elements approximately the usage ofCNN design to classify the MNIST hand composed dataset which has been transferred some time recently. To classify the MNIST dataset, I utilized 3 sorts of optimizers ADAM, SGD, RMSProp to check diverse exactness levels.

Introduction

The Convolutional Neural Network(CNN) is a type of artificial neural network which is used in image processing and recognition.In CNN optimizers are the algorithms or methods used to change the attributes of your neural network such as weights and learning rate in order to reduce the losses.In the mid project I had used three types of optimizers. They are Adam,SGD,RMSprop.Their details are given below:
Adam is an optimization algorithm that can be used instead of the classical stochastic gradient descent procedure to update network weights iteratively based in training data.Adam is a popular algorithm in the field of deep learning because it achieves good results fast.
SGD is an iterative method for optimizing an objective function with suitable smoothness properties.But ADAM is much faster than SGD.
RMSprop is a gradient-based optimization technique used in training neural networks. This normalization balances the step size (momentum), decreasing the step for large gradients to avoid exploding and increasing the step for small gradients to avoid vanishing.

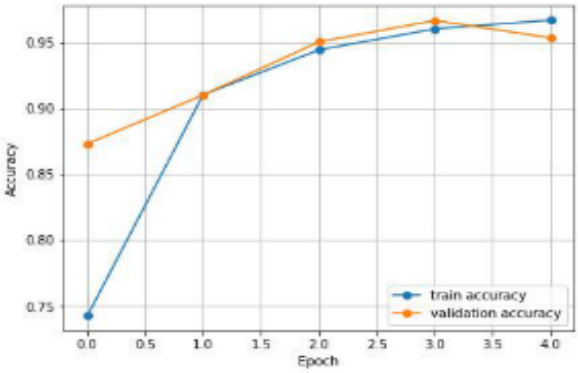
Result

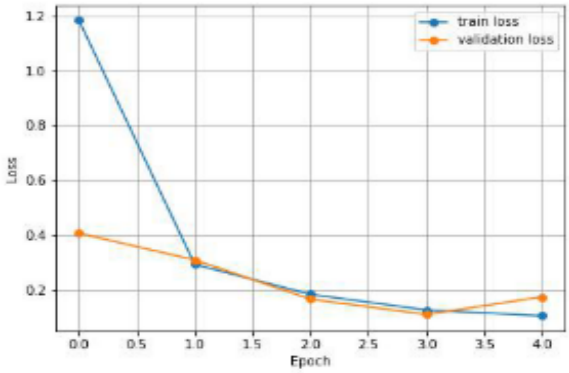





```
In [8]: test_loss, test_acc = model_1.evaluate(X_test, Y_test)
        print('\nTest Loss:', test_loss)
        print('\nTest Accuracy:', test_acc)

313/313 [==============================] - 1s 3ms/step - loss: 0.0718 - accuracy: 0.9825

Test Loss: 0.07182183116674423

Test Accuracy: 0.9825000166893005
```

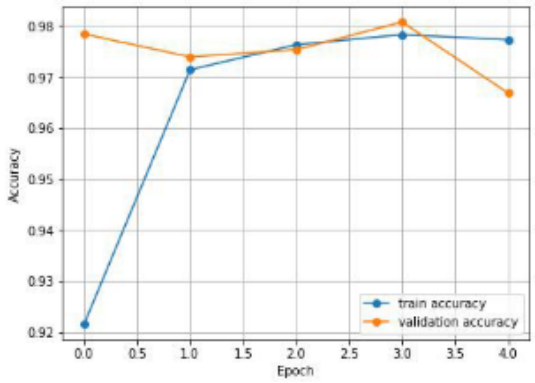
At first I had used Adam optimizer and got 98.25% accuracy and 7.18% loss.

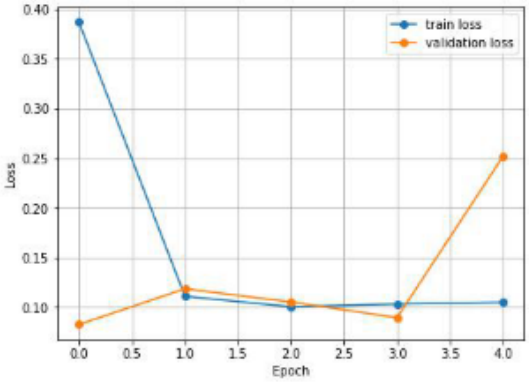





```
[14]: test_loss, test_acc = model_2.evaluate(X_test, Y_test)
      print('\nTest Loss:', test_loss)
      print('\nTest Accuracy:', test_acc)

313/313 [==============================] - 1s 4ms/step - loss: 0.1590 - accuracy: 0.9537

Test Loss: 0.15898685157299042

Test Accuracy: 0.9537000060081482
```

Secondly I had used SGD optimizer and got 95.37% accuracy and 15.89% loss






```
In [20]: test_loss, test_acc = model_3.evaluate(X_test, Y_test)
         print('\nTest Loss:', test_loss)
         print('\nTest Accuracy:', test_acc)

         313/313 [==============================] - 1s 3ms/step - loss: 0.2273 - accuracy: 0.9706

         Test Loss: 0.22732196748256683

         Test Accuracy: 0.9706000089645386
```

Lastly I had used RMSProp optimizer and got 97.06% accuracy and 22.73% loss.

Discussion:

In this mid report I had utilized 3 sorts of optimizer which are ADAM, SGD and RMSProp.I found a few contrast between their precision. ADAM is much speedier and successful than SGD and RMSProp. Adam optimizer gives much higher execution than the already utilized optimizer.My ADAM optimizer exactness is 98.25% .At that point the moment way better optimizer is RMSProp which is additionally great and its precision is 97.06%. Final one is SGD and the exactness of SGD is 95.37% which could be a little bit less at that point the exactness of ADAM and RMSProp. So ready to say that ADAM optimizer is the quickest and exceedingly precise optimizer in my case.