
# American International University-Bangladesh (AIUB)
# Department of Computer Science
## CVPR Mid Project Report

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**Abstract:** A convolutional neural network is a type of artificial neural network used in deep learning to evaluate visual information. Convolutional neural networks (CNNs) are neural networks with one or more convolutional layers that are primarily utilized for image processing, classification, segmentation, and other auto-correlated data. In this project, I have implemented CNN architecture to classify the MNIST handwritten dataset. I have used 3 types of optimizer ADAM, SGD, RMSProp to check different accuracy level.

**Introduction:** Optimizers are techniques or approaches that adjust the characteristics of your neural network, such as weights and learning rate, to decrease losses.

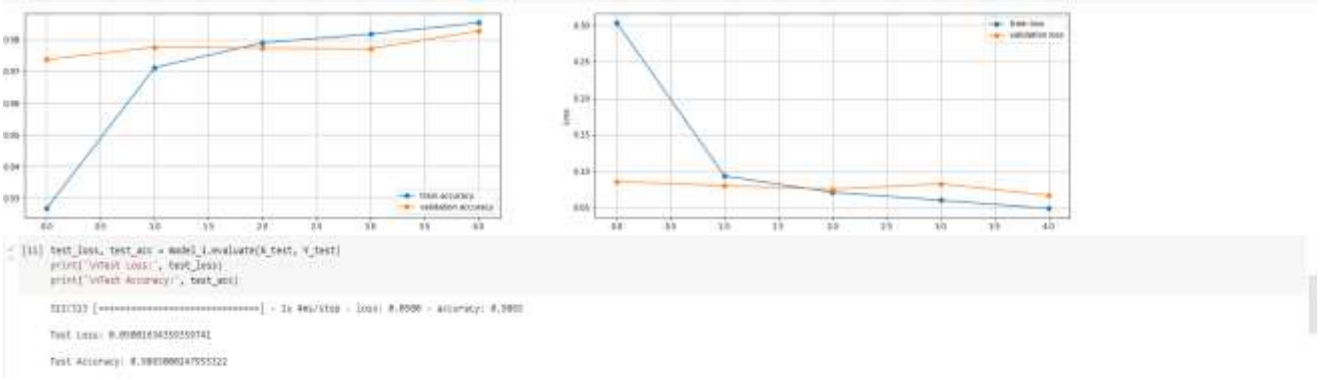
Adam is an optimization technique that may be used to update network weights iteratively based on training data instead of the traditional stochastic gradient descent procedure. Adam is a popular deep learning method since it produces good results quickly.

SGD is an approach for finding the best smoothness qualities for an objective function. However, ADAM is significantly quicker than SGD.

In the training of neural networks, RMSprop is a gradient-based optimization strategy. This normalization evens out the step size, reducing it for high gradients to prevent bursting and increasing it for minor gradients to avoid disappearing.

**Result:**

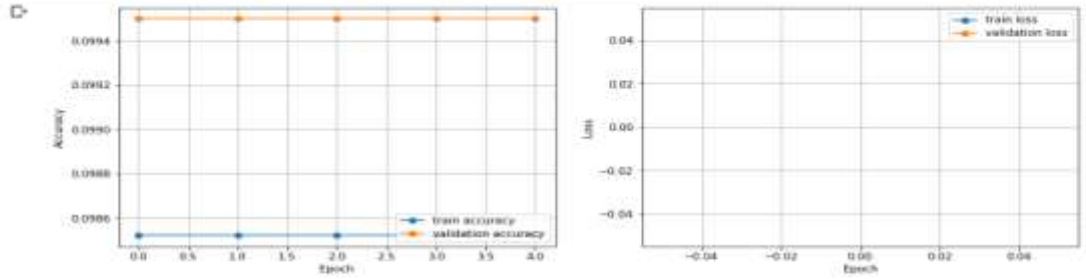
For ADAM, I have got test accuracy of 98.65% and loss 5%



**#SDG**

For SDG, I have got test accuracy of 97% and loss 0%

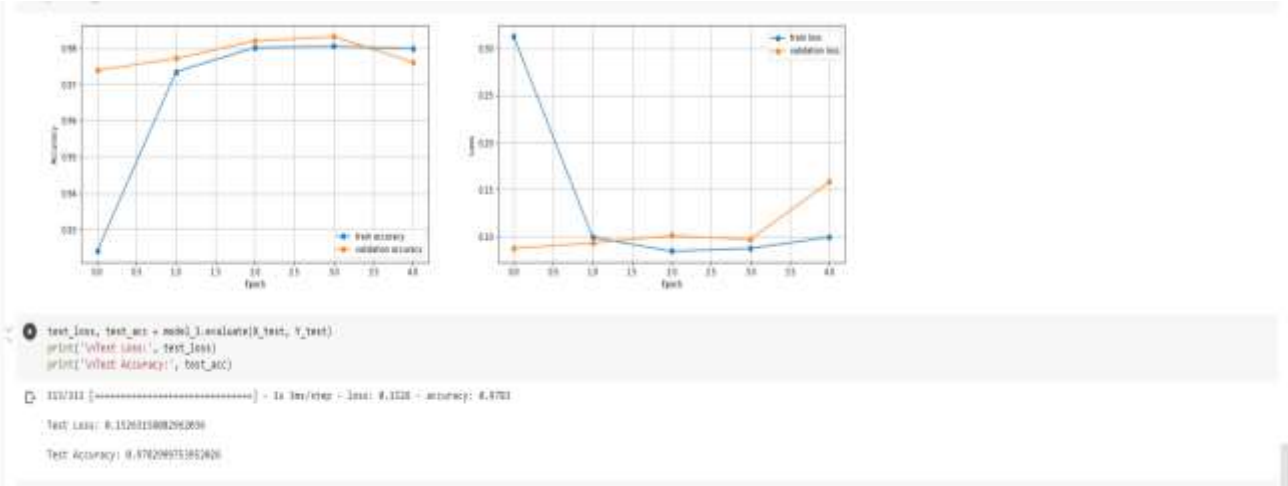
```
plt.show()
```




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

     313/313 [==============================] - 1s 3ms/step - loss: nan - accuracy: 0.0080

     Test Loss: nan

     Test Accuracy: 0.007999997437000027
```

**# RMSprop**

For RMSprop, I have got test accuracy of 97.82% and loss 15.26%



**Conclusion: I employed three types of optimizers in this mid-project report: ADAM, SGD, and RMSProp. I discovered a discrepancy in their correctness. SGD and RMSProp are much slower and less effective than ADAM. The Adam optimizer outperforms the previous optimizer by a wide margin. The accuracy of my ADAM optimizer is 98.65 percent. The second better optimizer is RMSProp, which is also good and has a 97.82 percent accuracy rate. The last one is SGD, which has a precision of 97 percent, which is little lower than ADAM and RMSProp. So, in my experience, the ADAM optimizer is the fastest and most accurate optimizer.**