AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

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Project Cover Sheet

Assignment Title:	mid_report		
Assignment No:	02	Date of Submission:	30.10.2021
Course Title:	COMPUTER VISION AND PATTERN RECOGNITION		
Course Code:	Click here to enter text.	Section:	A
Semester:	Fall 2021-22	Course Teacher:	DEBAJYOTI KARMAKER

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1	Md. Saiduzzaman Fahim	18-38829-3	BSc [CSE]	

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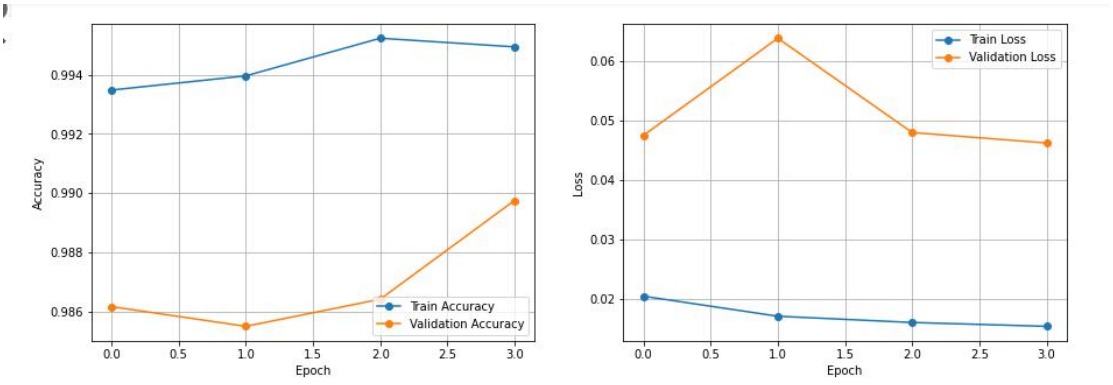
FACULTYCOMMENTS	**Marks Obtained**	
	Total Marks	

Abstract:
The automatic detection of handwritten digit from image data can be tricky as handwritten information depends on person to person. In this project our aim is to propose a simple Convolutional Neural Network(CNN) model to classify MNIST handwritten dataset. Also I used different optimizer like Adam, SGD, RMSProp to check which one gives best accuracy.

Introduction:
Optimizers are techniques or approaches that adjust the characteristics of your neural network, such as weights and learning rate, to decrease losses. Optimization algorithms or methods are in charge of lowering losses and delivering the most accurate outcomes.

In this report, we use 3 types of optimizer. They are:
1 . Adam: Adam is a deep learning model training technique that replaces stochastic gradient descent. Adam combines the finest features of the AdaGrad and RMSProp methods to provide an optimization technique for noisy issues with sparse gradients.
2 . SGD: Stochastic gradient descent (often abbreviated SGD) is an iterative approach for finding the best smoothness qualities for an objective function. One popular and persuasive argument for optimizers is that SGD generalizes better than Adam. However, it is much slower than ADAM.
3 . RMSProp: RMSprop stands for Root Mean Square Propagation. It is a gradient-based optimization approach for neural network training. This normalization equalizes the step size, reducing it for large gradients to avoid bursting and increasing it for small gradients to avoid fading.

Results:
Here I use ADAM optimizer and the test accuracy is 0.9894000291824341 that means 98.94%.
The test loss is 0.04011056944728976 that means 0.04% loss.

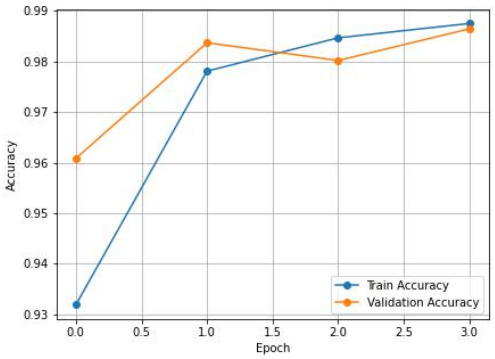


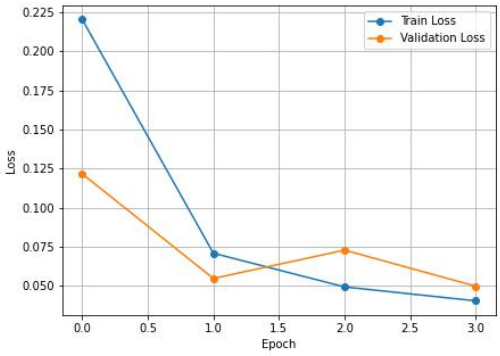

```
test_loss, test_acc = model.evaluate(X_test, Y_test)
print('\nTest Accuracy:', test_acc)
print('\nTest Loss:', test_loss)
```

```
313/313 [==============================] - 3s 9ms/step - loss: 0.0401 - accuracy: 0.9894

Test Accuracy: 0.9894000291824341

Test Loss: 0.040110569447278976
```

Here I use SGD optimizer and the test accuracy is 0.9864000082015991 that means

98.64%.
The test loss is 0.044768474996089935 that means 0.04% loss

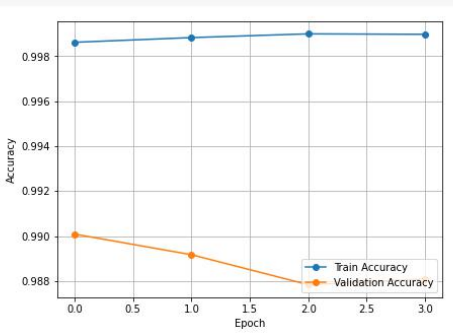


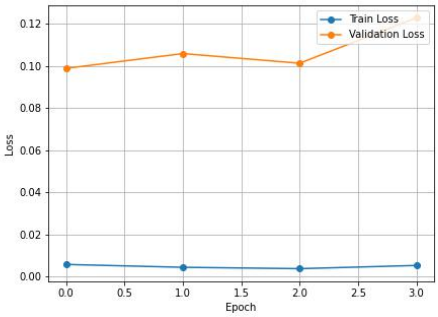



```
test_loss, test_acc = model.evaluate(X_test, Y_test)
print('\nTest Accuracy:', test_acc)
print('\nTest Loss:', test_loss)
```

```
313/313 [==============================] - 2s 6ms/step - loss: 0.0448 - accuracy: 0.9864

Test Accuracy: 0.9864000082015991

Test Loss: 0.044768474996089935
```

Here I use RMSProp optimizer and the test accuracy is 0.9886999726295471 that means 98.88%.
The test loss is 0.11858811541080475 that means 0.11% loss.






```
test_loss, test_acc = model.evaluate(X_test, Y_test)
print('\nTest Accuracy:', test_acc)
print('\nTest Loss:', test_loss)
```

```
313/313 [==============================] - 3s 9ms/step - loss: 0.1185 - accuracy: 0.9887

Test Accuracy: 0.9886999726295471

Test Loss: 0.11858811541080475
```

Discussion:
This report uses three types of optimizers: ADAM, SGD, and RMSProp. So I found a slight difference of among those precisions. ADAM is much faster than SGD and RMSProp. Built on the strengths of previous models, the Adam Optimizer offers much higher performance than the previously used and far outperforms it by providing an optimized descent gradient. My ADAM, SDG & RMSProp accuracy is 98.94%, 98.64% & 98.88% respectively.