Opt - SGD (learning rate: 0.05)

```
Training: 1/4 epoch, Learning rate: 0.0500000000, Average Loss:2.21, Accuracy: 17.44%, Test Loss:3.47, Test accuracy:10.20%
Training: 2/4 epoch, Learning rate: 0.0500000000, Average Loss:1.84, Accuracy: 28.76%, Test Loss:6.41, Test accuracy:10.30%
Training: 3/4 epoch, Learning rate: 0.0500000000, Average Loss:1.54, Accuracy: 39.78%, Test Loss:3.98, Test accuracy:10.70%
Training: 4/4 epoch, Learning rate: 0.0500000000, Average Loss:1.28, Accuracy: 51.78%, Test Loss:4.28, Test accuracy:12.10%
The 4 epoch achieves the best model, Test Loss: 4.2847, Test accuracy: 12.10%
```

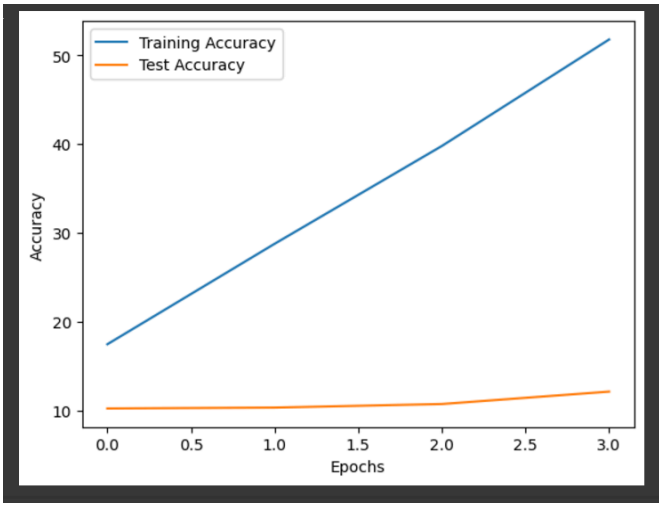
Optimizer_1 - Adam (learning rate: 0.005)

```
Training: 1/4 epoch, Learning rate: 0.0050000000, Average Loss:2.12, Accuracy: 20.00%, Test Loss:20.34, Test accuracy:10.20%
Training: 2/4 epoch, Learning rate: 0.0050000000, Average Loss:1.76, Accuracy: 34.64%, Test Loss:9.17, Test accuracy:10.20%
Training: 3/4 epoch, Learning rate: 0.0050000000, Average Loss:1.43, Accuracy: 44.48%, Test Loss:2.83, Test accuracy:17.40%
Training: 4/4 epoch, Learning rate: 0.0050000000, Average Loss:1.27, Accuracy: 51.54%, Test Loss:3.51, Test accuracy:18.00%
The 4 epoch achieves the best model, Test Loss: 3.5084, Test accuracy: 18.00%
```

Optimizer_2 - RMSprop (learning rate: 0.001)

```
Training: 1/4 epoch, Learning rate: 0.0010000000, Average Loss:2.10, Accuracy: 20.54%, Test Loss:5.30, Test accuracy:10.20%
Training: 2/4 epoch, Learning rate: 0.0010000000, Average Loss:1.72, Accuracy: 31.32%, Test Loss:3.94, Test accuracy:10.50%
Training: 3/4 epoch, Learning rate: 0.0010000000, Average Loss:1.46, Accuracy: 43.52%, Test Loss:6.09, Test accuracy:10.30%
Training: 4/4 epoch, Learning rate: 0.0010000000, Average Loss:1.27, Accuracy: 51.52%, Test Loss:2.93, Test accuracy:18.10%
The 4 epoch achieves the best model, Test Loss: 2.9305, Test accuracy: 18.10%
```

Discussion



By analyzing the opt optimizer and plotting the calculated values we can see that the model seems to have overfitted as the test accuracy remains low whereas the training accuracy keeps increasing with each epoch. This is very consistent with other overfitted models and shows that each increasing epoch would increase the overall accuracy of the model. From the accuracy-loss graph, we can tell that as the accuracy increases to 25%-35% there is a spike in loss, however, this immediately plummets once the accuracy rises more. It is possible that the model could underfit after a certain number of epochs, however, as we only tested till epoch 4 we were only able to see the model overfitting the data. If the model had been underfitted then we would not be seeing an increase in the accuracy, however, we would see an increase in the losses. While this model shows great support for being well-fitted to the data, the variance in the loss is something to consider as well.