**CSE – 575**

**Spring 2020**

**Project 3 – Classification Using Neural Networks and Deep learning**

Name: Guru Preetam Kadiri

ASURITE ID: gkadiri

**Introduction**

The objective of this project is to implement Convolution Neural Network (CNN) on images from the MNIST dataset.

The MNIST dataset has

* 60000 training samples – 10 handwritten digits; each digit has 6000 training samples
* 10000 validation samples – 10 handwritten digits; each digit has 1000 samples.

The model is trained for 12 epoches.

**Baseline Code – STRATEGY 1**

Given kernel Size for this strategy is 3\*3.

Input Dimension: (28,28,1)

Kernel Size: 3\*3

Feature Maps: 6

Stride: 1

Activation: relU

**RESULTS:**

* **Test Loss:** 0.043279333824937934
* **Test Accuracy:** 0.9868999719619751

**PLOT:**

*Key:* ***blue line*** *is the train data;* ***orange line*** *is the text data*

**A screenshot of a cell phone

Description automatically generated**

**5 \* 5 Kernel Size – STRATEGY 2**

For this strategy, the kernel size is increased from 3\*3 to 5\*5

Input Dimension: (28,28,1)

Kernel Size: 5\*5

Feature Maps: 6

Stride: 1

Activation: relU

**RESULTS:**

* **Test Loss:** 0.036271140560423375
* **Test Accuracy:** 0.9876999855041504

**PLOT:**

*Key:* ***blue line*** *is the train data;* ***orange line*** *is the text data*

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**Changing Feature Maps – STRATEGY 3**

The kernel size is kept at 5 \* 5 and we change the features from to 20.

Input Dimension: (28,28,1)

Kernel Size: 5\*5

Feature Maps: 20

Stride: 1

Activation: relU

**RESULTS:**

* **Test Loss:** 0.0336128990590063
* **Test Accuracy:** 0.9889000058174133

**PLOT:**

*Key:* ***blue line*** *is the train data;* ***orange line*** *is the text data*

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**RESULTS**

|  |  |  |
| --- | --- | --- |
| **STRATEGY** | **TEST LOSS** | **TEST ACCURACY** |
| Strategy1 | 0.03777911817478889 | 0.9884999990463257 |
| Strategy2 | 0.036271140560423375 | 0.9876999855041504 |
| Strategy3 | 0.0336128990590063 | 0.9889000058174133 |

**OBSERVATION**

1. From the above table, we can see that the accuracyfor **strategy 3** is highest, followed

by **strategy 2** and then **strategy1.**

1. Also looking at the plots, the loss plot for train data starts higher than test data. At the end of the 12th epoch, the train data has lower loss than the test data. This is due to the overfitting of the training model.