

WEEKLY REPORT

19MCM124
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MTECH AI

1. Implementation of Convolution Neural network

a. Dataset:-

- i. Numerical digits
 1. This time all 10 digits (0 - 9) were used for training and testing the architecture.
- ii. Division of Dataset:-
 1. Training dataset:-
 - a. 70 percent of complete dataset (10500 images out of 15000 images).
 2. Test dataset
 - a. 30 percent of complete dataset(4500 images out of 15000 images)
 3. Custom dataset
 - a. Few custom dataset captured using webcam were also used for testing purpose.
- iii. Dataset size:
 1. Images of 70 by 70 dimensions
 2. Grayscale images were used.
 3. Custom dataset was converted from RGB to grayscale using cv2 package.
- iv. Conversion of Dataset from images to array representation
 1. Pickle package was used for pickling images to array (pickle files.)

b. Model architecture:-

- i. Library used:
 1. Tensorflow version 2 which is implemented on top of keras api.(learned from scratch this week.)
- ii. Models:-

1. Model 1:-

a. Layers implemented:

- i. Convolution layer:-
 1. Number of filters used = 8
 2. Size of each filter = $3 * 3$
 3. Padding = same (ie output array or image will be of same size as input size)
 4. Activation function = Relu (rectified linear units)
- ii. Maxpool layer:-
 1. Pool size =2.
 2. Stride =default (equal to pool size)
- iii. Flatten layer (input will be flatten to a single vector)
- iv. Dense layer 1 :
 1. Number of units used = 64
 2. Activation function = relu
- v. Dense layer 2:
 1. Number of units used = 64
 2. Activation function =softmax

b. Optimizer used:-

- i. Adam optimization used with default settings
 1. Learning rate = 0.01
 2. Beta 1 = 0.9
 3. Beta 2 = 0.99
 4. Epsilon = $1e-07$
- ii. Loss function= Sparse categorical cross entropy(it has the same loss formula as for logistic regression loss , but here the output labels can be of integer format with value ranging for all output labels)
- iii. **Epochs:**

1. Model was trained for 5 epochs with following result:-

a. Train Accuracy =0.8664

b. Train Loss = 0.4397

iv. Test results:-

1. Accuracy = 0.8129

2. Loss = 0.6281

v. Custom dataset:-

1. Results were poor

2. Accuracy less than 50 percent achieved

3. Reason:-

a. The train and validation dataset was completely different from the custom test set

b. Although the pixel quality of custom image were much better but resizing it to 70 * 70 image jeopardize that benefit.

c. Next step:-

i. I want to try the dataset in Deep Neural network ,it will give better insight of problem in dataset (biases and variances)

ii. Will try to optimize them this week.

iii. American Language alphabet i will try on cnn, and see if same accuracy can be achieved by it or not (although cnn does not suffer from overfitting but still results will be important to analyze).

