IDML ASSIGNMENT 3 REPORT

Working on a CNN by tweaking with its parameters and analysing the results

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INTRODUCTION

Convolutional Neural Networks (CNNs) are the current state-of-art architecture for image classification task. Whether it is facial recognition, self driving cars or object detection, CNNs are being used everywhere.For this assignment,we have designed a simple 2-D CNN using keras with tensorflow backend for MNIST digit recognition .

Architecture

We have decided to develop our own simple model capable of

results close to the state of the art models.The architecture can be described as follows:

1. Convolutional layer with 30 feature maps of size 5×5.
2. Pooling layer taking the max over 2*2 patches.
3. Convolutional layer with 15 feature maps of size 3×3.
4. Pooling layer taking the max over 2*2 patches.
5. Dropout layer with a probability of 20%.
6. Flatten layer.
7. Fully connected layer with 128 neurons and rectifier activation(relu).
8. Fully connected layer with 50 neurons and rectifier activation(relu).
9. Output layer and a softmax activation function.

EXPERIMENTS

> The model is fit over 10 epochs with a batch size of 200.Logarithmic loss function and ADAM optimizer are used.Trained on 60k samples and tested on 10k samples.
>
> error rate of 14 % is achieved.

We increased the number of epochs and changed the dropout(ranging from 0.1 to 0.5). We even modified our architecture by removing/adding convolutional,pooling and fully connected layers . Changed the batch size as well.

Also tried to replace softmax function with Softplus function.

ANALYSIS

Training on 60k samples provides far better accuracy than training on mere subset of the dataset.

With more number of epochs, the loss and accuracy of the model on training and testing data converged.This makes the model stable.

Softmax function(output layer) provides us with the best results.

Changing this to something like Sigmoid function substantially decreases the accuracy.

Adam optimizer is most suitable, convergence is fast.

CONCLUSION

To conclude,we observe the effect of changing parameters.Size of training data has a crucial effect on the accuracy of image recognition.Number of epochs and batch size considerably change the accuracy.Dropout and stride do not affect substantially. 86% accuracy is achieved.