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Subject: Advanced Machine Learning (INT248)

Project Name: Handwritten character Recognition

CA-1

Github link- <https://github.com/code-evince/Machine-Learning-CA-1>



Introduction

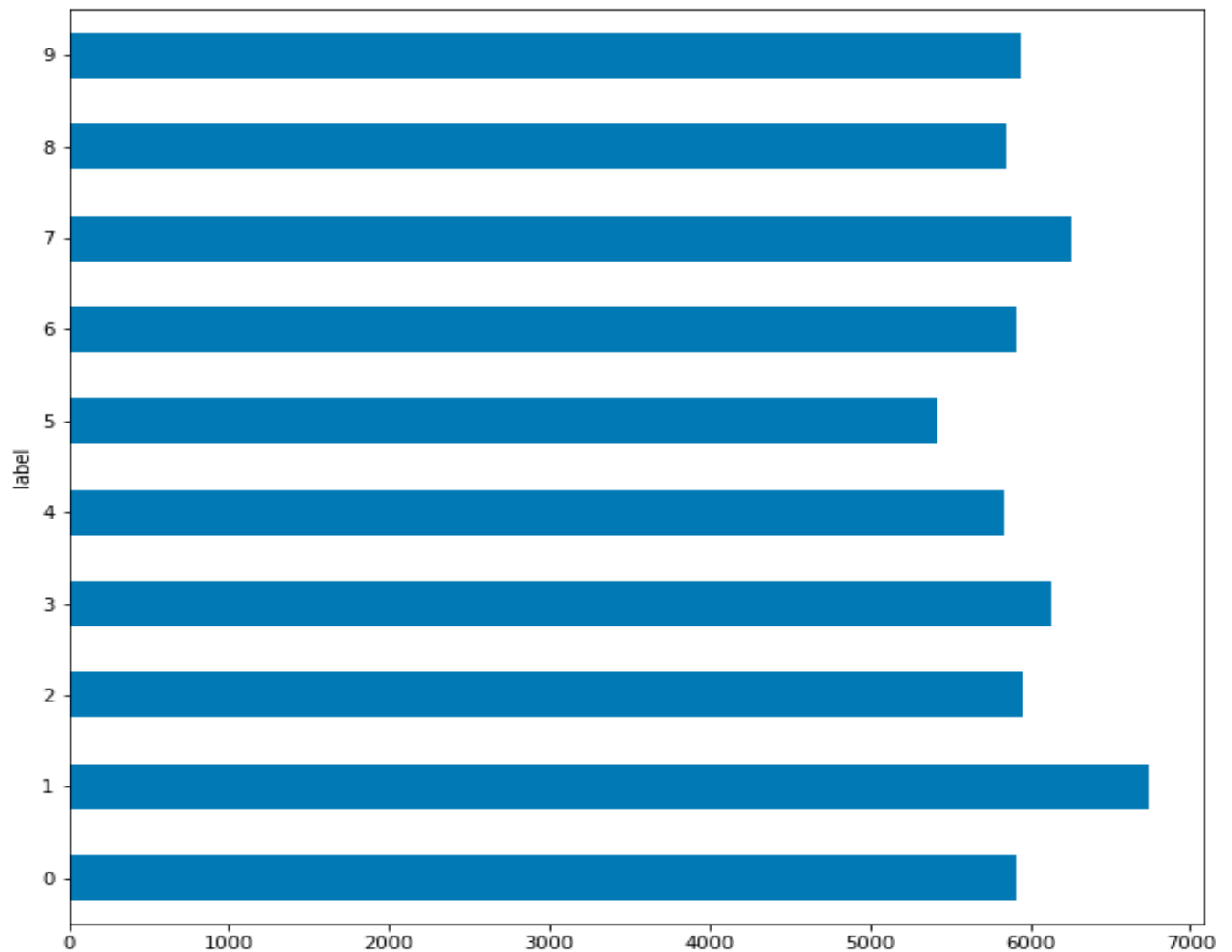
Despite the advancement of technology people are still crazy about writing their notes traditionally: with pen and paper. However, there are disadvantages to handwriting text. It's hard to store and access physical documents in an effective manner, search through them efficiently and to share them with others. Thus, a lot of important knowledge gets lost or does not get reviewed because of the fact that documents never get transferred to digital format. We have thus decided to tackle this problem in our project because we believe the significantly greater ease of management of digital text compared to written text will help people more effectively access, search, share, and analyze their records, while still allowing them to use their preferred writing method.

The aim of this project is to further explore the task of classifying handwritten text and to convert handwritten text into the digital format. Handwritten text is a very general term, and we wanted to narrow down the scope of the project by specifying the meaning of handwritten text for our purposes. In this project, we took on the challenge of classifying the image of any handwritten word, which might be of the form of cursive or block writing. This project can be combined with algorithms that segment the word images in a given line image, which can in turn be combined with algorithms that segment the line images in a given image of a whole handwritten page. Our models take in an image of a word and output the name of the word.

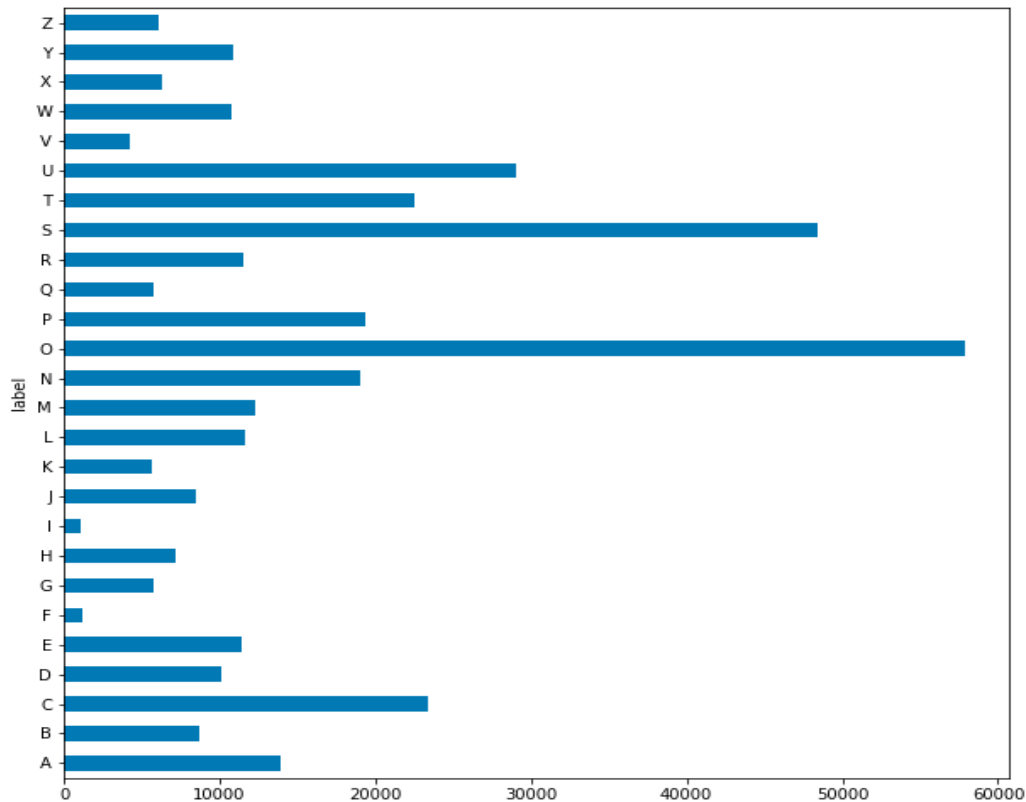
Dataset Used

The dataset used for Basic CNN model trained using MNIST and NIST dataset to predict handwritten characters , each image is resized to grayscale 28x28px image.

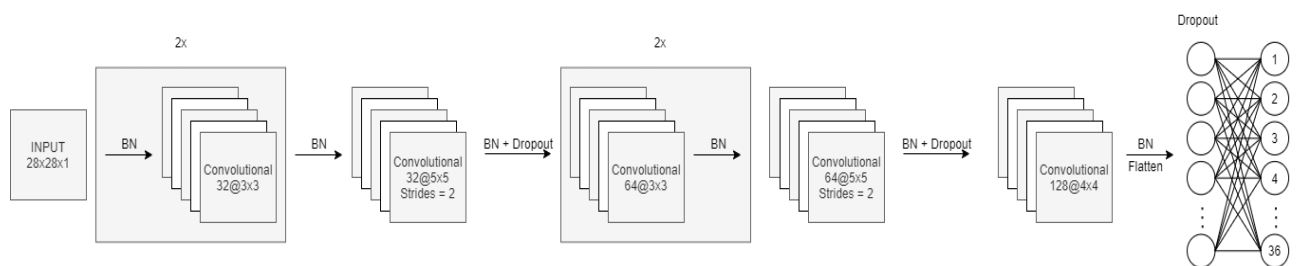
MNIST digits dataset



NIST character dataset

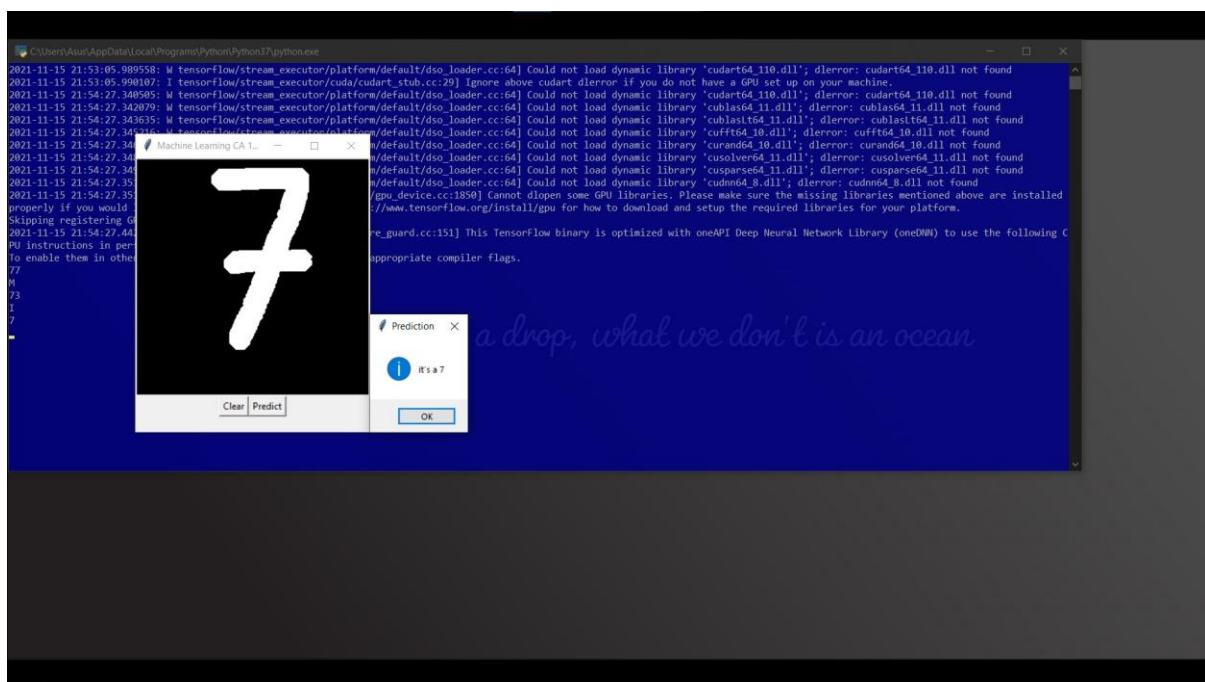
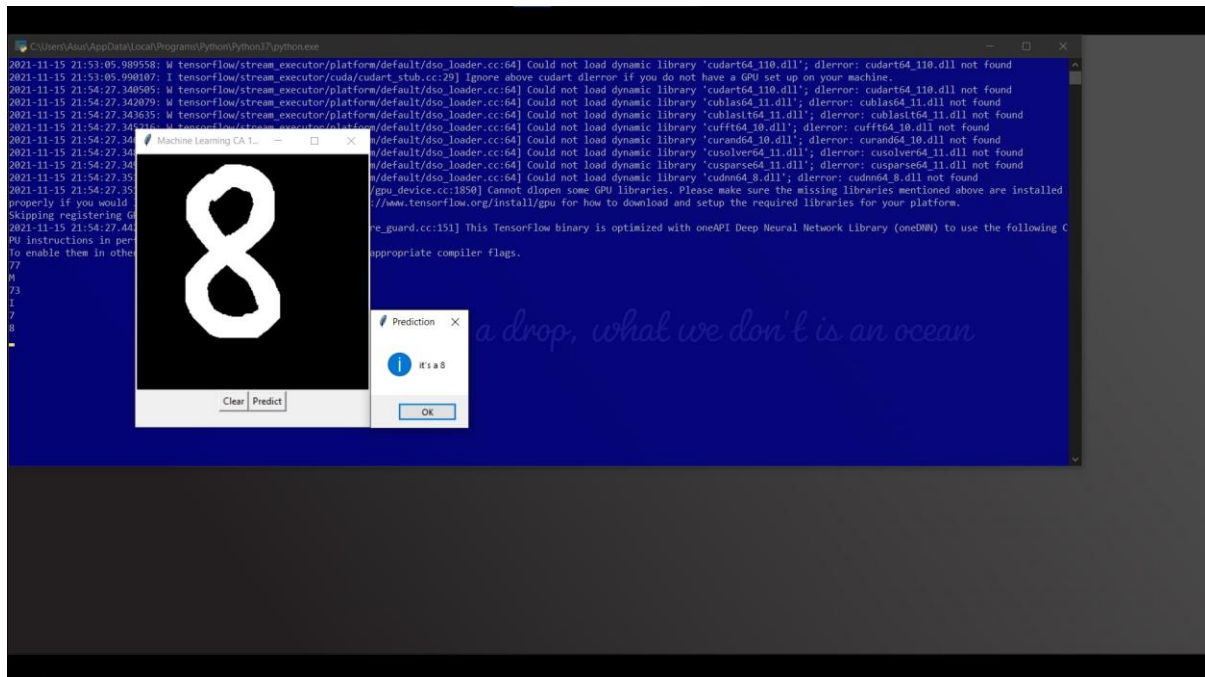


Proposed Architecture



And then the model is trained using the ADAM gradient descent algorithm, logarithmic loss, and a mini-batch gradient descent with mini-batch size 64 then saved model will be used to predict canvas image in Tkinter GUI.

Screenshots



Results

when we ran the model on the test data set,after training for about 50 epochs the accuracy the model produces an accuracy of 95.17%.

Future scope

- Electronic form filling
- Writing electronic applications in one's own handwriting and nativescript
- Alternative to hardware and software keyboards
- Putting in the mathematical equations by simple handwriting

Conclusion

Handwritten character recognition is done in this project.The result which was got was correct up to more than 90% of the cases, but it would be improved at the end.The method I came up with gave efficient and effective result both for feature extraction as well as recognition. There are also different methods through which 'handwritten character recognition' is achieved.

References

- Wikipedia
- Convolutional Neural Network Benchmarks:
<https://github.com/jcjohnson/cnn-benchmarks>
- Tensorflow : https://www.tensorflow.org/guide/keras/save_and_serialize
- Dataset : https://www.kaggle.com/oddrational/mnist-incsv/version/2?select=mnist_train.csv
- ADAM Gradient Decent Algorithm <https://ruder.io/optimizing-gradient-descent/>