Digit Recognition using Convolutional Neural Networks

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Problem Statement

The aim is to correctly identify digits from a dataset of tens of thousands of handwritten images. MNIST handwritten digit recognition problem and deep learning models are developed in Python.

Handwriting digit recognition application is used in different tasks of our real life time purposes. Precisely, it is used in banks for reading checks, post offices for sorting letter and many other related tasks.

Expected Milestones

- Load and reshape the MNIST dataset.

- Perform multi-layer perceptron model on the problem.

- Create Convolutional Neural Networks (CNN) models for MNIST. Beginning with simpler versions and extending them to more sophisticated CNN models.

- With reference to [1] and [2] we aim to use CNN to correctly identify Odia digits.

Dataset

The data sets can be found on http://yann.lecun.com/exdb/mnist/.

Overview of the Proposed Method

Convolutional Neural Network uses a class of multilayer feedforward network that can be used to classify handwritten digits which will be the central theme of the project. A convolutional network has the advantage of extracting and using features information, improving the recognition of 2D shapes with a high degree of invariance to translation, scaling and other distortions. The input layer of our network consists of input neurons encoding the values corresponding to the input pixels of the handwritten digits. Training data which is fetched from MNIST data set consists of say n by n pixel images and so input layer will contain n^2 input neurons. The second layer of our network will be the hidden layer and it will be taking the aggregated output of first layer and further attempts to detect the patterns present in the input images. Most of the experimentation will be done in the hidden layer. Implementation of a backpropagation algorithm with specif adaptations to the problem can also be made in the training environment.

References

[1] Ciresan, Dan Claudiu, Meier, Ueli, Gambardella, Luca Maria, and Schmidhuber, Jurgen. Deep big simple neural nets excel on handwritten digit recognition. Neural Computation, 22(12):3207–3220, 2010. https://arxiv.org/abs/1003.0358

[2] Md. Zahangir Alom, Paheding Sidike, Tarek M. Taha and Vijayan K. Asari, Handwritten Bangla Digit Recognition Using Deep Learning, 2017. http://arxiv.org/abs/1705.02680