MINOR PROJECT SYNOPSIS

ON

HANDWRITTEN DIGIT RECOGNITION

USING DEEP LEARNING

Submitted to – Dr. Richa Gupta.

Submitted By

Akshit Joshi 18102004 A1

Ashutosh Sharma 18102254 A2

Himanshu Kumar 18102153 A6

JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY,NOIDA .

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING.

INTRODUCTION

The handwritten digit recognition is the ability of computers to recognize human handwritten digits. It is a hard task for the machine because handwritten digits are not perfect and can be made with many different flavours. The handwritten digit recognition is the solution to this problem which uses the image of a digit and recognizes the digit present in the image. We are going to implement a handwritten digit recognition app using the MNIST dataset. We will be using a special type of deep neural network that is Convolutional Neural Networks. In the end, we are going to build a GUI in which you can draw the digit and recognize it straight away.

METHODOLOGY TO BE FOLLOWED

We have divided our work in 3 phases.

Phase 1

In the first phase we are going to import all the modules that we are going to need for training our model. The image data cannot be fed directly into the model so we need to perform some operations and process the data to make it ready for our neural network. Now we will create our CNN model in Python data science project.

Phase 2

In this phase we will start training the model using our dataset. We will have around 10,000 images in our dataset which will be used to evaluate how good our model works. The testing data was not involved in the training of the data therefore, it is new data for our model.

Phase 3

Now for the GUI, we have created a new file in which we build an interactive window to draw digits on canvas and with a button, we can recognize the digit.Then we will create the App class which is responsible for building the GUI for our application. We will create a canvas where we can draw by capturing the mouse event using a button.

Time Flow

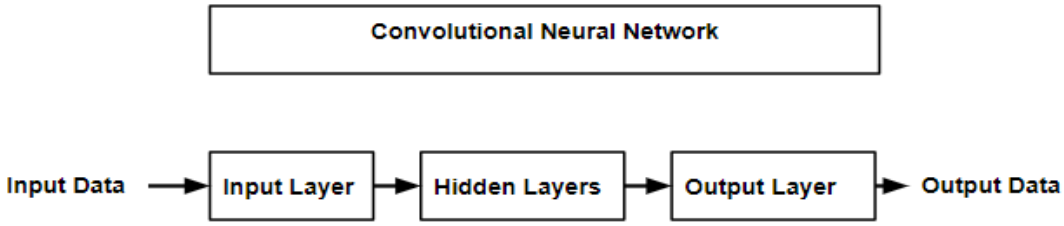
September – October	Phase 1
October -November	Phase 2
November - December	Phase 3

Dataset Used

We will use MNIST dataset is used in this project to train the model._The MNIST dataset contains 60,000 training images of handwritten digits from zero to nine and 10,000 images for testing. So, the MNIST dataset has 10 different classes. The handwritten digits images are represented as a 28×28 matrix where each cell contains grayscale pixel value**.**

Convolutional Neural Network

As shown in Fig 1 , A CNN is comprised of an input layer,an output layer and multiple hidden layers in between .The hidden layer of a CNN mainly consists of convolution layer ,pooling layer and fully connected layers.



The basic block diagram of CNN (Fig.1)

In 1980, the new cognitive machine was put forward in literature [1], and the concept of CNN was introduced for the first time. It became the first model of depth learning. In 2003, the literature [2] summarized the CNN. As shown in Fig 1, the convolutional neural network is a multilayer feed forward network. Each layer consists of a number of two-dimensional planes and each plane consists of multiple neurons. Convolution layer and the subsampling layer can have multiple layers. Convolution is an algorithm commonly used in image recognition.Other technologies used include Python as an interface language using some of its libraries like keras and Tkinter for building the GUI.

CONCLUSION

Hence by the end we will have successfully built a Python deep learning project on handwritten digit recognition app. We have built and trained the Convolutional neural network which is very effective for image classification purposes. Later on, we build the GUI where we draw a digit on the canvas then we classify the digit and show the results.

REFERENCES

[1] Deng L, Hinton G, Kingsbury B, "New types of deep neural network learning for speech recognition and related applications: an overview," Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing. Vancouver BC: IEEE, 2013, pp. 8599-8603.

[2] Xu Peng, Bo Hua, "Facial expression recognition based on convolutional neural networks," Microcomputer & Its Applications, no. 12, pp. 45-47, 2015.