PROJECT OBJECTIVES

The **handwritten digit recognition** is the capability of computer applications to **recognize** the human **handwritten digits**. It is a hard task for the **machine** because **handwritten digits** are not perfect and can be made with many different shapes and sizes. The **handwritten digit recognition system** is a way to tackle this problem which uses the image of a **digit** and recognizes the **digit** present in the image. Convolutional **Neural Network** model created using **PyTorch library** over the **MNIST dataset** to **recognize handwritten digits** .

Handwritten Digit Recognition is the capability of a computer to fete the mortal handwritten integers from different sources like images, paper s, touch defenses, etc, and classify. them into 10 predefined classes **(0-9)**. This has been a Content of bottomless- exploration in the field of deep literacy. Number recognition has numerous operations like number plate recognition, postal correspondence sorting, bank check processing, etc . (2). In Handwritten number recognition, we face numerous challenges . because of different styles of jotting of different peoples as it . is not an Optic character recognition. This exploration provides a comprehensive comparison between different machine literacy and deep literacy algorithms for the purpose of handwritten number recognition. For this, we've used Support . Vector Machine, Multilayer Perceptron, and Convolutional . **Neural Network**. The comparison between these algorithms is carried out on the base of their delicacy, crimes, and .testing- training time corroborated by plots and maps that have been constructe d using **matplotlib** for visualization.

Datasets Details : -

The **MNIST dataset** is an acronym that stands for the Modified National Institute of Standards and Technology dataset.

It is a dataset of **60,000 small square 28×28 pixel grayscale images** of handwritten single digits between **0 and 9**.

The task is to classify a given image of a handwritten digit into one of 10 classes representing integer values from 0 to 9, inclusively.

It is a widely used and deeply understood dataset and, for the most part, is "solved." Top-performing models are deep learning convolutional neural networks that achieve a classification accuracy of above 99%, with an error rate between 0.4 %and 0.2% on the hold out test dataset.

Handwritten character recognition is an extensive exploration area that formerly contains detailed ways of perpetration which include major literacy datasets, popular algorithms, . features scaling and point birth styles. **MNIST dataset** (Modified National Institute of Norms and Technology database) is the subset of the NIST dataset which is a combination of two of NIST's databases Special. Database 1 and Special Database 3. Special Database 1 and Special Database 3 correspond of integers written by high academy scholars and workers of the United States Census Bureau,. independently. MNIST contains a aggregate of handwritten . number images (- training set and- test set) in . 28x28 pixel bounding box andanti-aliased. All these images have corresponding Y values which apprises what the number

Implementation Steps : -

1. Import the libraries and load the dataset
2. Preprocess the data
3. Create the model
4. Train the model
5. Evaluate the model
6. Create GUI to predict digits