

# Handwritten Digit Recognition

## What is Handwritten Digit Recognition?

Handwritten digit recognition is the ability of computers to recognize handwritten digits from different sources like images, papers, touch screens, etc, and classify them into 10 predefined classes (0-9). It is a hard task for the machines to understand or recognize the digits written by humans as each individual has his/her own style in writing the digits and also digits can be written with different shapes and sizes.

The handwritten digit recognition is a project which helps in tackling this problem which uses an AI model that has been trained with datasets to recognize handwritten digits present in the image.

## 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

## 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**.

A class of multilayer sustain forward system called Convolutional network is taken into consideration. A Convolutional network has a benefit over other Artificial Neural networks in extracting and utilizing the features data, enhancing the knowledge of 2D shapes with higher degree of accuracy and unvarying to translation, scaling and other distortions.

The digits are passed into input layers of the convolutional neural network and then into the hidden layers which contain two sets of convolutional, activation and pooling layers. Then finally it is mapped onto the fully connected layer and given a softmax classifier to classify the digits. The model has been implemented using keras deep learning inbuilt python library.

Number recognition has huge applications like number plate recognition, helping visually impaired people in learning, smartboard where the board can recognize the expression, evaluate it and return the output and so on.

The following are the images that show the predictions made by the model :

