

# NMST Handwritten Digit Classification using Deep Learning

## Objective:

The goal of this project is to develop a deep learning model that can accurately classify handwritten digits from the MNIST dataset.

## Data Acquisition and Preprocessing:

- The MNIST dataset containing 60,000 training images and 10,000 test images of handwritten digits (0-9) is obtained from the Keras library.
- Each image in the dataset is grayscale with dimensions 28x28 pixels.
- The pixel values are scaled to the range [0, 1] by dividing each pixel value by 255.

## Model Architecture:

- The neural network model consists of three layers: two hidden layers with 50 neurons each and ReLU activation functions, and an output layer with 10 neurons (one for each digit) and a softmax activation function.
- The model is compiled with the Adam optimizer, sparse categorical crossentropy loss function, and accuracy as the evaluation metric.

## Training and Evaluation:

- The model is trained on the training dataset for 10 epochs.
- During training, the model achieves an accuracy of approximately 98.92% on the training data.
- The trained model is evaluated on the test dataset, achieving an accuracy of 97.65%.

## Prediction System:

- A predictive system is developed to classify handwritten digits from external images.
- Users can input the path of the image to be predicted, and the system will display the image and predict the corresponding digit using the trained model.

## Confusion Matrix:

- A confusion matrix is generated to visualize the performance of the model across different classes.
- The matrix shows the true labels versus the predicted labels, highlighting areas of correct and incorrect classifications.

## Conclusion:

The developed deep learning model demonstrates high accuracy in classifying handwritten digits from the MNIST dataset. It successfully identifies digits from external images with good accuracy. This project showcases the effectiveness of deep learning in digit recognition tasks and its potential applications in various fields.

## GitHub Repository:

The code and implementation details can be found in the project repository: [NMST Handwritten Digit Classification](#)

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