Explanation of Mini Project

Project Title: Image Classifier using Keras & TensorFlow

Name: Pinjari Avesh Bandu

Project Purpose:

The goal of this project is to build a machine learning model that can recognize handwritten digits (from 0 to 9). Using deep learning with Keras and TensorFlow, the model learns patterns from image data and is able to make predictions about new, unseen digits.

Tools and Libraries Used:

Python – Programming Language

NumPy – For numerical operations

Matplotlib – For displaying predictions as images

Keras – To create the neural network model

TensorFlow – Backend engine to train and test the model

MNIST Dataset – A dataset of 70,000 handwritten digits (0–9)

Project Workflow:

1. Load Dataset: The MNIST dataset is loaded, which contains 60,000 training images and 10,000 test images.

2. Preprocess Data: Images are normalized to values between 0 and 1. Labels are one-hot encoded.

3. Build the Model: A simple neural network is created with input, hidden, and output layers.

4. Train the Model: The model is trained for 5 epochs to learn from the data.

5. Evaluate the Model: The model is tested on test data and its accuracy is calculated.

6. Visualize Predictions: A few sample digits are displayed along with predicted and actual values.

Output Results:

Test Accuracy: ~96% (This means the model correctly predicts 96 out of 100 digits)

Visual Output: The model shows test images with predictions like:

Predicted: 7, Actual: 7

Predicted: 2, Actual: 2 (and so on)

Real-Life Applications:

Recognizing digits in postal codes (ZIP code readers)

Reading numbers on bank cheques automatically

Converting handwritten notes into digital text

Conclusion:

This project helped in understanding how deep learning models can be used to solve real-world problems like image recognition.