Handwritten Digit Recognition Project – Final Report

# 1. Project Overview

This project focuses on recognizing handwritten digits (0-9) using a Convolutional Neural Network (CNN). It is built on the MNIST dataset and deployed using Streamlit with CSV download functionality and Power BI visualization.

# 2. Problem Statement

To create an accurate and efficient model that can classify handwritten digits from image data.

# 3. Dataset Description

We used the MNIST dataset consisting of 70,000 grayscale images of size 28x28 pixels, categorized into 10 digit classes (0–9).

# 4. Exploratory Data Analysis

Basic image previews, distribution of digits, and pixel intensity checks were done.

# 5. Model Building – CNN

A CNN model was built with Conv2D, MaxPooling, and Dense layers. It was trained for multiple epochs with high accuracy using 'digit\_model.h5'.

# 6. Evaluation Metrics

Model evaluated using accuracy score, loss curve, and confusion matrix.

# 7. Streamlit App

The Streamlit app allows the user to upload digit images, predicts the digit, and downloads results as CSV.

# 8. Power BI Integration

The predicted CSV is used in Power BI to create dashboards showing digit-wise prediction counts.

# 9. Conclusion

The CNN model achieved high accuracy and worked effectively in real-time digit prediction through the Streamlit interface.

# 10. Future Scope

Can extend to alphabets, regional characters, and multi-digit handwriting recognition.