

Handwritten Character Recognition - Project Report

1. Introduction

This project is developed as part of my CodeAlpha Internship. It focuses on building a Machine Learning model that can recognize handwritten digits using Deep Learning techniques. The dataset used is MNIST, which contains 70,000 images of handwritten digits (0-9).

2. Objectives

- Develop a Convolutional Neural Network (CNN) model for handwritten digit recognition.
- Train the model using the MNIST dataset.
- Evaluate the model performance on test data.
- Visualize the training process and predictions.

3. Methodology

The project is implemented using Python and TensorFlow. The dataset is preprocessed by normalizing pixel values and reshaping for CNN input. A CNN model with convolutional, pooling, and dense layers is built. The model is trained for 5 epochs using the Adam optimizer and sparse categorical crossentropy loss. Finally, results are evaluated and predictions are visualized.

4. Results

The model achieved high accuracy on the test dataset. The training and validation accuracy curves show good convergence. Predictions on sample test images demonstrate the model's capability to correctly classify digits.

5. Conclusion

This project successfully demonstrates handwritten digit recognition using a Convolutional Neural Network. It highlights the importance of deep learning in image classification tasks and can be extended to full handwritten character recognition systems.

6. Tools & Technologies

- Python
- TensorFlow / Keras
- NumPy
- Matplotlib

7. Internship Acknowledgement

This project was completed as part of my internship at CodeAlpha. I am thankful to CodeAlpha for providing me with the opportunity to work on this project and enhance my machine learning skills.