

# **Project Report on Handwritten Digit Recognition**

## **ARTIFICIAL INTELLIGENCE (TASK 2)**

**Submitted by**

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# **1.Introduction**

The "Handwritten Digit Recognition" project aims to create a simple AI model capable of recognizing handwritten digits. The project involves training a machine learning model to identify digits ranging from 0 to 9 that are written by users, enabling it to predict the digit represented by the handwritten input.

## **2.Objectives**

1. Develop a digit recognition model that can accurately identify handwritten digits.
2. Create a user-friendly interface for users to input handwritten digits.
3. Implement a prediction mechanism to display the recognized digit to the user.

## **3.Methodology:-**

### **1.Data Collection and Preparation**

1. **Data Gathering:** Collect a dataset of handwritten digits (0-9). A popular dataset for this purpose is the MNIST dataset, which contains 28x28 pixel grayscale images of handwritten digits.
2. **Data Preprocessing:** Preprocess the dataset by normalizing the images and splitting it into training and testing sets. This step is essential for training a machine learning model.

## **b)Model Development and Training**

**Model Selection:** Choose an appropriate machine learning algorithm for digit recognition.

Convolutional Neural Networks (CNNs) are commonly used for image recognition tasks like this.

**3. Model Training:** Train the selected model using the training dataset. Fine-tune hyperparameters and perform cross-validation to optimize the model's performance.

## **c)User Interface Design and Development**

**5. Front-end Development:** Create a user-friendly front-end interface that allows users to draw or input handwritten digits.

**6. Back-end Development:** Develop the back-end of the application to receive and process user input, pass it to the trained model, and display the recognized digit.

## **d)Integration and Testing**

**7. Integration:** Integrate the front-end and back-end components to create a seamless user experience.

**8. Testing:** Conduct thorough testing of the application to ensure the model's accuracy and the smooth functionality of the user interface.

## **e)Deployment and Final Testing**

9. **Deployment:** Deploy the application on a web server or cloud platform for public access.
10. **Final Testing:** Perform final testing to validate the application's performance in a real-world environment.

## **4.Results and Discussion:-**

- Discuss the accuracy and performance of the trained model.
- Present any challenges faced during the project and how they were addressed.
- Provide user feedback and improvements for future enhancements.

## **5.Future Enhancements**

- Implement multi-digit recognition to handle numbers with multiple digits.
- Extend the recognition capability to recognize characters and symbols in addition to digits.
- Improve the user interface for a more intuitive user experience.
- Explore deploying the model on mobile devices for on-the-go digit recognition.
- This project report summarizes the work completed for the "Handwritten Digit Recognition" project. It outlines the objectives, tasks, and outcomes of the

project, as well as future directions for enhancements and improvements.

## **6.Conclusion:-**

The "Handwritten Digit Recognition" project successfully developed an AI model capable of recognizing handwritten digits with a high degree of accuracy. The user-friendly interface allows users to input their handwritten digits, and the system promptly identifies and displays the recognized digit. This project demonstrates the potential of machine learning in image recognition tasks and can serve as a foundation for further enhancements and applications in the field.

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## **8. References**

- MNIST Dataset:  
[<https://www.kaggle.com/datasets/hojjatk/mnist-dataset/>]
- TensorFlow: [<https://www.tensorflow.org/>]
- scikit-learn: [<https://scikit-learn.org/stable/>]