**Phase-1 Submission Template**

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Department: BE-Computer science and Engineering

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**1.Problem Statement**

Recognizing handwritten digits is vital for building smarter AI systems.Applications range from postal code reading to banking input systems.Traditional image processing struggles with varied handwriting styles.Deep learning provides a scalable and accurate solution to this issue.

**2.Objectives of the Project**

* Build a deep learning model capable of recognizing handwritten digits with high accuracy.
* Train and test the model using the MNIST dataset.
* Apply CNN (Convolutional Neural Network) techniques for effective image classification
* Evaluate the model performance using various metrics such as accuracy and confusion matrix.

**3.Scope of the Project**

* Features to Include:
* Digit classification interface
* Model trained using deep learning (uploaded imageCNN)
* Support for digit recognition from
* Limitations/Constraints
* Limited to digits 0–9 only
* Based on the MNIST dataset
* Deployment optional and limited to web-based platforms

**4.Data Sources**

Dataset Source: MNIST Handwritten Digit Dataset (from Kaggle or official source)  
Type: Public  
Nature: Static (used for model training and testing)

**5.High-Level Methodology**

* **Data Collection** – *Explain how you will obtain the data (e.g., download)*
* **Data Cleaning** – *Identify potential issues such as missing values, duplicates, or inconsistent formats, and describe how you plan to address them.*
* **Exploratory Data Analysis (EDA)** – *Describe the techniques or visualizations you'll use to uncover patterns, trends, and relationships in the data.*
* **Feature Engineering** – *Indicate whether you will create new features or transform existing ones to improve model performance.*
* **Model Building** – *List the types of algorithms or models you plan to experiment with, and mention why they are suitable for your problem.*
* **Model Evaluation** – *Specify the metrics or validation strategies you will use to measure model accuracy and effectiveness.*
* **Visualization & Interpretation** – *Explain how you will present the key findings, insights, or predictions*
* **Deployment** – *State whether you will deploy your project (e.g., as a web app, dashboard, or notebook) and briefly describe the method or tools you plan to use, if applicable.*]

**6.Tools and Technologies**

Programming Language: Python  
Notebook/IDE: Google Colab, Jupyter Notebook  
Libraries: numpy, pandas, matplotlib, seaborn, TensorFlow, Keras, scikit-learn  
Optional Tools for Deployment: Streamlit, Flask

* **Programming Language** – *State the main language you will use (e.g., Python, R).*
* **Notebook/IDE** – *Mention the platform or environment you’ll work in (e.g., Google Colab, Jupyter Notebook, VS Code).*
* **Libraries** – *List the key libraries you plan to use for data processing, visualization, and modeling (e.g., pandas, numpy, seaborn, matplotlib, scikit-learn, TensorFlow).*
* **Optional Tools for Deployment** – *If applicable, name any tools or frameworks you might use for deployment (e.g., Streamlit, Flask, Gradio, FastAPI).*]

**7.Team Members and Roles**

Dharani.R– Model Design & Training  
Karthika.G – Data Collection & Analysis  
Harshitha shree.A.S– Web Deployment  
Lavanya.R– Documentation & Evaluation  
Monisha.P – Performance Monitoring & Model Optimization