Course Code: AI-802

Assignment 4.5 **Week 4 Submission**

Comprehensive Project Report

Course Title: Machine Learning
Instructor: Dr. Adeel Nisar

Submission Deadline
December 28, 2025

Total Marks: 20

Objective

The objective of this assignment is to assess students' ability to **document, analyze, and critically evaluate** their semester project in the form of a **research-style comprehensive report**. This deliverable consolidates all previous weekly submissions into a **structured, well-argued, and technically sound report**, similar to an academic conference or journal paper.

Important Instructions

- ***No plagiarism is allowed.*** *All content must be written in the students' own words.*
- ***Use of ChatGPT or any AI writing tool for report writing is strictly prohibited.***
- *Reports will be checked using plagiarism and AI-detection tools.*
- *Any copied, paraphrased, or AI-generated text will result in* ***serious deduction of marks*** *or* ***zero marks****.*
- *Proper academic writing style, formatting, and clarity are mandatory.*
- *Figures, tables, and results must be* ***generated from the student's own experiments****.*
- *The report must be based on the* ***same project dataset and models*** *used in previous deliverables.*
- *Individual and group contributions must be consistent with earlier submissions.*

Submission Format

- *Submit* ***one PDF report*** *following the above structure*
- *Include proper headings and numbering*
- *Use clear figures and tables with captions*
- *Code submission is* ***not required*** *for this deliverable, but results must match previous assignments*

Report Structure (Mandatory)

Students **must strictly follow** the template below. Missing sections will result in loss of marks.

Abstract

Provide a concise summary (150–200 words) covering:

- Problem domain
- Dataset used
- Methods/models applied
- Key experimental results
- Main conclusion

1. Introduction / Problem Statement

- Clearly define the problem being addressed
- Explain the motivation and real-world relevance
- State the main objectives of the project
- Briefly outline the approach used

2. Related Work

- Summarize relevant prior studies, methods, or approaches
- Explain how your work differs or improves upon existing methods
- This section is optional but will be rewarded if done well

3. Methodology

This section should describe **how the problem was solved**, including:

- Overall system pipeline
- Description of machine learning / deep learning models used
- Model architecture (high-level explanation)
- Training strategy and optimization method
- Justification for model choices

4. Experiments and Results

4.1 Dataset Description

- Name and source of the dataset
- Number of samples
- Number of classes
- Feature types
- Any class imbalance issues

4.2 Data Settings

- Data preprocessing steps
- Normalization / standardization
- Train–test split strategy
- Cross-validation (if used)
- Evaluation metrics

4.3 Results (Comparison of All Approaches)

- Present results of **all implemented models**
- Compare models using:
  - Accuracy
  - F1-Score
- Use tables and/or graphs for clarity

4.4 Discussion

- Interpret the results
- Explain why certain models performed better or worse
- Discuss strengths and limitations of your approach
- Analyze errors or misclassifications

5. Conclusion and Future Work

- Summarize key findings
- Restate the main contributions
- Discuss possible improvements
- Suggest future research directions