Assignment 3: Methodology Implementation and Answering Key Questions

Course: Data Science
Class: BSCS-F22
Instructor: Ghulam Ali
Course Learning Outcome: CLO-04 GA-03

Due Date: Nov 30, 2025 11:45 PM

Objective:

The objective of this assignment is to implement the complete methodology designed in Assignment 2 and use it to answer the key questions identified in Assignment 1 or revised in Assignment 2. Students are expected to carry out end-to-end data analysis or modeling and provide well-reasoned, insight-driven answers to the selected questions. They may include additional steps if needed to address complex or critical questions.

Assignment Tasks:

1. Methodology Implementation:

- Apply the full methodology proposed in Assignment 2.
- This may include (as applicable): For example: Statistical tests, Machine learning models (classification, regression, clustering, etc.), Feature engineering, Model training and evaluation and Data transformations or enhancements.
- Justify each step of the methodology and explain the tools/techniques used.
- Use appropriate metrics (e.g., accuracy, RMSE, precision, recall) to evaluate your results.

2. Answering the Key Questions:

- Revisit the original questions defined in Assignment 1.
- For each question:
  - Clearly state the question again.
  - Provide a detailed answer using data insights and results from your methodology.
  - Include visualizations (charts, graphs, or tables) that support your answer.
  - Provide proper reasoning behind each conclusion.

3. Critical Questions & Additional Steps:

- Identify if any questions require additional steps (e.g., advanced techniques, new features, or external data).
- Document any extra processes applied and justify their inclusion.

4. Documentation:

Students must submit a well-structured report covering:

I. **Introduction:** Summary of the problem, dataset, and purpose of this phase.
II. **Methodology Recap:** Brief recap of the methodology selected.
III. **Implementation Details:** Description of implementation steps with justifications.
IV. **Question-wise Analysis:**
    - Each question should be answered clearly.
    - Results supported with graphs, charts, or tables.
V. **Critical Additions:** Description of any extra steps taken to handle complex questions.
VI. **Findings & Insights:** Summary of insights gained through the methodology.
VII. **Conclusion:** Overall results, lessons learned, and any limitations.
VIII. **Code Snippets:** Include key code snippets (keep full code in the notebook/script file).

Submission Guidelines:

1. The report should be in PDF format.
2. The code must be submitted separately in a Jupyter Notebook (.ipynb).
3. Proper citations should be included if external sources are used.
4. Submit your assignment on Google Classroom by the due date.