MA289 Intro to Statistical Learning
Assignment 2: Pathological Demonstration of an AI Modeling Method

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Submit a shared **Google Colab notebook (edit access)**. No PDF is required for this assignment.

Overview

Select a specific AI modeling method from the course (examples include: standardization/scaling, resampling, PCA, logistic regression, cross-validation, decision trees, bias–variance tradeoff, regularization, etc.). Your objective is to demonstrate the importance, strengths, or limitations of the selected method using a **synthetic dataset that is intentionally designed to stress-test or expose a key property of the method**.

You must:

- Clearly state the method selected and the specific property being tested.
- Design a synthetic dataset that pathologically highlights this property.
- Implement the method in Python.
- Provide visualizations and numerical evidence supporting your conclusions.

The goal is to show conceptual understanding through controlled experimental design.

Requirements

Your Colab notebook must include:

- Clear explanation of the selected modeling method.
- Description of how the synthetic dataset was constructed and why it stresses the method.
- Python implementation.
- Appropriate evaluation metrics and visualizations.
- Interpretation of results.

Code must be clean, well-commented, and reproducible.

Grading Rubric (50 Points)

Criterion	Points	Score
1. Method Selection and Conceptual Clarity	**10**	
– Clear explanation of chosen method	5	_____
– Clear statement of property being tested	5	_____
2. Pathological Dataset Design	**15**	
– Dataset intentionally stresses the method	10	_____
– Clear explanation of design logic	5	_____
3. Implementation and Demonstration	**15**	
– Correct implementation in Python	10	_____
– Appropriate evaluation and visualization	5	_____
4. Interpretation and Insight	**10**	
– Correct interpretation of results	5	_____
– Clear demonstration of why the method matters	5	_____
Total	**50**	_____