Homework 1

Due Date: Sunday, September 29, 2024

Read carefully and solve the following problems.

1 Confusion Matrix (40 pts)

The results of a binary classification model are shown below:

	Actual Positive	Actual Negative	Total
Predicted Positive	50	10	60
Predicted Negative	5	35	40
Total	55	45	100

Table 1: Confusion Matrix

1. Calculate the accuracy.

2. Calculate the precision.

3. Calculate the recall.

4. Calculate the F1 score.

2 Linear Regression (60 pts)

Given the following dataset, calculate the parameters w (slope) and b (intercept) of a linear regression model $y = wx + b$ by hand.

x	y
1	2
2	3
3	5
4	4
5	6

Requirements

1. **Detailed Calculation Steps:**

   (a) Derive the closed-form solutions of the univariate linear regression using mean-square error (MSE). Clearly outline the step-by-step process, providing detailed calculations and explanations.

   (b) Use the solution derived above.

2. **Result Verification:**

   (a) Clearly state the final values of w and b.

Submission Guide

- **File Format** : HW1_*2024-12345*_*gildong*_*HONG*.pdf

- Make sure your file is converted into a PDF file.

- Handwriting, Microsoft Word, or LaTeX formats are all acceptable.

- A 10% deduction per day will be applied for late submissions.