# Computer Science Assignment

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## 15 April 2025

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### Question One

A two-class model was trained and then tested with a data set of 100 instances. The test set contained 60 instances in negative class N, and 40 instances in positive class P (these are the golden annotated labels). As a result of testing, the following prediction counts were obtained:

- 50 instances of N were classified correctly.
- 10 instances of N were classified into P.
- 10 instances of P were classified correctly.
- 30 instances of P were classified into N.

### a) Construct a contingency table (also called confusion matrix).

|  | Actual Positives | Actual Negatives |
|---|---|---|
| Predicted Positives | 10 | 10 |
| Predicted Negatives | 30 | 50 |

### b) Calculate the following macro metrics: precision, recall & F1. Show your calculations.

$\text{Precision}_{\text{Macro}} = \frac{1}{n} \sum_{i=1}^{n} \frac{TP_i}{TP_i + FP_i}$

$= \frac{1}{2} \cdot \left( \frac{10}{10+10} \right) + \left( \frac{50}{50+30} \right) = 0.5625$

$\text{Recall}_{\text{Macro}} = \frac{1}{n} \sum_{i=1}^{n} \frac{TP_i}{TP_i + FN_i}$

$= \frac{1}{2} \cdot \left( \frac{10}{10+30} \right) + \left( \frac{50}{50+10} \right) = 0.5417$

$\text{F1}_{\text{Macro}} = 2 \cdot \text{Recall}_{\text{Macro}} \cdot \frac{\text{Precision}_{\text{Macro}}}{\text{Recall}_{\text{Macro}} + \text{Precision}_{\text{Macro}}}$

$= 2 \cdot 0.5417 \cdot \frac{0.5625}{0.5417 + 0.5625} = 0.5519$

### c) Calculate the following micro metrics: precision, recall & F1. Show your calculations.

$\text{Precision}_{\text{Micro}} = \frac{TP}{TP + FP}$

$= \frac{10}{10+10} = 0.5$

$\text{Recall}_{\text{Micro}} = \frac{TP}{TP + FN}$

$= \frac{10}{10+30} = 0.25$

$$F1_{Micro} = 2 \cdot Recall_{Micro} \cdot \frac{Precision_{Micro}}{Recall_{Micro} + Precision_{Micro}}$$

$$= 2 \cdot 0.25 \cdot \frac{0.5}{0.25 + 0.5} = 0.3333333$$

## Question Two