Computer Science Assignment Question One

Michael Alizzi

15 April 2025

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.

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

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

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

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

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

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