

Question

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Q1.a

Contingency Table or Confusion Matrix

		Actual values	
		Class P (40)	Class N (60)
Predicted Values	Class P	10	10
	Class N	30	50

Q1 b) Macro Metrics

Class N

$$TPR_N = Precision_N = \frac{TP_N}{TP_N + FN_N} = \frac{50}{50 + 30} = \frac{50}{80} = 0.625$$

$$PPV_N = Recall_N = \frac{TP_N}{TP_N + FN_N} = \frac{50}{50 + 10} = \frac{50}{60} \approx 0.8333$$

$$F1_N = 2 \times \frac{TPR_N \cdot PPV_N}{TPR_N + PPV_N} = \frac{2 \times 0.625 \times 0.8333}{0.625 + 0.8333} \approx 0.714$$

Class P

$$Precision_P = \frac{TP_P}{TP_P + FP_P} = \frac{10}{10 + 10} = 0.5$$

$$Recall_P = PPV_P = \frac{TP_P}{TP_P + FN_P} = \frac{10}{10 + 30} = 0.25$$

$$F1_P = 2 \times \frac{TPR_P \cdot PPV_P}{TPR_P + PPV_P} = \frac{2 \times 0.5 \times 0.25}{0.5 + 0.25} = 0.333$$

① Macro Metrics

$$① Precision = \frac{TPR_N + TPR_P}{2} = \frac{0.625 + 0.5}{2} = 0.5625$$

$$② Recall = \frac{PPV_N + PPV_P}{2} = \frac{0.8333 + 0.25}{2} \approx 0.542$$

$$③ F1 = \frac{F1_N + F1_P}{2} = \frac{0.714 + 0.3333}{2} \approx 0.524$$

Q1

① Micro Metrics

$$① Precision = \frac{TP_{Total}}{TP_{Total} + FP_{Total}} = \frac{50 + 10}{(50 + 10) + (30 + 10)} = \frac{60}{100} = 0.6$$

$$② Recall = \frac{TP_{Total}}{TP_{Total} + FN_{Total}} = \frac{60}{60 + (10 + 30)} = \frac{60}{100} = 0.6$$

$$③ F1 = 2 \times \frac{Precision \times Recall}{Precision + Recall} = \frac{2 \times 0.6 \times 0.6}{0.6 + 0.6} = 0.6$$

Q1.b

					MACRO Metrics (2 classes, P & N => k=2)			
<div>Metric Class</div>	TP	FP	FN	TN	Precision TPR	Recall PPV	F1	
					TP/(TP+FP)	TP/(TP+FN)	2*RPR*PPV/(TPR+PPV)	
P	10	10	30	50	0.5	0.25	0.333333333	
N	50	30	10	10	0.625	0.833333333	0.714285714	
					Metric	Precision TPR	Recall PPV	F1
					Formula	(TPR_P+TPR_N)/2	(PPV_P+PPV_N)/2	(F1_P+F1_N)/2
					Value	0.5625	0.541666667	0.523809524

Q1.c

					MICRO Metrics			
Metric Class \	TP	FP	FN	TN	Precision TPR	Recall PPV	F1	
					TP/(TP+FP)	TP/(TP+FN)	2*RPR*PPV/(TPR+PPV)	
P	10	10	30	50	0.5	0.25	0.333333333	
N	50	30	10	10	0.625	0.833333333	0.714285714	
Total (P+N)	60	40	40	60	0.6	0.6	0.6	
					Metric	Precision TPR	Recall PPV	F1
					Formula	TPR_Total	PPV_Total	F1_Total
					Value	0.6	0.6	0.6