

Evaluation of classifiers:

	height	Weight	B.P. Sys	B.P. dia	Heart disease(x)	checked by doctor	predicted	
1	62	70	120	80	Not	No	True	Negative
2	72	90	110	70	Not	Yes	False	Positive
3	74	80	130	70	Not	Not	True	Negative
4	65	120	150	90	Yes	Yes	True	Positive
5	67	100	140	85	Yes	Not	False	Negative
6	64	110	130	90	Not	Yes	False	Positive
7	69	150	170	100	Yes	Yes	True	Positive
8	75	170	100	95	Yes	No	False	Negative
9	66	160	95	80	Yes	Yes	True	Positive
10								

Gold label: Gold Standard/Target/Ground Truth.

✓ $TP \Rightarrow$ The model predict as heart disease and The patient has heart disease.

$FP \Rightarrow$ The model predict as heart disease but in actual he has not heart disease

$TN \Rightarrow$ The model predict as he has not heart disease but in actual he has.

✓ $FN \Rightarrow$ The model predict as he has not heart disease but In actual has heart disease

FP ^I
FN ^{II} \rightarrow Misclassification.

act

P	TP	FN \rightarrow Type 2
N	FP	TN

\swarrow Misclassification

Type I
~~Rate~~ ~~of~~ ~~error~~ ~~act~~

Recall ~~how~~ out of the actual ^{Cases} Positive how many did ~~you~~ ^{Model} ~~correct~~ The model correctly identify as +ve

$$R = \frac{TP}{TP + \cancel{FP} + \cancel{FN}} \Rightarrow$$

P = ~~How~~ ~~accurate~~ you are in predicting the Positive cases.

out of all cases the model predicted as positive how many we actually Positive.

$$\frac{TP}{TP + FP} \Rightarrow$$

F₁ = $\frac{2 \times P \times \text{Recall}}{\text{Precision} + \text{Recall}} \Rightarrow$ Harmonic Mean of Precision & Recall

$$\frac{1}{P} + \frac{1}{R} = \frac{2}{F_1}$$

		Predicted		
		Positive	Negative	
Actual	Positive	TP 70 ✓	FN 30	⇒ Type II Error (missed detection)
	Neg	FP 20	TN 80 ✓	
		✓ Type I Error (False alarm)		

Precision: $P = \frac{TP}{TP+FP} = \frac{70}{70+20} = \frac{70}{90} = 0.778 = 77.8\%$

Recall: $\text{Recall} = \frac{TP}{TP+FN} = \frac{70}{70+30} = \frac{70}{100} = 0.7 \Rightarrow 70\%$

Accuracy:

$$\frac{TP+TN}{TP+TN+FP+FN} \Rightarrow \frac{70+80}{70+30+20+80} = \frac{150}{200} = 0.75 = 75\%$$

F_1 :

$$F_1 = \frac{2PR}{P+R} = \frac{2(.778)(.7)}{(.778)+(.7)} = \frac{2(.5446)}{1.478} = .736$$