

Actual CONFUSION MATRIX

Has Cancer Hasn't Cancer

Predicted

Has Cancer	TP	FP
Hasn't Cancer	FN	TN

TP: No. of people having cancer correctly classified.

TN: No. of person's who doesn't have cancer correctly classified.

FP: No. of person who don't have cancer → classified as wrongly having cancer.

FN: No. of person who have cancer → classified as not having cancer.

SENSITIVITY

.. Cancer

→ percentage of patients with heart disease were correctly classified. =

$$\text{Sensitivity} = \left(\frac{TP}{TP + FN} \right)$$

Specificity

→ Percentage of patients without heart disease are correctly classified

$$\text{Specificity} = \frac{TN}{TN + FP}$$

For multiclass

	1	2	3
1	TP		
2	FN		
3	FN		

$$\begin{array}{l} \text{Sensitivity}_1, \\ \text{Sensitivity}_2, \\ \text{Sensitivity}_3 \end{array} \left| \begin{array}{l} \text{Specificity}_1 \\ \text{Specificity}_2 \\ \text{Specificity}_3 \end{array} \right|$$

	1	2	3
1	12	102	83
2	112	23	77
3	83	92	17

↓
(TN)₁

$$\text{sensitivity}_1 = \left(\frac{12}{112 + 83} \right)$$

$$\text{specificity}_1 = \left(\frac{TN}{FP + TN} \right) = \frac{23 + 77 + 92 + 17}{(102 + 83 + 23 + 77 + 92 + 17)}$$

$$\text{sensitivity}_2 = \left(\frac{TP}{TP + FN} \right) = \frac{23}{23 + (102 + 92)}$$

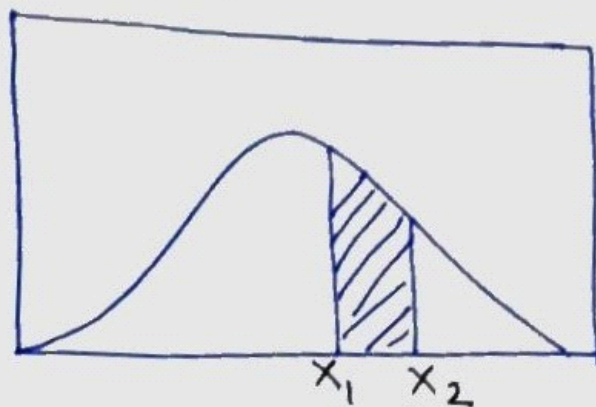
$$\text{specificity}_2 = \frac{TN}{TN + FP} = \frac{(12 + 17)}{(2 + 83 + 17 + 83) + (102 + 77)}$$

$$\text{sensitivity}_3 = \frac{TP}{TP + FN} = \frac{17}{17 + 83 + 77}$$

Probability and Likelihood.

Probabilities are the areas under the fixed distribution.

$\Pr(\text{data} | \text{distribution})$



Likelihoods are the y-axis values for fixed data points with distributions that can be moved.

~~Pr~~

$L(\text{distribution} | \text{data})$

$L(\text{mean} = \mu, \text{standard deviation} = \sigma | \text{data} = x_1)$

$= y_1$

