



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA

CREATE CHANGE

Machine Learning

COMP4702/COMP7703

Prac 6

Amelia Qiu

https://github.com/Amelia-Tong/MachineLearning_COMP4702/blob/main/week4

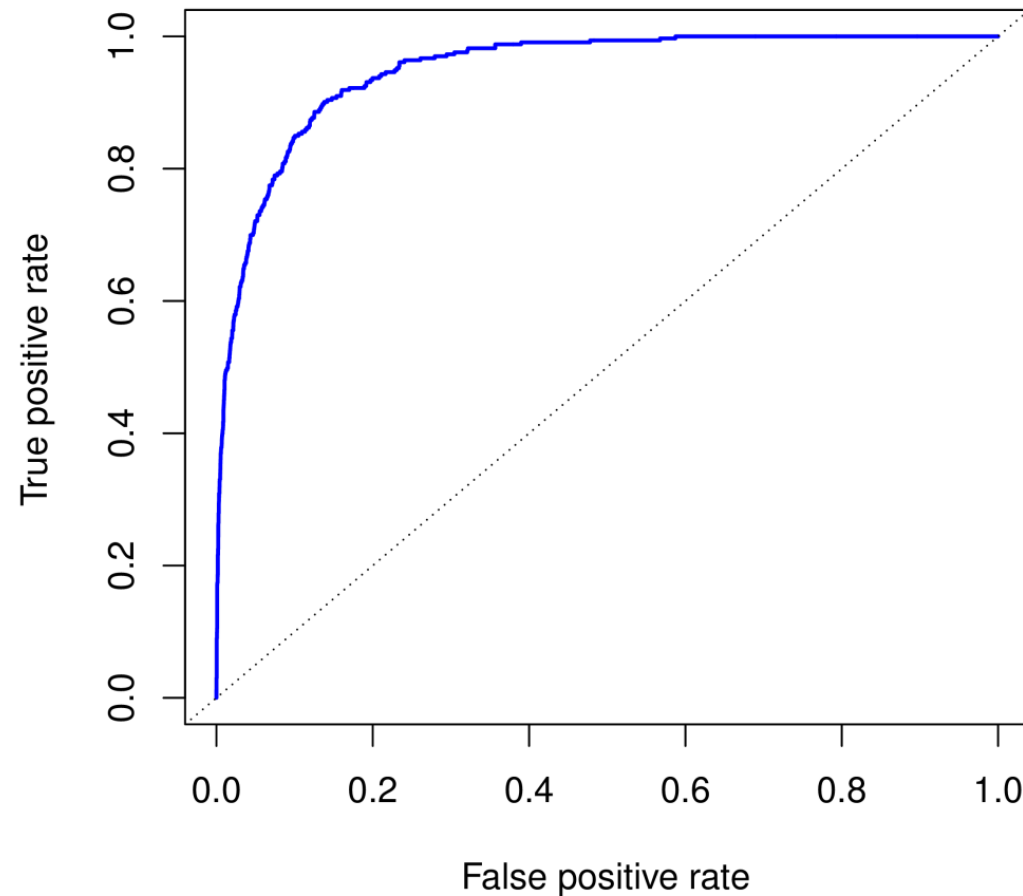
confusion Matrix

		true	
		C1 (positive)	C2 (negative)
pred- icted	C1	<i>a</i>	<i>b</i>
	C2	<i>c</i>	<i>d</i>

- Sensitivity: $a/(a+c)$ (true positive, recall)
- Specificity: $d/(b+d)$ (true negative)
- False positive: $c/(a+c)$
- False negative: $b/(b+d)$ (1- specificity)

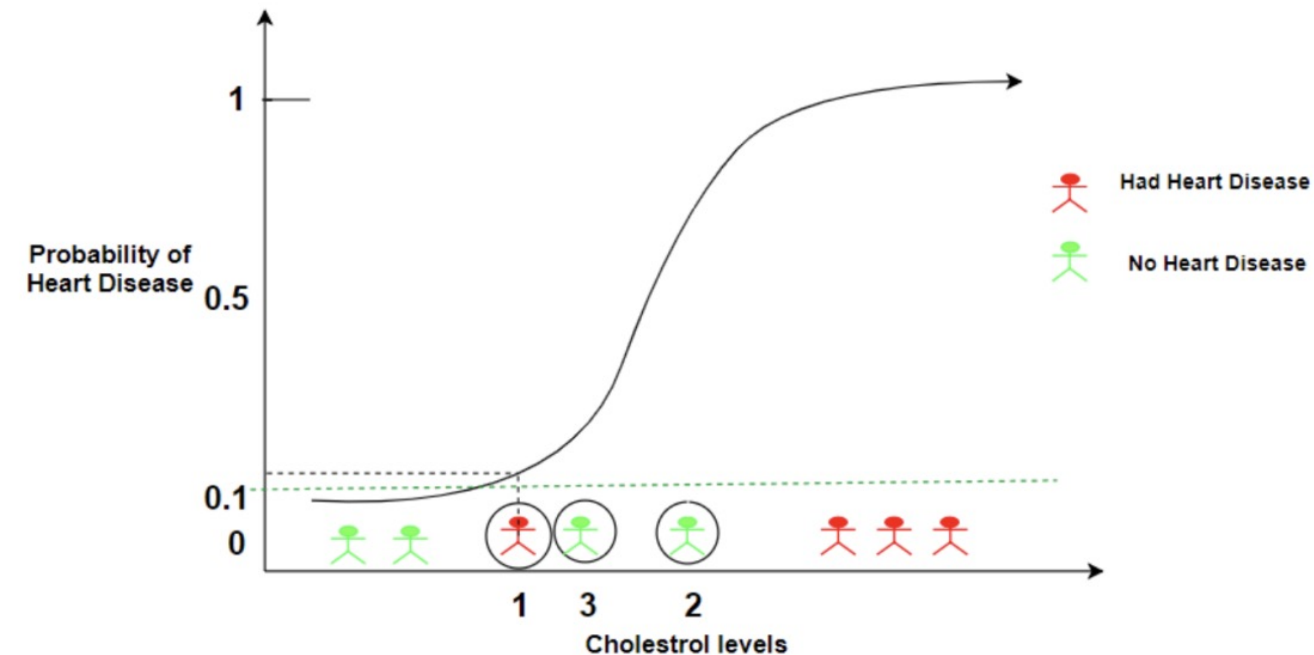
ROC Curve

ROC Curve



- The dotted line is "no information" classifier; class and predictor are not associated.
- The ideal ROC curve hugs the top left corner, indicating a high true positive rate and a low false positive rate.
- Compute the confusion table for each split, record the sensitivity and specificity and plot the resulting numbers.

ROC Curve



Setting threshold from 0.5 to 0.1:

- The model will correctly identify all people having heart disease. (true positive rate increase)
- However, Patient 2 and 3 will now be wrongly classified as having heart disease. (false positive rate increase)

Regularisation

$$\text{RSS} = \sum_{i=1}^n \left(y_i - \beta_0 - \sum_{j=1}^p \beta_j x_{ij} \right)^2$$

- Least squares:

$$\underset{\beta}{\text{minimize}} \text{RSS}$$

- Lasso (L1 normalisation):

$$\underset{\beta}{\text{minimize}} \text{RSS} + \lambda \sum_{j=1}^p |\beta_j|$$

- Ridge (L2 normalisation):

$$\underset{\beta}{\text{minimize}} \text{RSS} + \lambda \sum_{j=1}^p \beta_j^2$$