WS #11 - ROC curves

Math 150, Jo Hardin

Monday, March 2, 2026

Your Name: _____

Names of people you worked with: _____

Name one unique thing about where you grew up (in your home, your city, your front yard…).

Task: On the plot, label the following points (A through H) representing different cutoff values. An observation with a predicted probability greater than the cutoff is labeled "success".

[A] Using 0.25 as the cutoff:

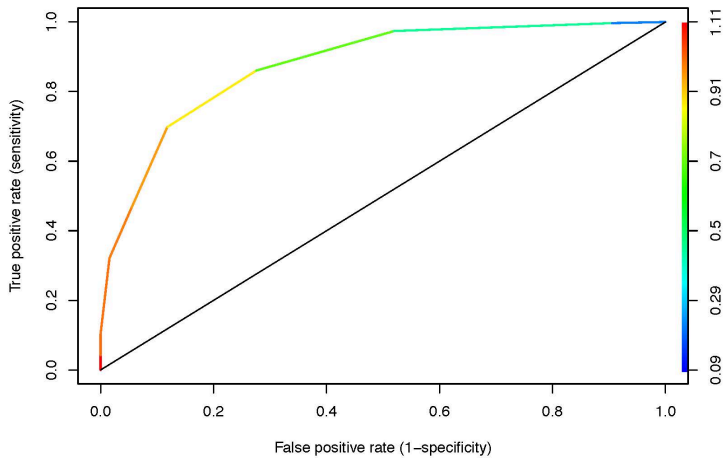
		truth	
		yes	no
predicted	yes	300	66
	no	8	61

[B] Using 0.7 as the cutoff:

		truth	
		yes	no
predicted	yes	265	35
	no	43	92

[C] Using 0.9 as the cutoff:

		truth	
		yes	no
predicted	yes	144	7
	no	164	120



[D] Using probability 1 as the cutoff.
[E] Using 0 as the cutoff.
[F] A model which predicts perfectly.
[G] Random guessing.
[H] Worse than random guessing.

Solution:

[A]

$$\begin{aligned} \text{sensitivity} &= TPR = 300/308 = 0.974 \\ \text{specificity} &= 61/127 = 0.480, 1 \text{ - specificity} = FPR = 0.520 \end{aligned}$$

[B]

$$\begin{aligned} \text{sensitivity} &= TPR = 265/308 = 0.860 \\ \text{specificity} &= 92/127 = 0.724, 1 \text{ - specificity} = FPR = 0.276 \end{aligned}$$

[C]

$$\begin{aligned} \text{sensitivity} &= TPR = 144/308 = 0.467 \\ \text{specificity} &= 120/127 = 0.945, 1 \text{ - specificity} = FPR = 0.055 \end{aligned}$$

[D] all models will go through (0,0) → predict everything negative, prob=1 as your cutoff

[E] all models will go through (1,1) → predict everything positive, prob=0 as your cutoff

[F] you have a model that gives perfect sensitivity (no FN!) and specificity (no FP)

[G] random guessing. If classifier randomly guess, it should get half the positives correct and half the negatives correct. If it guesses 90% of the positives correctly, it will also guess 90% of the negatives to be positive.

[H] worse than random guessing. Note that the opposite classifier to (H) might be quite good!