data science

29 Sep 2017

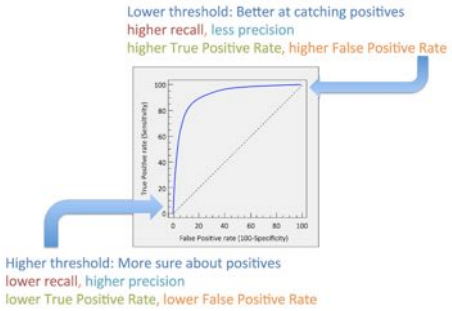
25 flashcards made with the Flashcard Hero app (Mac/iPhone/iPad).

Q: 1	Q: 2
Recall or Sensitivity	Precision
Q: 3	Q: 4
Specificity	Accuracy

A: 2 TP / (TP + FP) = Positives caught relative to false positives Out of all cases I predicted as positive, how many times was I right? This is *sureness* about positives.	A: 1 True positive rate TP / (TP + FN) = Positives Caught / All Positives Out of all the (few) positive cases, how many did I find. This is about *catching* positives.
A: 4 Percent correct predictions of all predictions (TP + TN) / (TP + TN + FP + FN) (true positive + true negative) / (total population) predicted / actual	A: 3 True negative rate TN / (TN + FP) = Negatives Caught / All Negatives The proportion of negatives that are correctly identified.

Q: 5 F1	Q: 6 ROC Curve
Q: 7 Bayes theorem	Q: 8 Bootstrapping

A: 6



A: 5

2*Recall*Precision / (Recall+Precision)

Harmonic mean of recall (catching positives) and precision (sureness of positives)

A: 8

Sampling from a dataset with replacement, to create a "new" dataset. Used in random forest.

A: 7

Expresses the probability of A, conditioned on B.

$$P(A \mid B) = \frac{P(B \mid A)P(A)}{P(B)}$$

posterior — likelihood — prior — evidence

Q: 9 Bagging	Q: 10 Random forest
Q: 11 Boosting	Q: 12 Maximum likelihood estimation

A: 10 Uses bagging (bootstrap + aggregating), but introduces more randomness by using a random subset of features for each tree. Excess trees will not overfit.	A: 9 Bootstrap + Aggregating. Combining the predictions of decision trees, each of which was trained on a bootstrapped dataset
A: 12 Select the parameter that makes the observed data "most likely,", i.e. maximizes the probability of obtaining the data at hand. To solve: 1. Write Likelihood = product of probabilities 2. Take log and simplify 3. Take derivative wrt parameter, set to zero, solve for parameter	A: 11 Fits successive trees to residuals with incorrect predictions upweighted based on smooth loss function. Successive trees scaled by learning rate lambda < 1.0. Fits to entire dataset. Can overfit.

Q: 13 Bias-variance tradeoff	Q: 14 Lasso regression
Q: 15 Ridge regression	Q: 16 ElasticNet

A: 14 Adds the L1 norm (magnitude of coefficients) to the linear regression cost function, for regularization. Tends to produce sparse solutions, with many coefficients zeroed.	A: 13 The **bias** is error from erroneous assumptions in the learning algorithm. High bias can cause an algorithm to miss the relevant relations between features and target outputs (**underfitting**). The **variance** is error from sensitivity to small fluctuations in the training set. High variance can cause an algorithm to model the random noise in the training data, rather than the intended outputs (**overfitting**). Need to manage both so that model generalizes well.
A: 16 Combines lasso and ridge: both the L1 and L2 norm are included in the linear regression cost function.	A: 15 Adds the L2 norm (sum of the squares of coefficients) to the linear regression cost function, for regularization. Tends to produce dense solutions, and smoother functions.

Q: 17 Regularization	Q: 18 Binary classification outcomes
Q: 19 p-value	Q: 20 SVM (Support Vector Machine)

A: 18 **True Negative** case was negative and predicted negative **True Positive** case was positive and predicted positive **False Negative** case was positive but predicted negative **False Positive** case was negative but predicted positive	A: 17 Reduces overfitting by favoring simpler models over complex ones, usually by controlling the size of the parameters used.
A: 20 Linear classifier for binary classification. Finds optimal separating hyperplane that has maximum margin. Margin = distance between closest data points to the separator, margin is "no man's land," no data point inside margin.	A: 19 The p-value for each term tests the null hypothesis that the coefficient is equal to zero (no effect). A low p-value (< 0.05) indicates that you can reject the null hypothesis.

Q: 21 Logistic regression	Q: 22 K-nearest neighbor
Q: 23 K-means clustering	Q: 24 Generalized Linear Models

A: 22 Classification algorithm that predicts based on the most common class among K-nearest nodes.	A: 21 Classification algorithm which uses the logistic function whose values are constrained to [0,1].
A: 24 Response variable y, explanatory variables x1 x2 x3 ..., link function g	A: 23 Randomly initialize cluster centers or K-means++, with each point belonging to the nearest center. Move centers to each cluster mean; reassign points. Continue until centers stop moving. K-means++ is an initialization method that creates cluster centers with prob increasing with distance^2 to first point. Still random, but ensures centers are spaced out.

Q: 25 Standard deviation	

	A: 25 $s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$