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Week 2 Quiz: Evaluating machine learning models

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TOTAL POINTS 9

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1. What is the sensitivity and specificity of a pneumonia model that always outputs positive? In other words, the models says that every patient has the disease. **1 / 1 point**

   - sensitivity = 1.0, specificity = 1.0
   - sensitivity = 1.0, specificity = 0.0
   - sensitivity = 0.5, specificity = 0.5
   - sensitivity = 0.0, specificity = 1.0

   Correct

   - Sensitivity tells us how good the model is at correctly identifying those patients who actually have the disease and label them as having the disease.
   - Specificity tells us how good the model is at correctly identifying the healthy patients as not having the disease.

   A sensitivity of 1 would mean that the model identifies all the diseased patients as having the disease, and does not identify any healthy patients as healthy. This is what the model is doing in this example.

2. In some studies, you may have to compute the Positive predictive value (PPV) from the sensitivity, specificity and prevalence. **1 / 1 point**

   Given a sensitivity = 0.9, specificity = 0.8, and prevalence = 0.2, what is the PPV (positive predictive value)?

   HINT: please check the reading item "Calculating PPV in terms of sensitivity, specificity and prevalence"

   - 0.18
   - 0.53
   - 0.02
   - 0.9

   Correct

   $$PPV = \frac{sensitivity \times prevalence}{sensitivity \times prevalence + (1 - specificity) \times (1 - prevalence)}$$

   The numerator is (sensitivity * prevalence) = 0.9*0.2 = 0.18.

   The denominator is

   0.18 + 0.2 * 0.8 = 0.34.

   Therefore the PPV is 0.18/0.34 ~ 0.52

3. If sensitivity = 0.9, specificity = 0.8, and prevalence = 0.2, then what is the accuracy? **1 / 1 point**

   Hint: You can watch the video "Sensitivity, Specificity and Prevalence" to find the equation.

   - 0.52
   - 0.82
   - 0.75
   - 0.44

   Correct

   The equation for accuracy is:

   $$Accuracy = (Sensitivity \times Prevalence) + (Specificity \times (1 - Prevalence))$$

   So accuracy = (0.9*0.2) + (0.8*0.8) = 0.82

4. What is the sensitivity and specificity of a model which randomly assigns a score between 0 and 1 to each example (with equal probability) if we use a threshold of 0.7? **1 / 1 point**

   - Sensitivity = 0.3, Specificity = 0.7
   - Sensitivity = 0.7, Specificity = 0.3
   - Not enough information to answer the question.
   - Sensitivity = 0.5, Specificity = 0.5

   Correct

   TP