Errata and Updates for ASM Exam SRM Study Manual (Third Edition)

(Last updated 6/9/2023) sorted by page

Page 106 The second edition of *An Introduction to Statistical Learning* modified their formulas for AIC and BIC of a linear regression by removing σ^2 from the denominators. Thus on the manual's page 106, formulas (7.4) and (7.5) should be changed to

$$\text{AIC}= \frac{1}{n}(\text{RSS} + 2d\hat{\sigma}^2) \tag{7.4}$$

$$\text{BIC}= \frac{1}{n}\big(\text{RSS} + (\ln n)d\hat{\sigma}^2\big) \tag{7.5}$$

Pages 113 and 120 Exercises 7.17 and 7.18 require modification.

7.17 For a linear regression model with 100 observations, you are given:

- The model has 10 variables and an intercept.
- The residual sum of squares is 64.8.
- The estimated variance of the residual term is 5.5.

Calculate AIC and BIC using the formulas in James et al.

Solution

$$\text{AIC} = \frac{1}{100}\big(64.8 + 2(10)(5.5)\big) = \boxed{\mathbf{1.748}}$$

$$\text{BIC} = \frac{1}{100}\big(64.8 + (\ln 100)(10)(5.5)\big) = \boxed{\mathbf{3.181}}$$

7.18 A linear regression model has n observations and 8 predictors. You are testing a model having a subset of the 8 predictors. The subset has 4 predictors.

You are given:

- Both models have intercepts.
- The training RSS of the original model is 82.8.

- The training RSS of the subset model is 116.2.
- The variance of the residuals is estimated using the original model.
- AIC and BIC of the subset model are calculated using the formulas in James et al.
- The AIC of the subset model is 105.2458.

Calculate the BIC of the subset model.

Solution

$$\begin{aligned}
\hat{\sigma}^2 &= \frac{82.8}{n-9} \\
\text{AIC} &= n - 9n\,(116.2 + (2)(4)(82.8)n - 9) \\
105.2458 &= \frac{116.2(n-9) + 8(82.8)}{n} \\
105.2458n &= 116.2n - 383.4 \\
n &= \frac{383.4}{10.9542} = 35 \\
\text{BIC} &= 2635\left(116.2 + \frac{(\ln 35)(4)(82.8)}{26}\right) = \boxed{\mathbf{110.9638}}
\end{aligned}$$

Page 262 In Exercise 15.10, in the three bullets, the models should be numbered as Model I, Model II, and Model III respectively.

Page 274 On the line above the first displayed expression, change "mean square error" to RSS. One line and three lines below the displayed expression, change MSE to RSS.

Page 295 Replace the solution to exercise 16.5 with the following:

Splits I and III don't split at all; all observations go into R_2. Split II puts (4,1) into R_2 and everything else into R_1. There is no error for (4,1), whereas the error of the other 5 is the square difference from the mean, or the population (division by 5) variance times 5, which is 0.548. Split IV puts (1,0) into R_1 and everything else into R_2. Once again, we can compute the RSS as the variance in R_2, or 0.2824, times 5, or 1.412. Split V puts two observations, (3,2) and (2,2), into R_2 and the others into R_1. The variance of the observations in R_1 is 0.451875 so the sum of squares is $4(0.451875) = 1.8075$. The RSS for R_2 is $(1.5-1.75)^2+(2-1.75)^2 = 0.125$. The total RSS for this split is $1.8075 + 0.125 = 1.9325$. Split II minimizes the RSS. (B)

Page 295 In the solution to Exercise 16.8, on the fifth line, change "86 + 82 + 81 + 4(9) = 286 to 82 + 81 + 11 + 86 + 4(9) = 296.