Problem 12

Wednesday, June 12, 2024 4:02 PM

You $\tilde{Pr}(Y = \text{orange} \mid X = x) = \dfrac{\exp(\hat{\beta}_0 + \hat{\beta}_1 x)}{1 + \exp(\hat{\beta}_0 + \hat{\beta}_1 x)}$

Friend $\hat{Pr}(Y = \text{orange} \mid X = x) =$
$$\frac{\exp(\hat{a}_{\text{orange}0} + \hat{a}_{\text{orange}1} x)}{\exp(\hat{a}_{\text{orange}0} + \hat{a}_{\text{orange}1}) + \exp(\hat{a}_{\text{apple}0} + \text{apple}_1 x)}$$

$$Me = \frac{\exp(\check{\beta}_{\text{orange}0} + \check{\beta}_{\text{orange}1} x)}{1 + \exp(\check{\beta}_{0\,\text{orange}0} + \check{\beta}_{\text{orange}1} x)} = p(x)$$

a) $\log\left(\dfrac{p(x)}{1-p(x)}\right) = \cancel{\log}\left(e^{\text{orange}_0 + \text{orange}_1 x}\right)$ (orange)

$\cancel{\log}\left(e^{\text{apple}_0 + \text{apple}_1 x}\right)$ (apple)

$\log\left(\dfrac{p(x)}{1-p(x)}\right) = \cancel{\log}(e$

$\text{orange} = \text{orange}_0 + \text{orange}_1 X$

b) $\text{odds}\left(\dfrac{pr(Y = \text{orange} \mid X = x)}{pr(Y = \text{apple} \mid X = x)}\right) = \dfrac{\exp(\hat{a}_{\text{orange}0} + \hat{a}_{\text{orange}1} x)}{\exp(\hat{a}_{\text{apple}0} + \text{apple}_1 x)}$ (4.14)

Orang log odds $= \hat{a}_{\text{orange}0} + \hat{a}_{\text{orange}} x - \hat{a}_{\text{pple}0} - \text{apple}_1 X$

c) $P(x) = 2 - (1)x$: me

$\check{\beta}_0 \approx \text{orange}_0 - \text{apple}_0$

$\beta_1 \approx \text{orange}_1 - \text{apple}_1$

d) $\beta_0 \approx 1.2 - 3 = -1.8$

$\beta_1 \approx -2 - .06 = -2.06$

e) $me = -1.8 - 2.06(x)$

$\text{you} = 1.2 - 2x - 3 - .06x$

$= -1.8 - 2.06x$

They are the exact same. So 100% of time they will agree for these models created.