

Say

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_{1,2} X_1 X_2$$

$$X_1 = 0, X_2 = 0$$

$$Y = \beta_0$$

$$X_1 = 1, X_2 = 0$$

$$Y = \beta_0 + \beta_1$$

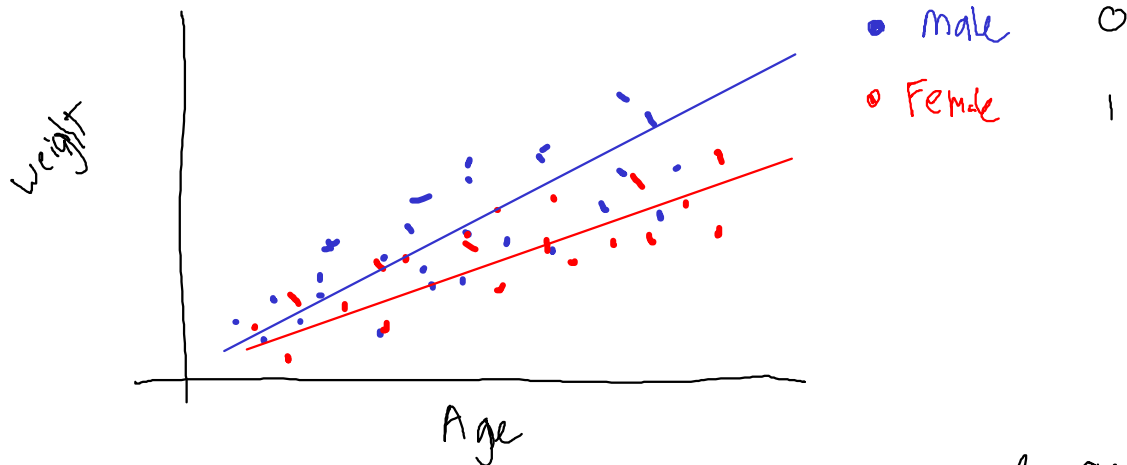
$$X_1 = 0, X_2 = 1$$

$$Y = \beta_0 + \beta_2$$

$$X_1 = 1, X_2 = 1$$

$$Y = \beta_0 + \beta_1 + \beta_2 + \beta_{1,2}$$

Interaction between Categorical & Quantitative
Cat Weight



$$\text{Weight} = \beta_0 + \beta_1 \text{ age} + \beta_2 \text{ Female} + \beta_3 \text{ age} \times \text{Female}$$

$$F=0$$

$$\text{Weight}_M = \beta_0 + \beta_1 \text{ age} + \text{X}$$

$$F=1$$

$$\begin{aligned} \text{Weight}_F &= \beta_0 + \beta_1 \text{ age} + \beta_2 + \beta_3 \text{ age} \\ &= (\beta_0 + \beta_2) + (\beta_1 + \beta_3) \text{ age} \end{aligned}$$

Say

color = R, O, B, P

$$y = \beta_0 + \beta_1 \cdot X_R + \beta_2 \cdot X_O + \beta_3 X_B + \beta_4 X_P$$

$$y_R = \beta_0 + \beta_1$$

$$y_O = \beta_0 + \beta_2$$

$$y_B = \beta_0 + \beta_3$$

$$y_P = \beta_0 + \beta_4$$