Jacob Vargo CS425 HW1

2.6 A better error function to implement robust regression would be to take the absolute value of the difference rather than the square.

$E(g|X) = \frac{1}{N}\sum_{t=1}^{N} |r^t - g(x^t)|$

2.7 derive $w_1 = \frac{\sum_t x^t r^t - \bar{x}\bar{r}N}{\sum_t (x^t)^2 - N\bar{x}^2}$ and $w_0 = \bar{r} - w_1\bar{x}$

(2.16) $E(w_1, w_0 | X) = \frac{1}{N}\sum_{t=1}^{N} [r^t - (w_1 x^t + w_0)]^2$

$\frac{dE(w_1, w_0|X)}{dw_0} = 0 = \frac{2}{N}[\sum_{t=1}^{N} r^t - w_1 \sum_{t=0}^{N} x^t - w_0 N) \cdot 1$

$0 = \bar{r} - w_1\bar{x} - w_0$

$w_0 = \bar{r} - w_1\bar{x}$

$\frac{dE(w_1, w_0|X)}{dw_1} = 0 = \frac{2}{N}\sum_{t=1}^{N} (r^t - w_1 x^t - w_0)(x^t)$

$0 = \frac{1}{N}\sum_{t=1}^{N} (x^t r^t - w_1 (x^t)^2 - x^t w_0)$

$0 = \frac{1}{N}\sum_{t=1}^{N} (x^t r^t - w_1 (x^t)^2 - x^t \bar{r} + x^t w_1 \bar{x})$

$0 = \frac{1}{N}\sum_{t=1}^{N} (x^t r^t - x^t \bar{r}) - \frac{1}{N}\cdot w_1 \cdot \sum_{t=1}^{N} ((x^t)^2 - x^t\bar{x})$

$w_1 = \frac{\frac{1}{N}\cdot\sum_{t=1}^{N} x^t r^t - \frac{1}{N}\sum_{t=1}^{N} x^t \bar{r}}{\frac{1}{N}\sum_{t=1}^{N} (x^t)^2 - \frac{1}{N}\sum_{t=1}^{N} x^t\bar{x}}$

$w_1 = \frac{\sum_t x^t r^t - \bar{x}\bar{r}N}{\sum_t (x^t)^2 - \bar{x}^2 N}$

2.11 A possible method to check for mislabeling would be to see if there are oppositly labeled data points near and around that point such that a hypothesis class that could fit is either contorted or is impossible to make.