Weighted Least Squares. In many cases, the variance σ_i^2 of the noise at measurement i depends on x_i. Observations where σ_i^2 is large are less accurate, and, hence, should play a smaller role in the estimation of β. The *weighted* least squares estimator is that value of b that minimizes the criterion

$$\sum_{i=1}^{n} \frac{(y_i - f_b(x_i))^2}{\sigma_i^2}.$$

overall possible b. In the linear case, this criterion is numerically of the same form, as we can make the change of variables $\tilde{y}_i = y_i/\sigma_i$ and $\tilde{\mathbf{x}}_{i,j} = \mathbf{x}_{i,j}/\sigma_i$.