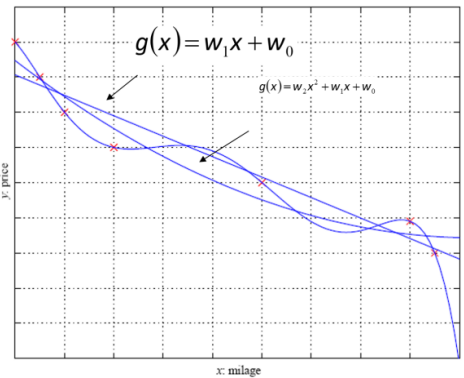
Regression

- The two basic types of regression are simple linear regression and multiple linear regression, although there are non-linear regression methods for more complicated data and analysis.
- Simple linear regression uses one independent variable to explain or predict the outcome of the dependent variable Y, while multiple linear regression uses two or more independent variables to predict the outcome.
- Simple Linear regression is a linear model, e.g. a model that assumes a linear relationship between the input variables (x) and the single output variable (y). More specifically, that y can be calculated from a linear combination of the input variables (x).

Estimation of coefficients - Simple Linear Regression



$$X = \{x^t, r^t\}_{t=1}^N$$

$$r^t \in \mathbb{R}$$

$$r^t = f(x^t) + \epsilon$$

$$E[g|X] = \frac{1}{N}\sum_{t=1}^{N}[r^t - g(x^t)]^2$$

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

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

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

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Assumptions in Linear Regression

- There must be a linear relation between independent and dependent variables.
- There should not be any outliers present.
- Sample observations should be independent.
- Error terms should be normally distributed with mean 0 and constant variance.
- Absence of multicollinearity and auto-correlation.

Thank You