model: $y = f(x) + \varepsilon$

Bias-Variance Tradeoff

* $E(y - \hat{f}(x))^2 = var(\hat{f}(x)) + [Bias(\hat{f}(x))]^2 + var(\varepsilon)$

$$E(y - \hat{f}(x))^2 = E[(f(x) + \varepsilon) - \hat{f}(x)]^2$$

$$= E[(f(x) - \hat{f}(x)) + \varepsilon]^2$$

$$= E[(f(x) - \hat{f}(x))^2] + E[\varepsilon]^2 + 2E[(f(x) - \hat{f}(x))\varepsilon]$$