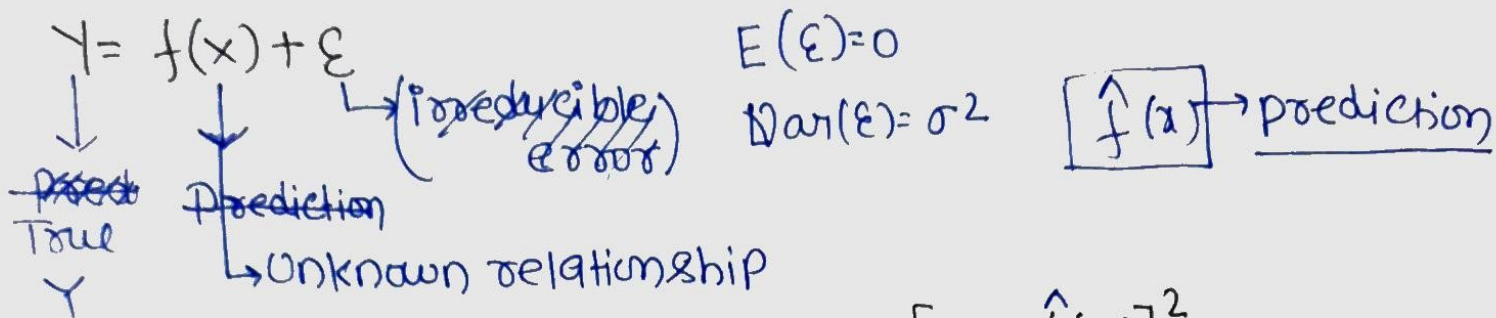


Bias-Variance Week-2, Lecture 7



$$\text{Expected prediction error}(x_0) = E [Y - \hat{f}(x_0)]^2$$

$$= E_{Y/X} [(Y - \hat{f}(x))^2 | X=x]$$

$$= E \left(\underbrace{E[\hat{f}(x_0)] - f(x_0)}_{\substack{\text{bias} \\ \text{bias}^2 \\ \text{variance}}} + \underbrace{[E[\hat{f}(x_0)] - f(x_0)]^2}_{\substack{\text{variance} \\ \text{bias}^2}} + \sigma^2 \right)$$

In case of KNN:

$$\text{variance} = \frac{\sigma^2}{K} \rightarrow \downarrow$$

bias $\rightarrow \uparrow$

if $K \uparrow$

More stable
less complex

K-NN in

high-dimension

bias is more

so more error