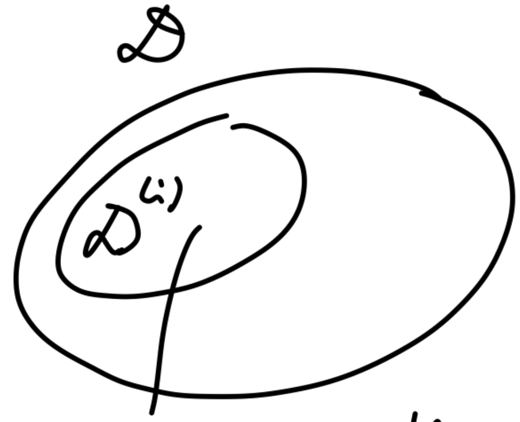
$$MSE(x) = \mathbb{E}_{\mathcal{D}^{(i)}} \left\{ \left( t(x) - h_\beta(x;\mathcal{D}^{(i)}) \right)^2 \right\}$$

each $\mathcal{D}^{(i)} = \{ t^{(k)}, x^{(k)} \}_{k=1}^{N}$




$$\boxed{MSE = \text{bias}^2 + \text{variance}}$$

$$\mathbb{E}_{\mathcal{D}^{(i)}} \left\{ \left( t(x) - h_\beta(x;\mathcal{D}^{(i)}) \right)^2 \right\}$$

$$= \mathbb{E}_{\mathcal{D}^{(i)}} \left\{ \left( t(x) - \mathbb{E}_{\mathcal{D}^{(i)}} h_\beta(x;\mathcal{D}^{(i)}) + \mathbb{E}_{\mathcal{D}^{(i)}} h_\beta(x;\mathcal{D}^{(i)}) - h_\beta(x;\mathcal{D}^{(i)}) \right)^2 \right\}$$

$$= \mathbb{E}_{\mathcal{D}^{(i)}} \left\{ \left( t(x) - \mathbb{E}_{\mathcal{D}^{(i)}} h_\beta(x;\mathcal{D}^{(i)}) \right)^2 \right\} = \text{bias}^2$$

$$+ \mathbb{E}_{\mathcal{D}^{(i)}} \left\{ \left( \mathbb{E}_{\mathcal{D}^{(i)}} h_\beta(x;\mathcal{D}^{(i)}) - h_\beta(x;\mathcal{D}^{(i)}) \right)^2 \right\} \rightarrow \underline{\text{variance}}$$

$$+ 2 \, \mathbb{E}_{\mathcal{D}^{(i)}} \left\{ \underbrace{\left( t(x) - \mathbb{E}_{\mathcal{D}^{(i)}} h_\beta(x; \mathcal{D}^{(i)}) \right) \left( \mathbb{E}_{\mathcal{D}^{(i)}} h_\beta(x; \mathcal{D}^{(i)}) - h_\beta(x; \mathcal{D}^{(i)}) \right)}_{= 0} \right\}$$