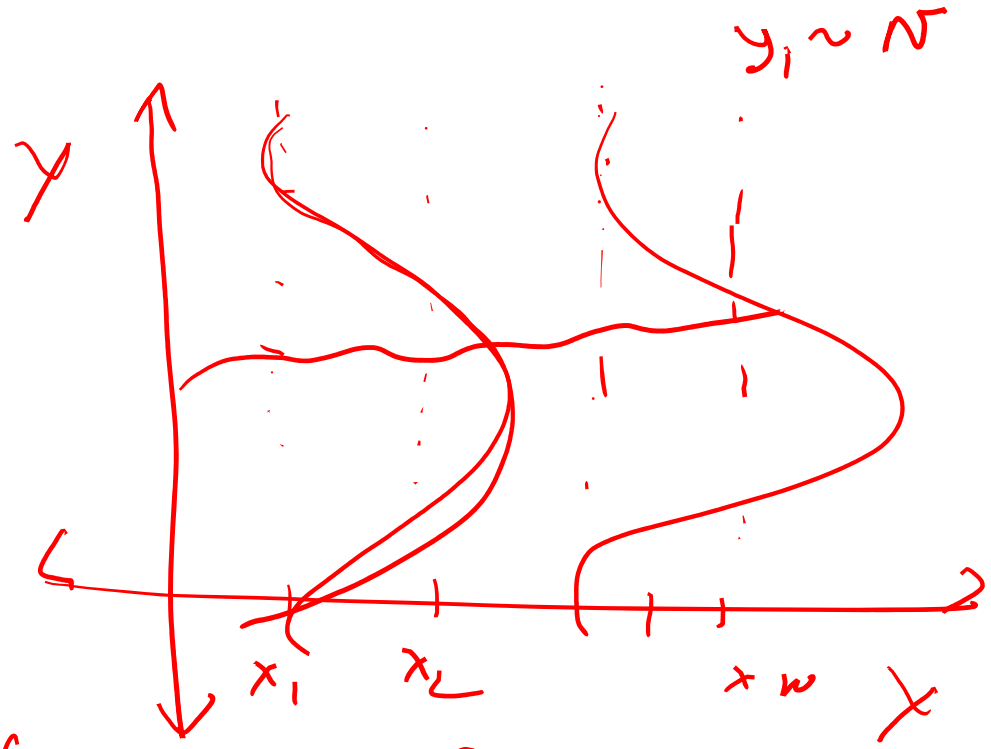


$y_i = f(x_i) + \epsilon_i$

$y_i / x_i \sim N($ $E(y/x_i)$

$\omega^T \varphi(x_i)$

y/x_1

$E(y_i/x)$

$T = \{ (x_1, y_1), (x_2, y_2) \ldots (x_N, y_N) \}$

$\omega^T \varphi(x)$ $\quad y_i/x_i \sim N(\omega^T \varphi(x_i), \sigma)$

$P(\theta/D) = P(D/\theta)P(\theta)$

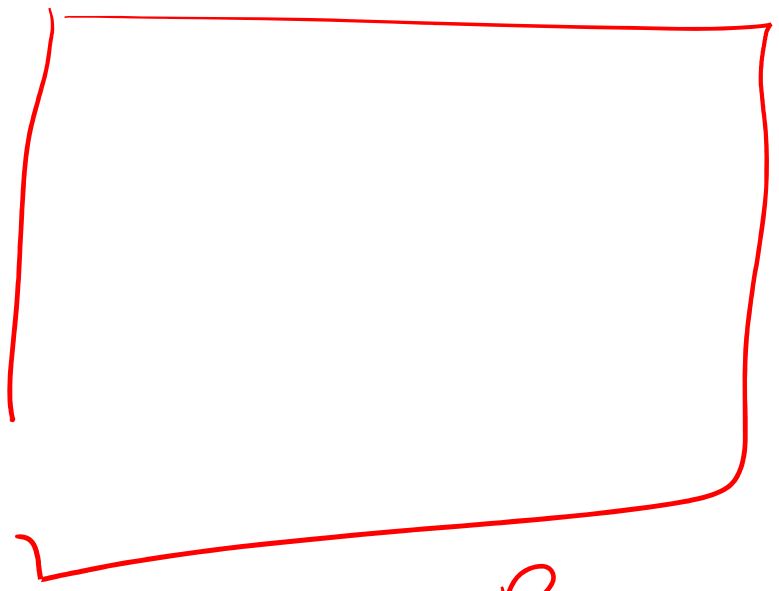
$D \subset P$

$D = \{x_1, x_2, \ldots x_N\}$

Find θ from sample D.

$\arg\max_\theta P(\theta/D)$

$= \max_\theta P(D/\theta)P(\theta)$



$D(\theta)$ Population

$\max_\theta P(D/\theta)$

$$\max_{\theta} \; P(D/\theta)$$

$$\max_{\theta} \; P((x_1, x_2, \cdots x_N)/\theta)$$

$$\max_{\theta} \; \prod_{i=1}^{N} P(x_i/\theta)$$

$$\max_{\theta} \; \log \prod_{i=1}^{N} P(x_i/\theta)$$

$$\max_{\theta} \; \sum_{i=1}^{N} \log P(x_i/\theta)$$

$S = N(\mu, \sigma)$

$x_i \sim N(\mu, \sigma)$

$$\max_{\mu} \; \sum_{i=1}^{N} \log P(x_i/\mu)$$

$$\max_{\mu} \sum_{i=1}^{N} \log\left(\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{x_i-\mu}{\sigma}\right)^2}\right)$$

$$= \max_{\mu} \left(\sum_{i=1}^{N} \log\left(\frac{1}{\sqrt{2\pi}\sigma}\right) - \sum_{i=1}^{N} \frac{1}{2}\left(\frac{x_i-\mu}{\sigma}\right)^2 \right)$$

$$\sigma = \frac{1}{N} \sum_{i=1}^{N} (x_i-\mu)^2$$

$$\Rightarrow \sum_{i=1}^{N} \frac{1}{\sigma} (x_i-\mu) = 0$$

$$\Rightarrow \sum_{i=1}^{N} (x_i-\mu) = 0$$

$$\mu = \frac{1}{N} \sum_{i=1}^{N} x_i$$

$$\max T$$

$$\max_{w} P\left((y_1, y_2, \ldots y_N) / (x_1, x_2, \ldots x_N)\right)$$

$$\max_{w} \prod_{i=1}^{N} P(y_i / x_i)$$

$$\max_{w} \prod_{i=1}^{N} \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{y_i - w^T \varphi(x_i)}{\sigma}\right)^2}$$

$$\max_{w} \sum_{i=1}^{N} \log\left(\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{1}{2}\left(\frac{y_i - w^T \varphi(x_i)}{\sigma}\right)^2}\right)$$

$$\max_{w} \left(\sum_{i=1}^{N} \log\left(\frac{1}{\sqrt{2\pi}\sigma}\right) - \frac{1}{2\sigma} \sum_{i=1}^{N} \left(y_i - w^T \varphi(x_i)\right)^2 \right)$$

$$\max_{w} - \sum_{i=1}^{N} \left(y_i - w^T \varphi(x_i)\right)^2$$

$$\Rightarrow \min_{w} \sum_{i=1}^{N} \left(y_i - w^T \varphi(x_i)\right)^2$$