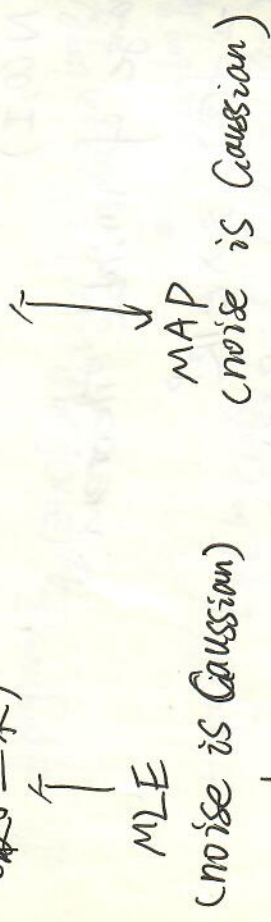


(十九) 贝叶斯线性回归

$$f(x) = w^T x, y = f(x) + \varepsilon = w^T x + \varepsilon$$

$\varepsilon \sim N(0, \sigma^2)$ lasso Ridge

LSE (最小二乘) \rightarrow Regularized LSE



$$w_{MLE} = \arg \max_w P(Data|w)$$

$$P(w|Data) \propto P(Data|w) P(w)$$

$$w_{MAP} = \arg \max_w P(w|Data) = \arg \max_w P(Data|w) P(w) \propto N(\mu_0, \Sigma_0)$$

Inference:

$$P(w|Data) = P(w|x, y) = \frac{P(y|w, x) P(w)}{\int P(y|w, x) P(w) dw} = \frac{P(y|w, x)}{P(y|x)}$$

$P(w) = P(w|x)$ 因为 w 定好了分布.

$$P(y|w, x) = \prod_{i=1}^N P(y_i|w, x_i) = \prod_{i=1}^N N(y_i|w^T x_i, \sigma^2)$$

$$P(y|x, w) \propto N(w^T x, \sigma^2)$$

$$P(w) \propto N(0, \Sigma_p)$$

$$P(w|Data) \propto P(y|w, x) \cdot P(w)$$

Gaussian

$$\propto \prod_{i=1}^N N(y_i|w^T x_i, \sigma^2) \cdot N(0, \Sigma_p)$$

共轭: Gaussian 分布的共轭



Vazyme