

Metoda — maks
wiar

$$L(\Theta)$$

Model liniowy (danych)

$$Y = \Theta^T X + Z$$

Model Gaussowski (zakt.)

$$p(Z) = \mathcal{N}(0, R)$$

Model Gauss (danych)

$$p(X | \mu, H)$$

Metoda Bayesa
 $p(\text{Par. modelu} | \text{Dane})$

$$Y = \Theta^T X + Z$$

$$p(Z) = \mathcal{N}(0, R)$$

plus przekonanie

$$p(\Theta) = \mathcal{N}(\mu, H)$$

$R, H, \mu =$

const.

$\Theta = ?$

$$\hat{\Theta}_{\text{MAP}} = ? = \arg \max_{\Theta} p(\Theta | Y, X)$$

$$p(\Theta) = \frac{1}{(2\pi)^{k/2} (\det H)^{1/2}} \cdot \exp \left[-\frac{1}{2} (\Theta - \mu)^T H^{-1} (\Theta - \mu) \right]$$

$$P(\theta | Y, X) = \frac{P(Y - \theta^T X) \cdot P(\theta)}{P(Y, X)}$$

Metoda Bayesa
 $p(\text{Par. modelu} | \text{Dane})$

$$Y = \theta^T X + Z$$

$$P(Z) = \mathcal{N}(0, R)$$

plus przekonanie

$$P(\theta) = \mathcal{N}(\mu, H)$$

$R, H, \mu =$

const.

$$\hat{\theta}_{\text{MAP}} = ? = \underset{\theta}{\text{argmax}} P(\theta | Y, X)$$

$\theta = ?$

$$P(\theta) = \frac{1}{(2\pi)^{k/2} (\det H)^{1/2}}$$

$$\cdot \exp \left[-\frac{1}{2} (\theta - \mu)^T H (\theta - \mu) \right]$$

Dane: X, Y

Model liniowy (dany)

$$Y = \Theta^T X + Z$$

$$Y = \bar{Y} + Z$$

Model zakt.:

$$P(Z) = \mathcal{N}(0, R)$$

znane



$$L(\Theta) = p(Y - \Theta^T X) = \quad \leftarrow \hat{\Theta}_{ML}$$

$$\frac{1}{(2\pi)^{K/2} (\det H)^{1/2}} \exp \left[-\frac{1}{2} (\hat{\Theta} - \mu)^T H (\hat{\Theta} - \mu) \right]$$

Dane: X

$$p(X | \mu, H) = \mathcal{N}(\mu, H)$$

Met. Bayesa

$$Y = \Theta^T X + Z, \quad p(Z) = \mathcal{N}(0, R)$$

plus przekonanie

$$p(\Theta) = \mathcal{N}(\mu, H)$$

$$\hat{\Theta}_{MAP} \stackrel{\text{argmax}_{\Theta}}{\sim} \underbrace{p(Y - \Theta^T X) \cdot p(\Theta)}_{p(\Theta | X)}$$

$R, H, \mu = \text{const}$

Model $\xrightarrow{\text{dane}}$ $Y = \Theta^T X \Theta$
 $\xrightarrow{\text{zakt.}}$ $Y = \Theta^T X + Z$

$$P(Z) = \frac{1}{(2\pi)^{N/2} \det R^{1/2}}$$

$$\exp\left[-\frac{1}{2}(Y - \Theta^T X) R^{-1} (Y - \Theta^T X)^T\right]$$

$$R_{N \times N}$$

$$R = \text{const.}$$

$$\Theta = ?$$

$$L(\Theta) = P(Y, X | \Theta)$$

Model przekonanie

$$P(\Theta) = \frac{1}{(2\pi)^{K/2} \det H^{1/2}} \exp\left[-\frac{1}{2}(\Theta - \mu)^T H^{-1} (\Theta - \mu)\right]$$

$$\Theta_{\text{MAP}} = \arg \max_{\Theta}$$

$$P(\Theta | Y, X) = \arg \max_{\Theta} L(\Theta) P(\Theta)$$

dla $H, R, \mu = \text{const.}$

$$H$$

$$K \times K$$

dane

proces

$$\frac{p(\text{Model} | \text{Dane})}{p(\text{Dane} | \text{Model})}$$