

Subject: .....

$$P(c) \geq \frac{1}{2}(1 - TV(P, Q))$$

سوال یک | برای کم کردن از کلمات حساس فنی کنید  $v \geq \mu$ 

$$TV(P, Q) = \frac{1}{2} \int |f_P(x) - f_Q(x)| = \int_{f_P(x) > f_Q(x)} f_P(x) - f_Q(x) = \frac{\tau}{2} \int_{f_P(x) > f_Q(x)} e^{-\tau|x-\mu|} - e^{-\tau|x-v|}$$

$$e^{-\tau|x-\mu|} \geq e^{-\tau|x-v|}$$

از آنجا که دو توزیع نام برده دارای scale یکسان هستند  $\Leftarrow$ 

$$\Rightarrow \begin{cases} \tau|x-\mu| \geq \tau|x-v| & x \leq \mu, \mu \leq v \\ \Rightarrow v \geq \mu \end{cases}$$

$$\begin{cases} \tau|x-\mu| \geq \tau|x-v| & \mu \leq x \leq \frac{\mu+v}{2} \\ \mu - x \geq x - v \Rightarrow x \leq \frac{\mu+v}{2} \end{cases}$$

$$\mu - x \geq x - v \Rightarrow x \leq \frac{\mu+v}{2}, \quad x \leq v \Rightarrow \text{سین}$$

$$\tau|x-\mu| \geq \tau|x-v| \Rightarrow x \geq v, \quad v \geq \mu$$

$$\mu - x \geq v - x \Rightarrow v \leq \mu \quad \text{سین}$$

$$\Rightarrow \frac{\tau}{2} \int_{x \leq \mu} e^{-\tau|x-\mu|} - e^{-\tau|x-v|} dx + \frac{\tau}{2} \int_{\mu \leq x \leq \frac{\mu+v}{2}} e^{-\tau|x-\mu|} - e^{-\tau|x-v|} dx =$$

$$\frac{\tau}{2} \int_{x \leq \mu} e^{-\tau(x-\mu)/2} - e^{-\tau(x-v)/2} dx + \frac{\tau}{2} \int_{\mu \leq x \leq \frac{\mu+v}{2}} e^{-\tau(x-\mu)/2} - e^{-\tau(x-v)/2} dx =$$

$$\frac{\tau}{2} \left[ \frac{1}{\tau} e^{-\tau(x-\mu)/2} - \frac{1}{\tau} e^{-\tau(x-v)/2} \right]_{-\infty}^{\mu} + \frac{1}{2} \left[ e^{-\tau(x-\mu)/2} - e^{-\tau(x-v)/2} \right]_{\mu}^{\frac{\mu+v}{2}} =$$

$$\frac{1}{2} \left[ 1 - e^{-\tau(\mu-v)/2} - (e^{-\tau(\mu-v)/2} - 1) - (e^{-\tau(\mu-v)/2} - e^{-\tau(\mu-v)/2}) \right]$$

$$\frac{1}{2} \left[ 2 - 2e^{-\tau(\mu-v)/2} \right] = 1 - e^{-\tau(\mu-v)/2}$$

Subject: \_\_\_\_\_

Date: \_\_\_\_\_

از حالت ساده‌تر می‌توانیم:

توزیع  $P$  با  $Q$   $\leftarrow$  ML است  $\leftarrow$  بهترین است

$$f_{P_x}(x) = \frac{1}{\sigma} e^{-\frac{|x-\mu|}{\sigma}}$$

$$f_{Q_x}(x) = \frac{1}{\sigma} e^{-\frac{|x-\nu|}{\sigma}}$$

نمونه  $x$  را داریم

$$\delta = \frac{f_{P_x}}{f_{Q_x}} = e^{-\frac{(|x-\mu| - |x-\nu|)}{\sigma}}$$

 $\Rightarrow$ 

$$\delta > 1 \rightarrow P$$

$$\delta < 1 \rightarrow Q$$

$$\delta = 1 \rightarrow \begin{cases} \lambda \rightarrow P \\ 1-\lambda \rightarrow Q \end{cases}$$

$$\lambda \leq 1$$

$$x \leq \frac{\mu+\nu}{2}$$

$$\Rightarrow \text{ratio} = 1: \delta = -\frac{1}{\sigma} (|x-\mu| - |x-\nu|) =$$

$$\text{ratio} > 0 \rightarrow P$$

$$\text{ratio} < 0 \rightarrow Q$$

$$\text{ratio} = 0 \rightarrow \begin{cases} \lambda \rightarrow P \\ 1-\lambda \rightarrow Q \end{cases}$$

$$\begin{cases} \lambda \rightarrow P \\ 1-\lambda \rightarrow Q \end{cases}$$

$$\lambda = \frac{\mu+\nu}{2}$$

$$Q$$

$$\lambda > \frac{\mu+\nu}{2}$$

فرصت  $H_0 \leftarrow$  توزیع  $P$   
 $H_1 \leftarrow$  توزیع  $Q$