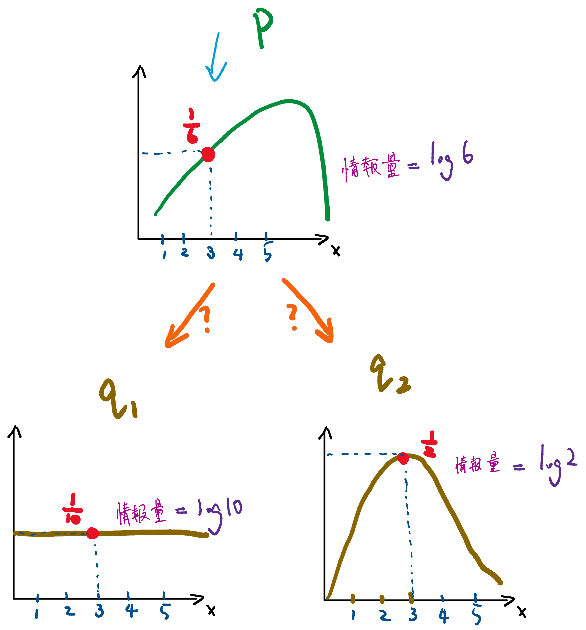
T2. KL距離

Thursday, May 20, 2021 2:13 AM

已知P，找一个与P最接近的分布 ⟺ q与P之间信息量的差尽可能小

保留尽可能多的信息量



点 x=3 に注目して.

q_1 与 P: $\log 10 - \log 6 = \log\left(\frac{5}{3}\right)$ ↑

q_2 与 P: $\log 2 - \log 6 = \log\left(\frac{1}{3}\right)$

⇓

すべての点に拡張しよう

$E_p[I_q]$ $\quad$ $E_p[I_p]$

相对熵 = 交叉熵 − 熵 $\quad$ 1.6. 情

$$\mathrm{KL}(p\,\|\,q) = -\int p(\mathbf{x})\boxed{\ln q(\mathbf{x})}\,\mathrm{d}\mathbf{x} - \left(-\int p(\mathbf{x})\ln p(\mathbf{x})\,\mathrm{d}\mathbf{x}\right) = E_p[I_q] - E_p[I_p]$$

$$= -\int p(\mathbf{x})\ln\left\{\frac{q(\mathbf{x})}{p(\mathbf{x})}\right\}\mathrm{d}\mathbf{x}$$

$$= E_p[I_q - I_p] = KL(p\|q)$$

$$E_q[I_p - I_q] = KL(q\|p)$$

$$P[X=3] = \frac{1}{6}$$

$$P[X=3, Y=4] = \frac{1}{12} = P[(x,y)=(3,4)] \rightarrow P[\vec{x}=\vec{x}]$$

$$P[X=3, Y=4, Z=5] = \frac{1}{20} = P[(x,y,z)=(3,4,5)] \rightarrow P[(x,y)=(3,4),\ z=5]$$

$$P[\vec{X},\vec{Y}] = P[\vec{Z}]$$

$$(\vec{x},\vec{y})$$

$P(x)$ $E(x)$

$P[X=x]$ $E[X=x]$

$P_Y(y)$ $E_Y(y)$