

5/20 Wed

	Rainy	Sunny		H
A	50%	50%	1	
B	90%	10%	0	...

$H(A) > H(B)$

$KL = \text{CrossEntropy} - \text{Entropy}$

P_1, P_2

ALG = $[P_1, P_2, \dots, P_n]$ $KL = \uparrow$

- $KL \uparrow \Rightarrow$ ALG Bad
- $KL \downarrow \Rightarrow$ ALG Good

Entropy \Leftrightarrow Variance

$H = \sum p_i \log(p_i)$
 $V = E[(X - \mu)^2]$

p_1	p_2	\dots	p_n
0	0	\dots	0

probability
 μ mean
 V value
 H

ML



$f(x, y) = x^2 y$ $x^2 + y^2 = 1$
 $F(x, y, \lambda) = x^2 y + \lambda(x^2 + y^2 - 1)$

$\frac{\partial F}{\partial x} = 2xy + 2\lambda x = 0$

$$\frac{\partial f}{\partial x} = x^2 + 2\lambda y = 0$$

$$x^2 + y^2 = 1$$

$$\Rightarrow \begin{cases} x^2 + y^2 + 2\lambda y = 0 \\ x^2 + y^2 = 1 \end{cases}$$

$$f(x, y) = (1 - y^2)y = y - y^3$$

$$f(x, y, z) = 8xy^2z$$

$$F = 8xy^2z + \lambda \left(\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} - 1 \right)$$

$$\begin{cases} \frac{\partial F}{\partial x} = 0 \\ \frac{\partial F}{\partial y} = 0 \\ \frac{\partial F}{\partial z} = 0 \\ \frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1 \end{cases} \Rightarrow \begin{cases} x = 0 \\ y = 0 \\ z = 0 \\ x = 0 \end{cases}$$

$f(x, \dots)$

$g(\dots)$

$$\lambda \quad x^2 y = A_1 \quad x^2 + y^2 = 1$$

A_2



$$\Delta f = \lambda \cdot \Delta g$$

$$\underline{f(x)} + \lambda \underline{g(x)} = 0$$

Linear Regression

$x_2 = \theta$



$$-\frac{2}{n} X^T Y + \frac{2}{n} X^T X \theta = 0$$

$$\frac{2}{n} X^T X \theta = \frac{2}{n} X^T Y$$

$$\theta = (X^T X)^{-1} X^T Y$$



\Rightarrow



\Rightarrow