Visualization

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1 COMPLEXITY

Let n be the size of the problem.
Polynomial complexity :

$$a_k n^k + a_{k-1} n^{k-1} + \cdots + n \tag{1}$$

Exponential complexity :

$$k^n \tag{2}$$

avec $k > 1$

2 EXERCISE 2

Hypothèse :
L : tide level in meters
t : time in hours
A : amplitude
ϕ : phase
f : frequence (Hz = s^{-1})jn
$\lambda = \frac{1}{f}$: periode en secondes
$\omega = 2\pi f$: pulsation (radian par seconde)

$$L = A \sin(\omega t + \phi) + c \tag{3}$$

error E :

$$\sum_{\text{samples}} (\text{prediction} - \text{truth})^2 \tag{4}$$

3 DISTANCES

L2 in two dimensions.

$$\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} \tag{5}$$

L2 in three dimensions.

$$\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2} \tag{6}$$

L1

$$|x_1 - x_2| + |y_1 - y_2| \tag{7}$$

L∞

$$\max(|x_1 - x_2|, |y_1 - y_2|) \tag{8}$$

weighted L1

$$\alpha_1|x_1 - x_2| + \alpha_2|y_1 - y_2| \tag{9}$$

4 LIKELIHOOD

$$L(\theta) = p(x_1, \ldots, x_n|\theta) \tag{10}$$

4.1 Exercise 5

$$L(p) = p \times (1 - p) \tag{11}$$

$$L(p) = p - p^2 \tag{12}$$

$$L'(p) = 1 - 2p \tag{13}$$

$L'(p) = 0$ si et seulement si $p = \frac{1}{2}$
Donc max atteint pour $\frac{1}{2}$.

5 DÉRIVÉE

$f : x \to f(x)$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} \tag{14}$$

$g : x \to 3x$
$\forall \in \mathbb{R}, x, g'(x) = 3$
$h : x \to x^2$
$h' =?$

6 ESPÉRANCE

X constant random variable : $X = \alpha$

$$\sum_{i=1}^{n} p_i x_i = \sum_{i=1}^{n} p_i \alpha = \alpha \sum_{i=1}^{n} p_i \tag{15}$$

7 KMEANS

$$I = \sum_{i=1}^{n} d(x_i, c_i)^2 \tag{16}$$

8 ENTROPY

Entropy of certain distribution.

$$H = 0 \tag{17}$$

Entropy of uniform distribution with n values :

$$\begin{aligned} H &= -\sum_{i=1}^{n} \frac{1}{n} \log \frac{1}{n} \\ &= -n \times \frac{1}{n} \times \log \frac{1}{n} \\ &= \log n \end{aligned} \tag{18}$$