Development statistics

S04 Continuous Distribution

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Distribution

1. Discrete distribution
   - Binomial distribution
   - Poisson distribution
2. Continuous distribution
   - Uniform distribution
   - Normal distribution
   - T-distribution

Mean & variance of continuous distribution

- Mean of continuous distribution

$$\mu = \int_{-\infty}^{\infty} xf(x)dx$$

- Variance of continuous distribution

$$\sigma^2 = \int_{-\infty}^{\infty} (x-\mu)^2 f(x)dx$$

Uniform Distribution

- PDF

$$f(x) = \frac{1}{a}, \quad (1 < x < a)$$

- Average

$$\frac{a}{2}$$

- Variance

$$\frac{a^2}{12}$$

Normal Distribution

- General form $N(\mu, \sigma^2)$

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} \exp\left[-\frac{(x-\mu)^2}{2\sigma^2} \right]$$

- Standard normal $N(0,1)$

$$z = \frac{x-\mu}{\sigma} \qquad f(z) = \frac{1}{\sqrt{2\pi}} \exp\left[-\frac{x^2}{2} \right]$$

Deviation score (偏差値)

- Deviation score

$$d = 10 * z + 50$$

$$z = \frac{d-50}{10}$$

- That is to say

$$d \sim N(50,100)$$

Normal Distribution

- PDF $N(\mu, \sigma^2)$

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} \exp\left[-\frac{(x-\mu)^2}{2\sigma^2} \right]$$

- Average μ
- Variance σ^2