Empirical Dist. Function "Zi & Raine"

$$\hat{F}_n(t) = \frac{\leq t \text{的样本数}}{\text{总样本}} = \frac{1}{n}\sum_{i=1}^{N} 1(x_i \leq t)$$

$$F(t) = P_r(X \leq t)$$

$$f(t) = \lim_{h \to 0} \frac{F(t+h) - F(t-h)}{2h}$$

用 EDF 代替 F:

$$f(t) = \frac{1}{2h} \frac{\#\, x_i \in [t_i - h, t_i + h]}{n}$$

$$= \frac{1}{nh} \sum_{i=1}^{n} \left[\frac{1}{2} 1\left(\frac{|t - x_i|}{h} \leq 1 \right) \right]$$

$\frac{1}{2} 1(|t| \leq 1) \equiv K(t)$ ← 直方图

$$f(t) = \frac{1}{nh} \sum_{i=1}^{n} K\left(\frac{t - x_i}{h} \right)$$

$$f(t) = \frac{1}{nh} \sum_{i=1}^{n} \phi\left(\frac{t - x_i}{h} \right)$$

$$\int_{-\infty}^{\infty} f(t)\,dt = 1, \quad \frac{1}{nh} \sum_{i=1}^{n} \int_{-\infty}^{\infty} K\left(\frac{t - x_i}{h} \right) dt$$

令 $\frac{t}{h} = x$,

$$= \frac{1}{n} \sum_{i=1}^{n} \int_{-1}^{1} \frac{1}{2}\,dx = 1$$