

Probability & Random Variable Distribution.

Relative Frequencies / cumulative relative frequencies
& Sample / population data distribution

数据 Data $\Longleftrightarrow$ 随机变量 R.V.

互为因果.

Relative Frequency $\Leftrightarrow$ PDF. $P(X=a)$

Cumulative
relative
frequency $\Leftrightarrow$ CDF $P(X \leq a)$

2-way table for 2 variables
relative frequency / prob. table.

Prob. of a Event $\Leftrightarrow$ Marginal distribution.

Conditional Prob. of a Event $\Leftrightarrow$ Conditional distribution

Transformation of variable.

- 1) shape of new variable.
- 2) center (mean) of new variable
- 3) spread (std) of new variable.

a new variable Y . $Y = aX + b$

$$E(Y) = aE(X) + b.$$

$$\text{Std}(Y) = |a| \text{Std}(X)$$

Shape Y same skewness if $a > 0$

Same modalities.

unimodal / bimodal.

a new variable Z . $\geq$ old variable X, Y .

$$Z = aX + bY + c.$$

Shape of Z unknown except for
 X & Y both normal. $\Rightarrow Z$ is normal

$$E(Z) = aE(X) + bE(Y) + c$$

$$\text{Std}(Z) = \sqrt{a^2 \text{Std}^2(X) + b^2 \text{Std}^2(Y)}$$

* when X & Y independent ✓