

LINEAR PROGRAMMING

Decision Variables :

x_1, x_2 = 你要“决定多少”的东西

(产量、人数、小时数、广告投放量等)

Objective Function (目标)

$$\text{Max } Z = c_1x_1 + c_2x_2$$

$$\text{Min } Z = c_1x_1 + c_2x_2$$

DEPENDENT & INDEPENDENT RANDOM VARIABLES

1. Independence Test

Two RVs X and Y are independent if 方法 2 (快捷)

$$P(X,Y)=P(X) \cdot P(Y) \text{ for all } X,Y$$

$$\text{Var}(X) = E(X^2) - [E(X)]^2$$

若存在一组不成立 $\rightarrow$ Dependent

2. Expected Value Rules (期望公式)

永远成立 (不管独立还是相关) :

$$E(A+B)=E(A)+E(B)$$

$$E(aX+bY)=aE(X)+bE(Y)$$

3. Variance Rules (方差公式)

✓ 独立时才可直接相加 :

$$\text{Var}(A + B) = \text{Var}(A) + \text{Var}(B)$$

✗ Dependent 时不能直接相加

4. New Random Variable (构造新变量)

常见形式 :

$$T = X + Y$$

$$T = X - Y$$

$$T = \min(X, Y)$$

$$T = \max(X, Y)$$

统一解题流程 :

1. Draw probability tree

2. Build distribution of T

3. Compute $E(T)$

4. Compute $\text{Var}(T)$

5. Expected Value Formula (离散型)

$$E(X) = \sum x \cdot p(x)$$

6. Variance Formulas (两种方式)

方法 1 (定义)

$$\text{Var}(X) = \sum [x - E(X)]^2 \cdot p(x)$$

DEPENDENT & INDEPENDENT RANDOM VARIABLES (cont)

