有时某个strong association rule still not be interesting.

Lift 用来判断是否 interesting

例：

Rule: Tea → Coffee

$$\text{Confidence} = P(\text{Coffee}|\text{Tea}) = \frac{P(\text{Coffee}, \text{Tea})}{P(\text{Tea})} = 0.75 = \frac{150}{200}$$

$$P(\text{Coffee}) = 0.8$$

	Coffee	$\overline{\text{Coffee}}$	
Tea	0.15	0.05	0.2
$\overline{\text{Tea}}$	0.65	0.15	0.8
	0.8	0.2	1

得 $P(\text{Coffee}|\overline{\text{Tea}}) = \frac{0.65}{0.8} = \frac{650}{800} = 0.8125$ high!

$$\text{Lift}(X, Y) = \frac{\text{Confidence}(X \to Y)}{\text{Support}(Y)} = \frac{\frac{P(X \cup Y)}{P(X)}}{P(Y)} = \frac{P(X \cup Y)}{P(X)P(Y)} = \frac{P(Y|X)}{P(Y)}$$

$$\Rightarrow \begin{cases} = 1 & \text{independent} \\ > 1 & \text{positively correlated} \\ < 1 & \text{negatively correlated.} \end{cases}$$

$$\text{Lift}(\text{tea}, \text{coffee}) = \frac{\text{Confidence}(\text{tea} \rightarrow \text{coffee})}{\text{Support}(\text{coffee})}$$

$$= \frac{\frac{\sigma(\text{Tea}, \text{coffee})}{\sigma(\text{Tea})}}{p(\text{coffee})}$$

$$= \frac{\frac{0.15}{0.2}}{0.8} = 0.9375 < 1 \quad \text{neg. cor.}$$