Theoretic

April 14, 2023

1

5% ( ), 5%
.

1. **,** **,** **- “** **”?**

2. **-** **?** **,** **,** **,**
P(|“+”) **?**

3. **P( )** **,** **,** **,**
?

2

(1) :
- **B** - . $p_0 = \mathbb{P}(B) = 0.05$ -
- **NB** -
- + - , ,
- - -

$$\mathbb{P}(+|NB) = \mathbb{P}(-|B) = 0.05$$

$\mathbb{P}(B|+)$
, - :

$$\mathbb{P}(B|+) = \frac{\mathbb{P}(+|B)\mathbb{P}(B)}{\mathbb{P}(+)} = \frac{\mathbb{P}(+|B)\mathbb{P}(B)}{\mathbb{P}(+|B)\mathbb{P}(B) + \mathbb{P}(+|NB)\mathbb{P}(NB)}$$

,

$$\mathbb{P}(B|+) = \frac{(1-0.05)\cdot 0.05}{(1-0.05)\cdot 0.05 + 0.05\cdot(1-0.05)} = \frac{1}{2}$$

(2) ?
- , - , , , , .
, “ ”) , , .1.
: $\mathbb{P}(NB|+)$.
N . :
- $+_N$ - N “ ”

- $-_N$ -

, “ ”, $+_N$, “ ”, $-_N$.

$$\mathbb{P}(NB|+_N) = \frac{\mathbb{P}(+_N|NB)\mathbb{P}(NB)}{\mathbb{P}(+_N)} = \frac{\mathbb{P}(+_N|NB)\mathbb{P}(NB)}{\mathbb{P}(+_N|NB)\mathbb{P}(NB) + \mathbb{P}(+_N|B)\mathbb{P}(B)} = \frac{\mathbb{P}(+|NB)^N\mathbb{P}(NB)}{\mathbb{P}(+|NB)^N\mathbb{P}(NB) + \mathbb{P}(+|B)^N\mathbb{P}(B)} =$$

$$\mathbb{P}(B|+_N) = 1 - \mathbb{P}(NB|+_N) \to 1$$

, , .

, - . ,

$\mathbb{P}(NB|_)$

(3) p_0 - , p_1 - (, p_1)
$\mathbb{P}(B|+)$ p_0 p_1:

$$\mathbb{P}(B|+) = \frac{(1-p_1)p_0}{(1-p_1)p_0 + p_1(1-p_0)} = \frac{p_0 - p_0p_1}{p_0 + p_1 - 2p_0p_1} <> \frac{1}{2} \Leftrightarrow 2p_0 - 2p_0p_1 <> p_0 + p_1 - 2p_0p_1 \Leftrightarrow p_0 <> p_1$$

:

- , $p_0 > p_1$,
- , $p_0 < p_1$,
- , (1)