

N

Hyper-geometric Random Variable

N

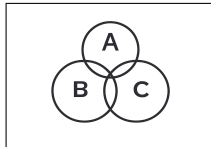


$$N = 5$$

$$K = 2$$

$$n = 2$$

$$k = 1$$

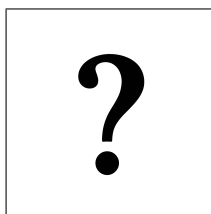


$$P(X = k) = \frac{\binom{K}{k} \binom{N - K}{n - k}}{\binom{N}{n}}$$

$$P(X = 1) = \frac{\binom{2}{1} \binom{3}{1}}{\binom{5}{2}} = \frac{2 \times 3}{10} = \frac{6}{10} = \boxed{0.6}$$

$$E[X] = n \frac{K}{N}$$

$$\text{Var}(X) = n \frac{K}{N} \left(1 - \frac{K}{N}\right) \frac{N - n}{N - 1}$$



$$N = 70$$

$$K = 40$$

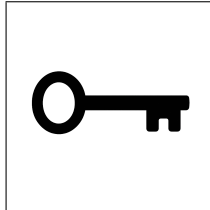
$$n = 10$$

$$P(X \geq 1) = ?$$

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$$\begin{aligned}N &= 70 \\K &= 40 \\n &= 10 \\P(X \geq 1) &= ?\end{aligned}$$

$$P(X = k) = \frac{\binom{K}{k} \binom{N - K}{n - k}}{\binom{N}{n}}$$

$$P(X = 0) = \frac{\binom{40}{0} \binom{30}{10}}{\binom{70}{10}} = \frac{\binom{30}{10}}{\binom{70}{10}}$$

$$P(X = 0) \approx 7.94 \times 10^{-5}$$

$$P(X \geq 1) = 1 - P(X = 0)$$

$$P(X \geq 1) = 1 - \frac{\binom{30}{10}}{\binom{70}{10}}$$

$$P(X \geq 1) \approx 1 - 7.94 \times 10^{-5}$$

$$P(X \geq 1) \approx \boxed{0.9999206}$$