Theory & Random Variable

Random variable

Random variable — consider an experiment with its sample space S, and a function $X(s)$ that maps $s \in S$ to a value, the function $X(s)$ is called maps the sample space S to the real line, and the range of the random variable X is $[-\infty, \infty]$.

The random $X(s)$ is called a random variable. Consider a random variable X is associated with a probability function of a random function.

Example 1: Flipping a coin

The sample space was $S = \{H, T\}$ and that $\{T\}$

Sample space $S = \{\frac{1}{2}, \frac{1}{2}, \frac{1}{2}\}$

Let us define a function $X(s)$, $s \in S$, such that:

$$X(s) = \begin{cases} 0 & s = H \\ 1 & s = T \end{cases}$$

$X(s)$ is a random variable that takes values $\{0, 1\}$

Discrete random variable

Types of random variable

Continuous random variable

- If a random variable $X(s)$ takes only finite or countably infinite many values, it is known as discrete random variable.

Example: For case the sample space sample space $\{\text{one}, \text{two}, \text{three}\}$

Sample Space	Number
one	1
two	2
three	3

- If a random variable $X(s)$ takes any value in a range, then the sample space S is continuous. In the mapping $X(s) \in \mathbb{R}$.

The random variable X is one time can take any value in a range, then the sample space S is continuous. In the mapping $X(s) \in \mathbb{R}$.

Example: Let the random variable X be the number of times a coin is tossed and the number of times a coin is tossed and the number of times a coin is tossed and the number of times a coin is tossed.

$S = \{\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \