------------NumPy Random-------------

Random number does NOT mean a different number every time. Random means something that can not be predicted logically.

Example:

x1: rand() method returns a random float between 0 and 1.
x2: Generate a 1-D array containing 5 random floats:
x3: Generate a 2-D array with 3 rows, each row containing 5 random numbers:
x4: The choice() method allows you to generate a random value based on an array of values.
x5: The choice() method also allows you to return an array of values.Add a size parameter to specify the shape of the array.
x6: Generate a random integer from 0 to 100:
x7: The randint() method takes a size parameter where you can specify the shape of an array.
x8: Generate a 2-D array with 3 rows, each row containing 5 random integers from 0 to 100:

Normal (Gaussian) Distribution
- It fits the probability distribution of many events, eg. IQ Scores, Heartbeat etc.
- Use the random.normal() method to get a Normal Data Distribution.

It has three parameters:

- loc - (Mean) where the peak of the bell exists.
- scale - (Standard Deviation) how flat the graph distribution should be.
- size - The shape of the returned array.

Binomial Distribution:

- Binomial Distribution
- Binomial Distribution is a Discrete Distribution.
- It describes the outcome of binary scenarios, e.g. toss of a coin, it will either be head or tails.

It has three parameters:

- n - number of trials.
- p - probability of occurence of each trial (e.g. for toss of a coin 0.5 each).
- size - The shape of the returned array.

Poisson Distribution
- Poisson Distribution is a Discrete Distribution.

- It estimates how many times an event can happen in a specified time. e.g. If someone eats twice a day what is the probability he will eat thrice?

It has two parameters:
- lam - rate or known number of occurrences e.g. 2 for above problem.
- size - The shape of the returned array.

Uniform Distribution
- Used to describe probability where every event has equal chances of occuring.
- E.g. Generation of random numbers.

It has three parameters:

- a - lower bound - default 0 .0.
- b - upper bound - default 1.0.
- size - The shape of the returned array.

Logistic Distribution
- Logistic Distribution is used to describe growth.
- Used extensively in machine learning in logistic regression, neural networks etc.

It has three parameters:
- loc - mean, where the peak is. Default 0.
- scale - standard deviation, the flatness of distribution. Default 1.
- size - The shape of the returned array.

Multinomial Distribution
- Multinomial distribution is a generalization of binomial distribution.
- It describes outcomes of multi-nomial scenarios unlike binomial where scenarios must be only one of two. e.g. Blood type of a population, dice roll outcome.

It has three parameters:

- n - number of possible outcomes (e.g. 6 for dice roll).
- pvals - list of probabilties of outcomes (e.g. [1/6, 1/6, 1/6, 1/6, 1/6, 1/6] for dice roll).
- size - The shape of the returned array.

Exponential Distribution
Exponential distribution is used for describing time till next event e.g. failure/success etc.

It has two parameters:
- scale - inverse of rate (see lam in poisson distribution) defaults to 1.0.
- size - The shape of the returned array.

Chi Square Distribution
Chi Square distribution is used as a basis to verify the hypothesis.

It has two parameters:
- df - (degree of freedom).
- size - The shape of the returned array.

Rayleigh Distribution

Rayleigh distribution is used in signal processing.
It has two parameters:

- scale - (standard deviation) decides how flat the distribution will be default 1.0).
- size - The shape of the returned array.

Pareto Distribution

A distribution following Pareto's law i.e. 80-20 distribution (20% factors cause 80% outcome).

It has two parameter:
- a - shape parameter.
- size - The shape of the returned array.

Zipf Distribution

- Zipf distributions are used to sample data based on zipf's law.
- Zipf's Law: In a collection, the nth common term is 1/n times of the most common term. E.g. the 5th most common word in English occurs nearly 1/5 times as often as the most common word.

It has two parameters:

- a - distribution parameter.
- size - The shape of the returned array.