How can the Uniform Distribution be used in Python?

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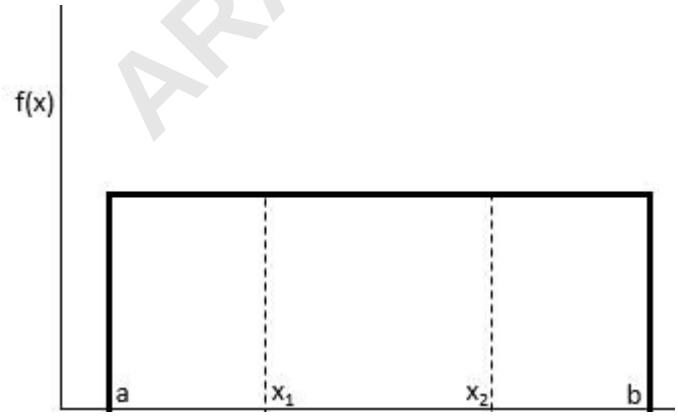
The Uniform Distribution is a probability distribution that is often used in statistical analysis to model events with equal likelihood of occurring within a given range. In Python, the Uniform Distribution can be utilized through various libraries and functions such as NumPy's "random.uniform" function, which generates random numbers within a specified range. This can be useful in simulating random events, generating random data for testing, and conducting Monte Carlo simulations. Additionally, the Uniform Distribution can be used in conjunction with other statistical methods and visualization tools in Python to analyze and interpret data. Its application in Python allows for efficient and accurate analysis of data with uniform probability distributions.

Use the Uniform Distribution in Python

A is a probability distribution in which every value between an interval from *a* to *b* is equally likely to be chosen.

The probability that we will obtain a value between x1 and x2 on an interval from *a* to *b* can be found using the formula:

P(obtain value between x1 and x2) = (x2 - x1) / (b - a)



To calculate probabilities related to the uniform distribution in Python we can use the function, which uses the following basic syntax:

scipy.stats.uniform(x, loc, scale)

where:

x: The value of the uniform distributionloc: The minimum possible valueloc + scale: The maximum possible value

The following examples show how to use this function in practice.

Example 1

Suppose a bus shows up at a bus stop every 20 minutes. If you arrive at the bus stop, what is the probability that the bus will show up in 8 minutes or less?

We can use the following code in Python to calculate this probability:

from scipy.statsimport uniform

#calculate uniform probability
uniform.cdf(x=8, loc=0, scale=20) - uniform.cdf(x=0, loc=0, scale=20)

0.4

The probability that the bus shows up in 8 minutes or less is 0.4.

Example 2

The weight of a certain species of frog is uniformly distributed between 15 and 25 grams. If you randomly select a frog, what is the probability that the frog weighs between 17 and 19 grams?

We can use the following code in Python to calculate this probability:

from scipy.statsimport uniform

#calculate uniform probability
uniform.cdf(x=19, loc=15, scale=10) - uniform.cdf(x=17, loc=15, scale=10)

0.2

The probability that the frog weighs between 17 and 19 grams is 0.2.

Example 3

The length of an NBA game is uniformly distributed between 120 and 170 minutes. What is the probability that a randomly selected NBA game lasts more than 150 minutes?

We can use the following code in Python to calculate this probability:

```
from scipy.stats import uniform

#calculate uniform probability
uniform.cdf(x=170, loc=120, scale=50) - uniform.cdf(x=150, loc=120, scale=50)
```

0.4

The probability that a randomly selected NBA game lasts more than 150 minutes is 0.4.

Bonus: You can double check the solution to each example by using the .

Additional Resources

The following tutorials explain how to use other common distributions in Python: