Estimating π value using Monte Carlo Method

1 Introduction

We will use the Monte Carlo Method to approximate the value of π. This method is a computational technique that involves generating random samples repeatedly to obtain numerical outcomes. We will use the MC method to calculate the areas of both a square and a circle inscribed within the square. The ratio of the area of the circle to the square gives the value of π.

2 Python Script

```python
import random
import matplotlib.pyplot as plt

num_points = int(input("Enter the amount of iteration you want: "))

pi_estimate = []

inside_circle = 0
outer_circle = 0

for i in range(num_points):
    x = random.uniform(-1, 1)
    y = random.uniform(-1, 1)

    if x**2 + y**2 <= 1:
        inside_circle += 1

    outer_circle += 1


    pi = 4 * (inside_circle / outer_circle)
    pi_estimate.append(pi)

print("Estimated value of pi:", pi)

plt.plot(pi_estimate)

plt.xlabel("Total Number of Points")
plt.ylabel("Estimated Value of pi")
plt.show()
```

```
Enter the amount of iteration you want: 50000
Estimated value of pi: 3.1456
```