Lab4-Monte Carlo for PI Estimate

CIS694/EEC693/CIS593 Deep Learning

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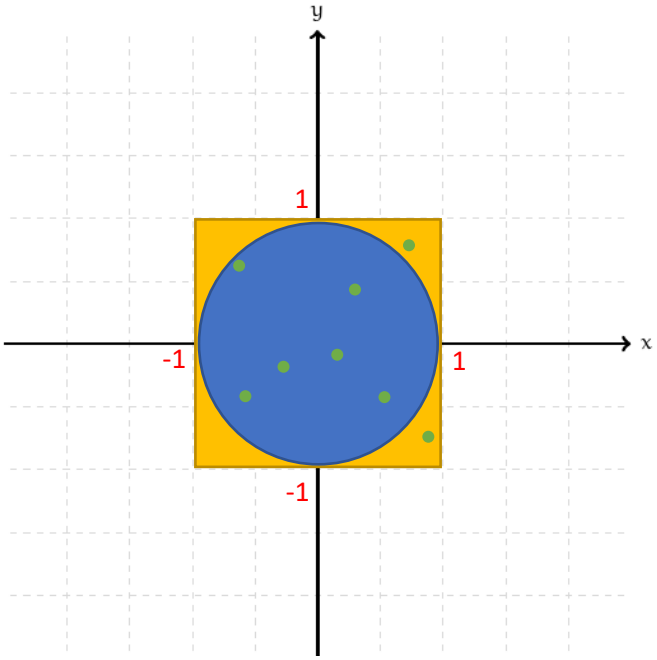
[**Background**] What is the area of a circle with the radius *r=10*? $Area = \pi r^2$

We know that π is 3.1415926…, so when the radius is 10, then the area of the circle should be about 314.15926…

[**Brainstorm**] Assume you do not know the value of π, many mathematical formulas cannot be evaluated. How to estimate the value of PI? One possible way is by the Monte Carlo method.

Monte Carlo methods are a broad class of computational algorithms that rely on repeated random sampling to obtain numerical results.
https://en.wikipedia.org/wiki/Monte_Carlo_method

Let us design a Monte Carlo method to estimate the value of PI:



Monte Carlo Method: Hints

1. Generate a large number (*n*) of random 2D points (uniformly distributed) in the [-1, 1] square.
2. What is the ideal probability of points falling inside the circle based on math if *n* is very large?
3. What is the observed probability of points falling inside the circle in your experiment?

4. Based on this Monte Carlo simulation, how to estimate the value of PI?

Please write a Python program named "PI_MonteCarlo.py" to estimate the value of PI using the above Monte Carlo method. *If finished, please think about the error bound.*