Report - Problem Set No 5

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Problem 1

Basic description:

In this problem, we're going to discuss 2D Random Walkers. As the lecture notes described, we expect our results to show these relations:

$$\langle r^2 \rangle = 2dDt, D = \frac{l^2}{2dr}$$
$$R_g = \sqrt{\langle r^2 \rangle}, \tau = l = 1, d = 2$$
$$\Rightarrow R_g = \sqrt{t}$$

The simulation creates a list of random choices of steps and calculates the sum of total changes of location of the random walker. The number of chosen random steps is equal to t. We repeat the simulation for different t many times and calculate the gyration radius of the all of final positions of each t.

Results:

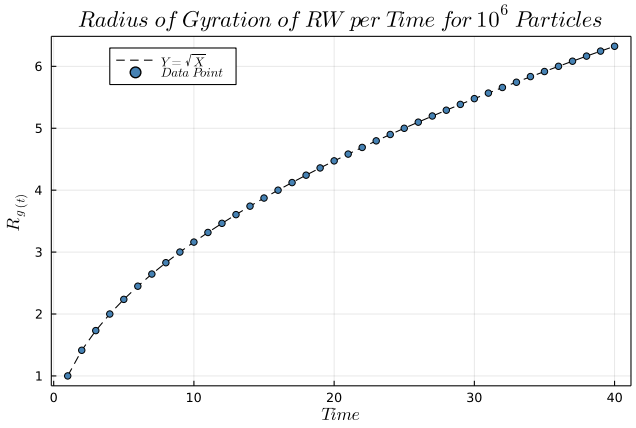

Figure 1: Gyration radius of each time step.

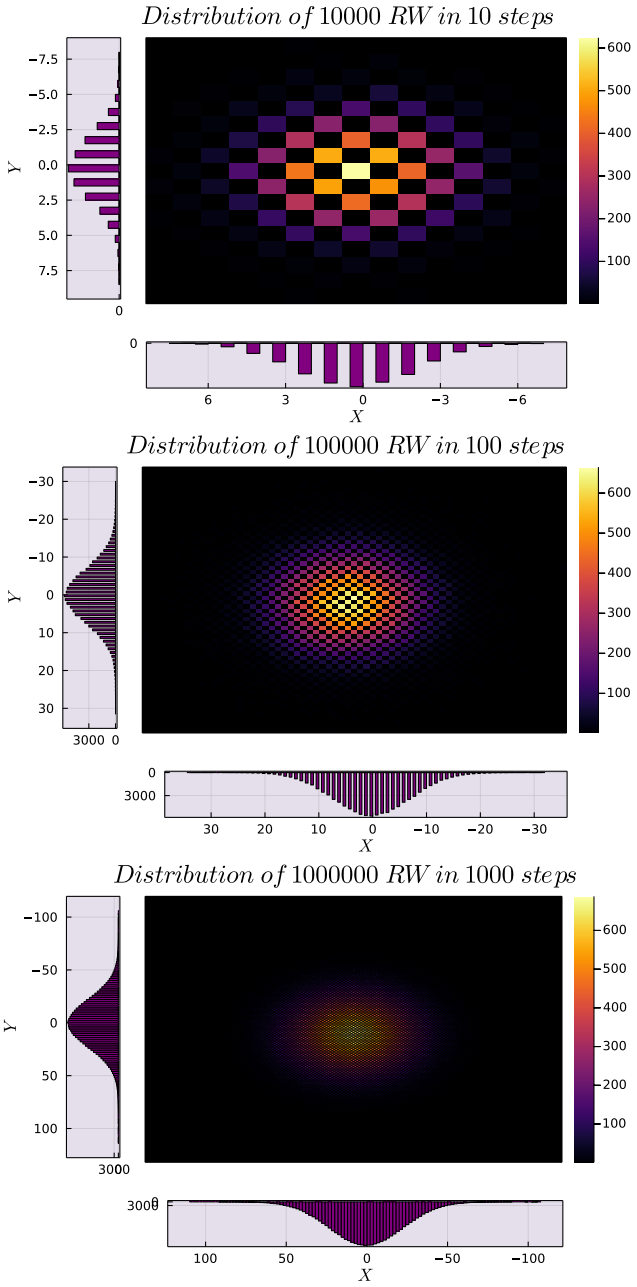

Figure 2: 2D Histogram, Shows distribute of Random Walkers in 10th, 100th, and 1000th time step.

Problem 2

Basic description:

The whole data I gathered is in this link

Thanks for watching :)