Modeling and Simulation, CS302

Lab-7

In this lab we are going to simulate some variants of the random walk problem that we have discussed in the lecture.

1. Numerically study the unbiased and biased random walk in one dimension.

   (a) Systematically analyze how the average distance travelled by the random walker depends on time.

   (b) Analyze the dependence of the variance of the random walker on time. Fit it with the analytical formula derived in the class.

   (c) Plot the histogram (probability distribution) of the random walker to be at a site. What is the distribution. Do you think that it is stationary and how do you ensure it?

2. **(2D random walk)** For this part you should refer to module 9.5 of the book. My suggestion is also to follow the documentation in the book for proper code development.

   (a) Using the pseudo-code randomWalkPoints develop the 2D random walk code with parameter n, for the number of steps.

   (b) By referring to animateWalk animate your random walk. This kind of visualization technique is extremely important while conducting simulations of the kind we are doing here.

   (c) Plot the average distance travelled versus number of steps. Plot it in a way to clearly show the dependence of the average distance travelled on the number of steps.

   (d) Modify your code for problem 8 in the Projects section. Based on the understanding developed note the key observations and also provide appropriate explanation for the observation that you make.