Modeling and Simulation, CS302

Lab-8

Due Date: April 01, 2021 (Thursday)

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

1. **(Warm up)** Implement the 1D unbiased and biased random walk.

   (a) For each plot and show how the average distance of the random walker changes in time.

   (b) For each of them plot and show how the variance of the random walker depends on time.

   (c) Plot the histogram of the 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 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 provide your explanation.