

PYTHON EXERCISE

RANDOM WALKS IN MONTE CARLO

00 - INTRODUCTION

The goal of this exercise is that you become even more familiar with programming in Python and apply the concepts learned in the lectures. For this reason, you will implement a library for simulating random walks and perform analysis on the obtained results.

Imagine you are in a city where all streets cross rectangular and thus form a perfect, endless grid. Every block of houses (distance between street intersections) in this city has the same length. You start walking at any starting position and at each intersection you randomly choose a direction (including the one you came from). What is the maximum number of blocks you can walk so that on average you are not more than six blocks away from your starting position?

Depending on your proficiency in mathematics, this problem could be solved analytically. However, this exercise is part of a programming lecture, thus we solve this problem by developing a Python program using Monte Carlo sampling¹. Simply put, Monte Carlo sampling simulates many outcomes, in our case walks, and aggregates the obtained results to estimate the needed probabilities.

For a better structuring of your program I have divided this exercise into five different parts that are each an individual exercise.

¹ https://en.wikipedia.org/wiki/Monte_Carlo_method