Program Structures and Algorithms
Spring 2024

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GITHUB LINK: https://github.com/gauthamkris7neu/INFO6205Assignment

Task:

Imagine a drunken man who, starting out leaning against a lamp post in the middle of an open space, takes a series of steps of the same length: 1 meter. The direction of these steps is randomly chosen from North, South, East or West. After m steps, how far (***d***), generally speaking, is the man from the lamp post? Note that *d* is the Euclidean distance of the man from the lamp-post.

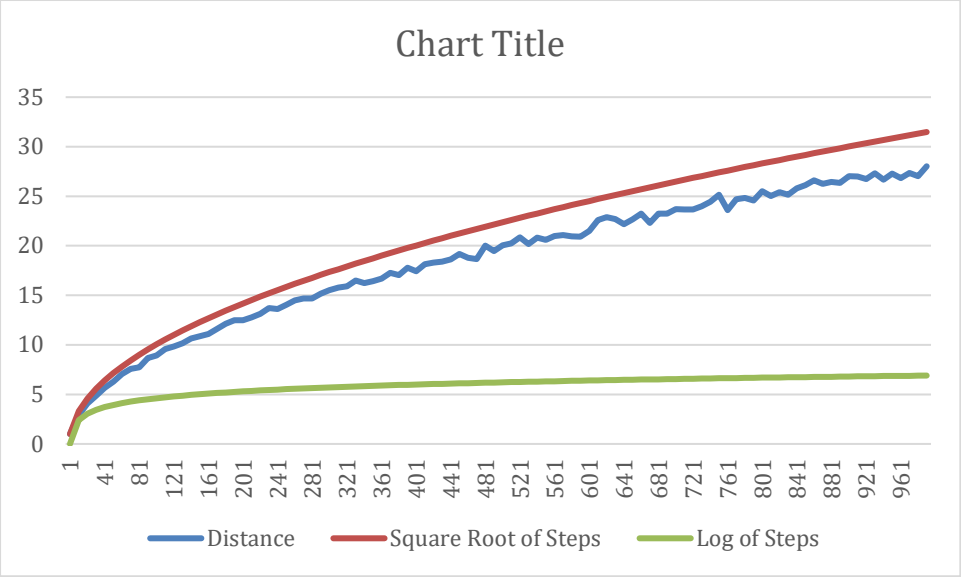
Relationship Conclusion:

To understand the relationship between distance 'd' and the number of steps 'm', we can run multiple simulations with varying values of m and observe the changes in the average distance.

Evidence to support that conclusion:

Number of Steps data taken for the simulations was from 1 to 1000 with increments of 10

Link for the data used : https://northeastern-my.sharepoint.com/:x:/g/personal/venkatakrishnapras_g_northeastern_edu/EW7pZiB2VfpOoTj5AXqdb2sBx055gZqXneWXerl3jsbReA?e=NmuNea



In examining the graph that plots expected D values against M values, we notice a declining trend. To put this into perspective, I compared this trend with two familiar functions: log(x) and square-root(x). This side-by-side comparison was quite revealing. It became clear that our graph aligns more closely

with the square-root function rather than the logarithmic function. This similarity is quite significant. It suggests that the expected value of D is likely proportional to the square root of M, not to its logarithm. In practical terms, this means that as M increases, D increases at a diminishing rate, a characteristic trait of square-root relationships. It's a subtle but important distinction that could have significant implications for our understanding of the underlying phenomena

Mathematically, this is expressed as:

$$d \propto \sqrt{m}$$

Unit Test Screenshots: