

Simulating being lost at a park.

Problem:

If I wanted to randomly find someone in an amusement park, would my odds of finding them be greater if I stood still or roamed around?

Assumptions:

The other person is constantly and randomly roaming

Foot traffic concentration is the same at all points of the park

Field of vision is always the same and unobstructed

Same walking speed for both parties

There is a time limit, because the odds are 100% assuming infinite time.

The other person is NOT looking for you. They are wandering around having the time of their life without you.

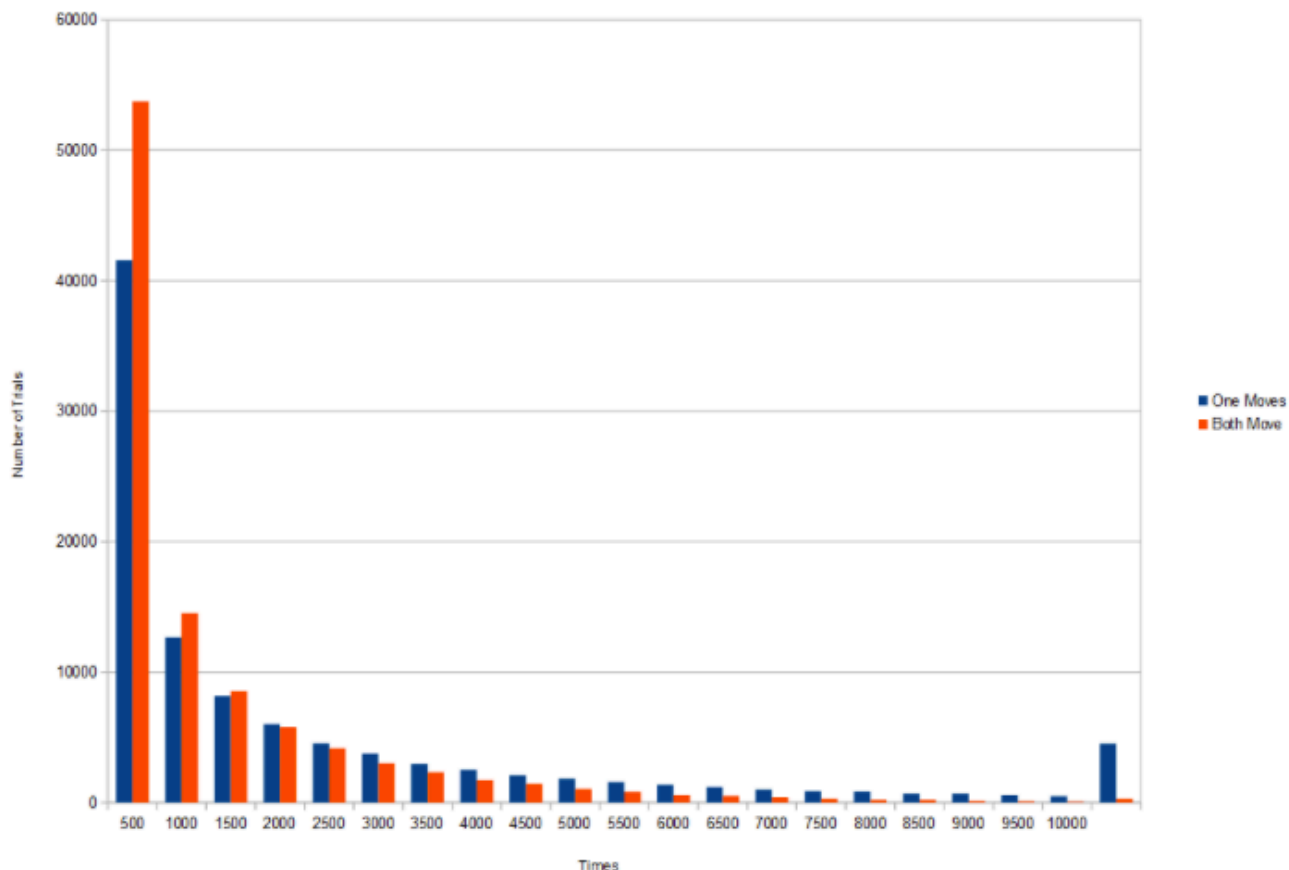
You could also assume that you and the other person are the only two people in the park to eliminate issues like others obstructing view etc.

Solution 1:

I ran a simulation using java for 100,000 trials each. The average time for both people moving is half that of only one person moving. Here is a histogram of the data: <http://i.imgur.com/5mYnGiT.png>

Details of the simulation:

People are assumed to be on a 100x100 grid. If they are on the same spot, they can find each other. At $t=0$, they are placed on a random location in the grid. Each time step, anyone that's moving will randomly move north, south, east, or west. They can't move out of the 100x100 grid, so if they pick a direction not allowed, they'll pick again.



Solution idea 2:

I did a simulation as well.

I simulated each test on grids of increasing size: 20x20, 40x40, 80x80, 160x160, and 320x320. I gave the seeker a vision of 10 units, and counted the number of loop iterations until the seeker found the other person. I only ran 100 trials for each grid size.

Median iterations for one person standing still: 0, 547, 9215, 32892, 188207

Median iterations for both people wandering randomly: 4, 380, 3208, 17359, 95125

The std. deviation was also much larger when one person was standing still.