

Will Skippy Get Home?

9										
8										
7										
6										
5										
4										
3										
2										
1										
0										
	0	1	2	3	4	5	6	7	8	9

Consider the 10x10 grid above. A lost, blind Kangaroo starts in position (0,0), shaded yellow and is trying to get home, which happens to be at cell (9,9), shaded green. Skippy's strategy to find his way home is to take random hops either North, South, East or West (with equal probability), without exiting the grid of course.

The question is, will this strategy get Skippy home, or will he hop around the grid forever?

This is an example of a **Markov Chain**, and we know that no matter how big the grid is, Skippy will eventually get home. The purpose of this assignment is to simulate the process and hence illustrate that Skippy gets home eventually.

This simulation can be implemented with quite a short Ruby script. However, you must use an object-oriented approach as described below.

Program Design

Use the following classes and indicative methods (add more if you wish, vary names if you wish):

class Die

Represents a 4-sided die and has these methods:

throw: return one of :NORTH, :SOUTH, :EAST, :WEST with equal probability

stats: return hash table describing stats on throws so far, e.g,

{:NORTH=>35, :SOUTH=>42, :EAST => 40 :WEST=>39}

class Point

Represents a point in 2-dimensional space.

class Kangaroo

Represents the kangaroo in the simulation. Instance variables include his location, which is initially (0,0). Provides these methods:

- hop!: take a random hop in one direction
- at_boundary?: return true iff at boundary of space
- at_home?: return true iff at home
- location: return current location (a Point)

class RandomWalk

Instantiates the Die and Kangaroo classes and starts the simulation. Provides these methods:

- start!: start the simulation
- final_location: return final location of the kangaroo
- no_of_hops: return number of hops the kangaroo took during the simulation
- stats: return hash table describing die stats

Assume the South-West of the space is (0,0) and that the space is a square. Your solution should work for a square of any dimension. Assume Skippy starts at (0,0) and that home is the North-East of the space at (dimension-1, dimension-1).

Input/Output Specifications

Input: Dimension of the grid. Integer, greater than or equal to 1.

Output:

- the series of points the kangaroo visits from initial location to home.
- total number of hops taken
- The stats of the die in the form: North 24%, South 23%, East 28%, West 25%.