

The Random Walker Algorithm

A drunk man will eventually find his way home but a drunk bird could get lost forever

The Random Walker Algorithm is used in many fields: image processing, finance (models stock market), gambler's ruin, etc. The least complex version, "simple random walk" occurs when the bias of the algorithm is evenly weighted, such as when a toss of a coin is used to determine whether to turn left or right. In most contemporary situations when an algorithm is used it is generally biased as a result of the data used to build the neural network.

Elsworth Kelly was an artist that used algorithm to create his art, as the example below:



Ellsworth Kelly
Spectrum Colors Arranged by Chance II
1951

From Mona website

We will create an art work using a Simple Random Walker Algorithm, a map grid, a coin and code. We will be using a map grid of the local vicinity and colouring each grid square with colour determined from walk(s).

The following extract is an example of a contemporary artist that uses the Random Walker Algorithm to produce art.



Cheyney Thomson, *Stochastic Process Painting*, 2018, olio su tela / oil on canvas. Courtesy: l'artista e / the artist and Campoli Presti, London/Paris

Two series of works are on display here: the three canvases in the *Stochastic Process Paintings*, and the prints in the *Sets of Curves*.

The former, created specially for this occasion, outline the interest of Cheyney Thomson in computer programming and ponder the medium of painting in art history. The random walker algorithm, normally used in financial theories to predict the prices of stock market shares, is used by the artist to translate trends in shades of color to be applied

to the canvas based on the three-dimensional color system devised by Albert Munsell in the early twentieth century. The series of prints called *Sets of Curves*, was instead made by a mechanical plotter, replacing the artist's hand. Inspired by the allegorical figure of Bellona, the goddess of war represented at the center of Rubens' *The Apotheosis of Henri IV* (1622-1625), now on display at the Louvre, Thompson's prints are an analysis and transcription of the lines present in the studies that two centuries later Paul Cézanne made on the same subject (1883-1886). Using a series of vectors that transformed each curve into a system of functions, the works that were thus derived are reproductions that are never identical, an abstract script that is the result of an automatized process.

Through the use of technological processes and generative devices, Thompson's research focuses on mechanisms of the creation, distribution, and affirmation of painting, producing projects that often last several years and that impose structures and restrictions upon their own elaboration.

CHEYNEY THOMPSON (1975, USA) lives and works in New York.

From catalogue: Imaginaries and Visions in the Age of Artificial Intelligence, 20 October 2018 — 24 February 2019

Instructions:

1. You will need to work in pairs for safety.
2. Print a grid of the local area as per the attached example.
3. Leave the confines of the school. Who will walk and who will guide? Toss the coin.
4. The next decision to make is which way to turn: left or right once outside the gate of the school.
5. Toss the coin to do this: Heads – left, Tails – right
6. Record this in the grid with the letters L or R.
7. Now, toss the coin again to determine if you will walk forwards or backwards: Heads – forwards, Tails – backwards. Be very careful when walking backwards. It is the job of your partner to keep you safe.
8. Record this in the grid with the letters F or B.
9. What perspective does walking backwards provide? Are we looking at where we have been whilst moving forward? We don't often have the opportunity to see the world in this manner. What does this reveal?
10. Keep moving forward, whether facing forward or backwards, until you reach the next intersection. Here you will need to toss the coins again.

The code consists of 4 simple commands. It is a very limited instruction set.

L: Walk to the left
R: Walk to the right
F: Walk forwards
B: Walk backwards

The algorithm is as follows:

1. Toss the coin,
2. If Heads
 - a. do L,
3. Else if Tails
 - a. do R,
4. Store the result (record it on the map grid)
5. Toss the coin,
6. If Heads
 - a. do F,
7. Else if Tails
 - a. do B,
8. Store the result (record it on the map grid)
9. Keep walking until you reach an intersection,
10. Go to step 1.

Once the walk has been completed, use the map and colour the grids according to an algorithm you devise.

For example:

grid letter combination	colour
L & F	red
L & B	green
R & F	blue
R & B	yellow

Enjoy your walk, have fun and learn something new about your neighbourhood and the world around you!

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