Isometric Snowflakes
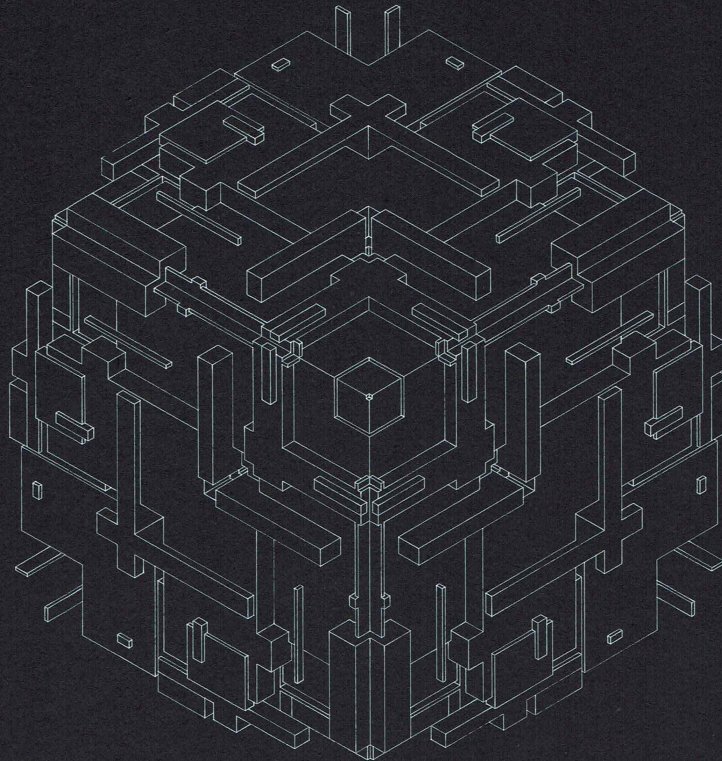
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[2019-12-15 Sun]

Contents

1 Introduction

This post uses a rust-based Emacs plugin for generating art and plotting it using AxiDraw plotters.

You can find it at l3kn/Plotter.

iso_snowflake1

0x2A40C66B

2 Symmetry

Most snowflakes have six-fold radial symmetry.

A cube under isometric projection forms a hexagon.

To replicate the symmetry of a snowflake, we fill this cube with randomly generated cuboids, then swap their axes (x and y, x and z, y and z) to introduce three-fold symmetry.

3 Randomness

Each image should uses a random seed of 32 bits (eight hexadecimal digits).

What I like about generative art is being surprised by how different the outputs of a simple algorithms can look when all the parameters are randomized.

When generating random numbers, I like to do so in two steps, first generating a range delimited by two powers of two $[2^a, 2^b]$ where $a <= b$ are chosen at random (in a limited range), then generating random numbers in this range.
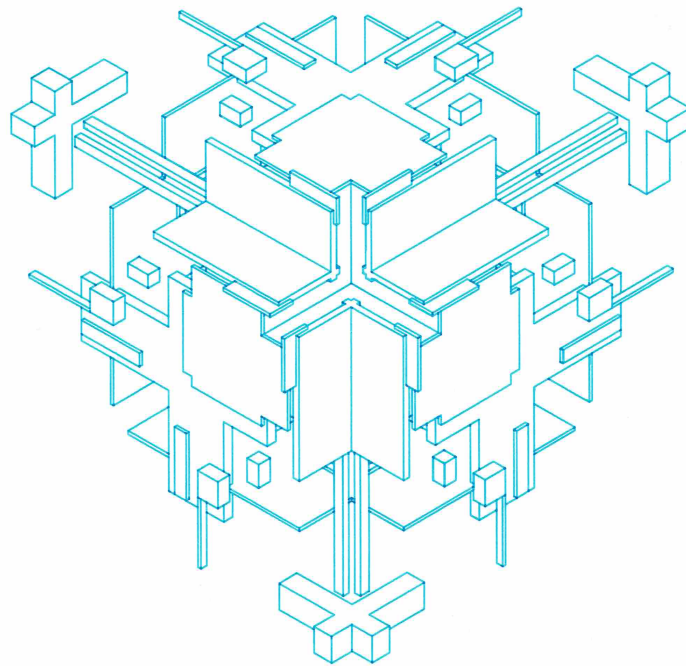
4 Iteration 1

-> is a **threading macro** from magnars/dash.el.

language=Lisp,label= ,caption= ,captionpos=b,numbers=none (dotimes $(_i 50)(let * ((seed(plt - random - seed))(caption(vector(format"0x(randomseed)(let *$ $((grid - size 128)(n - cuboids(plt - random - pow 247))(cuboid - size(plt - random - pow 2 - size 06))(grid(plt - make - grid grid - size)))(- > (loop for x below - cuboids collect(plt - random - iso - cuboid(plt - random - pow 2 - size 06)grid - size))(plt - swap - xy - both)(plt - swap - xz - both)(plt - swap - yz - both)(plt - grid - add grid))(plt - grid - to - image grid plt - a3 - size plt - a3 - caption - size(concat dir"/a3/"seed".svg")"iso_s now flake 1" caption)(plt - grid - to - image grid plt - a4 - size plt - a4 - caption - size(concat dir"/a4/"seed".svg")"iso_s now flake 1"c$
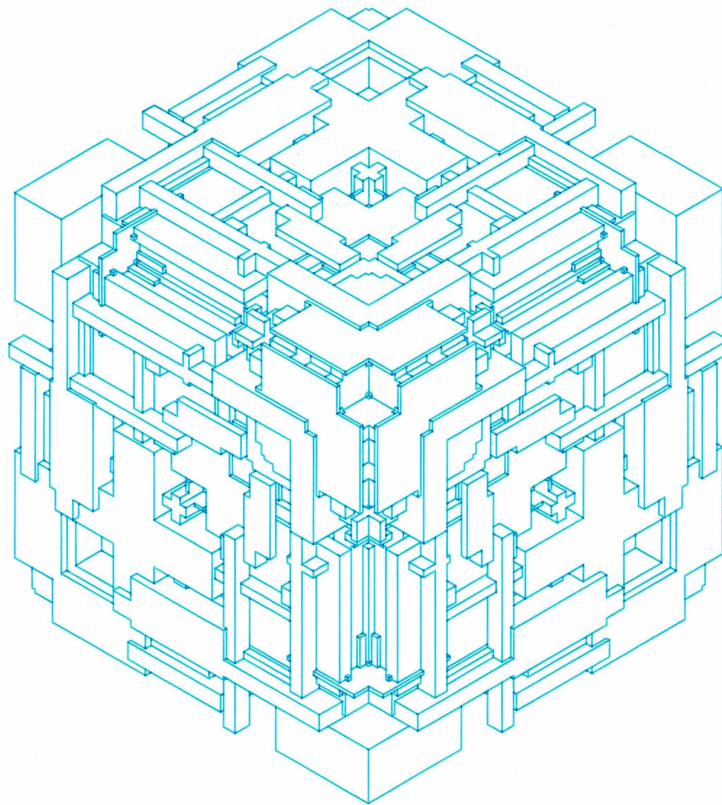
iso_snowflake1

0x37D9B638

5 Iteration 2

language=Lisp,label= ,caption= ,captionpos=b,numbers=none (dotimes ($_i$50)($let*$
(($seed(plt - random - seed))$)($caption(vector(format"0x(randomseed)(let *$

$((grid - size128)(n - cuboids(plt - random - pow247))(grid(plt - make - gridgrid - size)))(- > (loopforxbelown - cuboidscollect(plt - random - iso - cuboid(plt - random - pow2 - size06)grid - size))(plt - swap - xy - both)(plt - swap - xz - both)(plt - swap - yz - both)(plt - grid - addgrid))(plt - grid - to - imagegridplt - a3 - sizeplt - a3 - caption - size(concatdir"/a3/"seed".svg")"iso_snowflake2"caption)(plt - grid - to - imagegridplt-a4-sizeplt-a4-caption-size(concatdir"/a4/"seed".svg")"iso_snowflake2"caption))))$

iso_snowflake2

0x2C8A4425

6 Getting a Plot of This

If you have an AxiDraw or a similar plotter that can plot svg files, you should
be able to download these images and plot them yourself.

On l3kn/iso$_{\text{snowflakes}}$ you can find hundreds of randomly generated svg files in A3 and A4 size.

The order of the paths is already optimized, images can be plotted using the AxiDraw CLI.

I'm using the following command (AxiDraw V3 A3):

language=bash,label= ,caption= ,captionpos=b,numbers=none   axicli image$_n$ame.svg $- L2 - p/dev/ttyACM0 - s30 - S50 - a30$

For different paper sizes, you can resize the images in inkscape.

Only `path` elements are used, so it should be possible to plot these images with an HPGL plotter, too. To do so, either parse the `path` elements of the svg and scale the points or write to support@leonrische.me so we can come up with a format that's easy for me to generate and easy for you to use.

If you want a plot on nice paper, contact me at sales@leonrische.me.

7   License

When distributing this work, please link to the Isometric Snowflakes page. For printed / plotted versions, the URL could be written on the back.

This license allows commercial use, if you want to sell plots of these images, please don't charge more that necessary to cover material costs and a hourly wage for yourself you consider fair.

8   Material Used

8.1   Pens

- Faber-Castell Pitt Artist Pen, blue, 0.3 (S)

- Sakura Gelly Roll, white, 05

8.2   Paper

- Bristol, A4, 250g/m^2

- Black carton paper, A4, $3008/\text{m}^2$