Sacred Geometry L-Systems

Scene

My scene contains seven L-Systems that make up the sacred geometric configuration known as “Metatron’s Cube”. The Seed Of Life L-System, one that produces a grid of overlapping circles known as the “Flower of Life”, serves as the base and is overlaid with the Cube, Tetrahedron, Star (tetrahedron), Octahedron, Dodecahedron, and Icosahedron L-Systems, respectively.
The scene begins with the L-System’s levels set to render “Metatron’s Cube”, and the Seed of Life L-System’s coloring is altered to display only the “Fruit of Life” pattern (composed of the non-overlapping circles aligned on the three axes that intersect at the very center).
The Seed of Life L-System has a maximum level cap at level 31 because beyond that, the sketch crashes due to its attempting to push the matrix in excess of 32 times, and a minimum level cap at 1. Help and information menus are included.

Extension I: Additional L-Systems

I created seven L-Systems for this assignment, of which the six geometric systems are defined and function very similarly, while the Seed of Life system is more unique. Each system extends the L-System superclass and overrides the display method to dictate its behavior.

Extension II: User Interaction

The user can interact with the sketch by toggling each L-System individually and in groups, toggling the coloring, toggling the depth projection, increasing and decreasing the L-Systems’ levels, and resetting the configuration back to the standard view of Metatron’s Cube. A help menu is provided for the user’s convenience, along with a little information menu.

Extension III: Parametric L-Systems

I believe my L-Systems can be classified as parametric in two ways. First, the color(s) in which they are rendered is dependent upon user input. Secondly, the geometric L-Systems draw each concentric shape at a different size by scaling the edge lengths by the internal level counter, which is incremented by each L-System itself.

L-Systems

I began this project by creating an L-System super class that allows an L-System to be created from a JSON file. It handles reading and parsing of the JSON file and setting up the L-System in a way that a subclass need only override the rotation angle(s), move distance(s), and display method in order to dictate its behavior. Below are the formal definitions of each implemented L-System, which can also be found in their respective JSON files.

Seed Of Life

```
Alphabet: I, C, c, O, o, f, H, h, +, [, ]
Axiom: I
Rules: I -> Hch+[fO]+[fO]+[fO]+[fO]+[fO]+[fO]
       O -> c[fHoh][+fC]
       o -> Hch[fO][+fC]
       C -> c[fC]
```

Tetrahedron

Alphabet: I, F, E, L, +, [,]
Axiom: I
Rules: I -> [F+++++E++++[+F]E++++[+F]E]LI

Star Tetrahedron

Alphabet: I, F, f, S, M, E, L, D, d, |, +, [,]
Axiom: I
Rules: I -> [f+++M++++[+DFd]M[++++M]M++++[+DFd]M[++++M]M++++
[+DFd]M++++M][F+++++SDSdS++++[+F]SDSdS++++[+F]SDSdS]
[|Df+++++M++++M++++Md]LI

Cube

Alphabet: I, F, f, L, D, d, +, [,]
Axiom: I
Rules: I -> [[DFd++F]+[F++F]+[DFd++F]+[F++F]+[DFd++F]+[F++F]]LI

Octahedron

Alphabet: I, F, f, E, L, D, d, +, |, [,]
Axiom: I
Rules: I -> [f++++[E++E]+F+++[E++E]+F+++[E++E]+F][|Df+++++F++++F+
+++Fd]LI

Dodecahedron (alphabet contains ‘,’)

Alphabet: I, F, S, M, E, L, D, d, -, ,, +, ., <, #, >, |, [,]
Axiom: I
Rules: I -> [[F[<M[,S]#E]-M.S>E]+[F[<M[,S]#E]-M.S>E]+
[F[<M[,S]#E]-M.S>E]][|D[F[<M]-M]+[F[<M]-M]+[F[<M]-
Md]]LI

Icosahedron

Alphabet: I, F, E, M, S, f, e, L, D, d, +, >, #, |, [,]
Axiom: I
Rules: I -> [e++++E++E++E++E++E++E][[f[[S]>F#F]+++++M]++++
[f[[S]>F#F]+++++M]++++[f[[S]>F#F]+++++M]][|
D[f[[S]>F#F]+++++M]++++[f[[S]>F#F]+++++M]++++
[f[[S]>F#F]+++++M]d]LI