The Significance of Fractal Art in Composition Education

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Abstract:

This article explains how to make compositions using mathematical formulas and geometric constructions, as well as the notion of fractals, which are a part of the composition.

Key words: fractal composition, rhythm, symmetry, asymmetry, principle, method, galaxy, crystal.

COMPOSITION (Latin: Compositio- structure, union, connection) is the arrangement of pieces of a work of art that are connected in terms of substance, character, and purpose.

It is a means of conveying the artist's idea (sculptor, etc.) in the fine arts, in which the artist's expertise is vividly exhibited. The author masters the spatial width and produces an artistic environment by arranging lines, shapes, colors, and images through composition. The composition is built on logic, form clarity, and harmony. Every work of art has a composition at its core, which reflects the thoughts and feelings that arise during the perception of existence. There are "static" and "dynamic" compositions, as well as "open" and "closed" compositions. Certain "rules" define and restrict composition (canons). As a result, the range of compositional expression became more limited. "Stable" and "closed" compositions dominated the Renaissance, whereas "dynamic" and "open" compositions dominated the Baroque. Compositions based on laws and attempts to build compositions based on free compositional approaches have both played major roles in the history of art. There are "static" and "dynamic" compositions, as well as "open" and "closed" compositions. Certain "rules" define and restrict composition (canons). As a result, the range of compositional expression became more limited. "Stable" and "closed" compositions dominated the Renaissance, whereas "dynamic" and "open" compositions dominated the Baroque. Compositions based on laws and attempts to build compositions based on free compositional approaches have both played major roles in the history of art.

So, today, we'd like to discuss the concept of fractal, which is a component of composition.

The name "fractal" comes from the Latin word "fractus," which means "fragmented," and is derived from the terms "fraction," "fractional," and "fractal." The term "fractal" has yet to be defined clearly. In 1975, American scientist Benoit Mandelbrot created the term fractal to characterize uneven but self-similar patterns.

What exactly is a fractal? Fractal is a self-similar term that refers to a geometric shape made up of numerous pieces that repeat the overall shape. It can be applied to any form that has one or more of the following characteristics:

1. It has a well-organized framework on all levels. They are also distinct from regular forms (circle, ellipse, graph of a function) in that a little portion of a regular shape seems to be a straight line when viewed at a very large scale. Increased scale does not simplify the structure of fractals; we observe the same complex environment at all scales.

2. Self-identical or almost self-identical.

3. It has a fractional or metric size that is more than the topological size.

4. It can be built in a recursive mode..

Fractal definitions are listed below.

The fractal has no definite definition, however different definitions can be found in the literature.

To create fractals, you must first create their (composition) equation. This is accomplished through a variety of approaches.

Consider the procedure of creating Koch triad curves as an example. Gelge von Koch, a Swedish physicist, investigated this curve in 1904. A unit cut is the first step in building a curve. As illustrated in Figure 2.1.1, divide this piece into three equal segments and replace the center one with two connected sections of the same length. This technique is then applied to each link separately in the next phase. As a result, a new broken line emerges, one end of which coincides with the beginning of the next. Figure 1 depicts the curve's five generations. The Koch fractal curve is obtained by repeating this method indefinitely. Prefractal curves are defined as those obtained from n steps in an arbitrary n-bound.
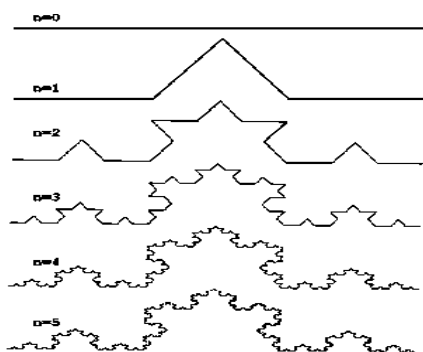

Figure 1. Construct the Koch triad curve

The Serpin rug is another example of a fractal object. A simple equilateral triangle is obtained at step zero. The triangle's sides are divided into two equal portions in the first phase, and the sides' centers are joined by intersections. This method is then applied to each triangle separately in the next phase. As a result, additional triangles emerge. The Serpin triangle fractal is formed by repeating this method indefinitely.

Figure 2. Serpin triangle.

There are no obvious borders in the image of such collections.

Nonlinear dynamic systems, as you may know, have numerous stable states. After a few repetitions, the dynamic system's state is determined by its original state. As a result, each static state takes up

many sections of the starting state, and the system eventually settles into the final state under discussion. The phase space is also separated into the attraction's area of attraction. If the two-dimensional space has phase, you can use different colors to paint the area around the points of gravity to create a color phase portrait of these systems. By altering the color selection algorithm, fractal artworks can be created.

Mathematicians now have the ability to use simple techniques to generate exceedingly complicated notrivial structures.

For each starting point, the iteration is carried out. A complicated plane of a set is a rectangle or square segment. When the number of iterations is large enough, the iteration process continues until the center of the circle lies at point (0) and surpasses the radius 2 boundary of the circle, or enters a point in the circle (for example, 200-500). (The iteration process comes to a halt if a large enough number of iterations remain in the circle.)

The approach presented above gives a close approximation to the Mandelbrot set. When the number of iterations is unlimited, the Mandelbrot set includes points that do not go to infinity. After the number of iterations, the points that lie within the set (where complex structures appear) go to infinity, and the points that lie within the set go to infinity after a few iterations.

This article provides information on how to produce compositions using mathematical formulas and geometric constructs, as well as a description of the practice in this area.

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