

Fuzzy Fractal Image Processing



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ABSTRACT

Fractals geometry is introduced by Mandelbrot [as” the Geometry of Nature”. Clouds are not spheres, mountains are not cones, coastlines are not circles and nor does lightning travel in a straight line. All Clouds, Coastline, walking and Mountains are having scale invariance and self-similarity. These structures are imprecise or fuzzy

In this presentation the fuzzy fractal structures are studied. Fuzzy Fractals are structures, have the property of scale invariance or self-similarity.. Fuzzy fractal structures allow dimension of fractals. These structures need computer assistance for a generation. Some methods and techniques are studied for Computer generation/.

1. INTRODUCTION

Fractals geometry is introduced by Mandelbrot [as” the Geometry of Nature”. Clouds are not spheres, mountains are not cones, coastlines are not circles and nor does lightning travel in a straight lineAll Clouds, Coastline, walking and Mountains are having scale invariance and self-similarity. These structures are imprecise or fuzzy



References

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2. METHODS

Definition: Given some universe of discourse X, a fuzzy set A of X is defined by its membership function μ_A taking values on the unit interval[0,1] i.e., $\mu_A(x): \rightarrow [0,1]$
For instance, Bell membership function

$$\mu_A(x) = 1.0 / (1.0 + (x-c)/b)^{2b}$$

Gaussian membership function

$$\mu_{curve}(x) = [-(1/2) \mod [(x-c)/s]^m]$$

Fractals are given by using Gaussian membership function.

Iteration

Iteration is the method in which output function value may be taken an input value to the function. This method is proposed to reduce the complexity of Computer generation of fractals.

Recursion:

Recursion is a process that calls itself, directly or indirectly. This method can be applied to simplify the complexity of Computer generation of fractals using programming.

For instance, consider the generation of the Koch curve. The recursion method is applied to call self-similarity. With different fuzzy lengths



3. RESULTS

. Fractal is defined as similar or fuzzy to themselves of geometrical shapes. For instance, coastlines, mountains, rivers, etc. are Fuzzy Fracas. The fractal structures are studied through the fractal dimension and defined by

$$D = \log N(h) / \log(1/h)$$

Where h is the length of line-segment and N(h) is the number of line-segments.

The fractal demelition will not change for fuzzy fractals.

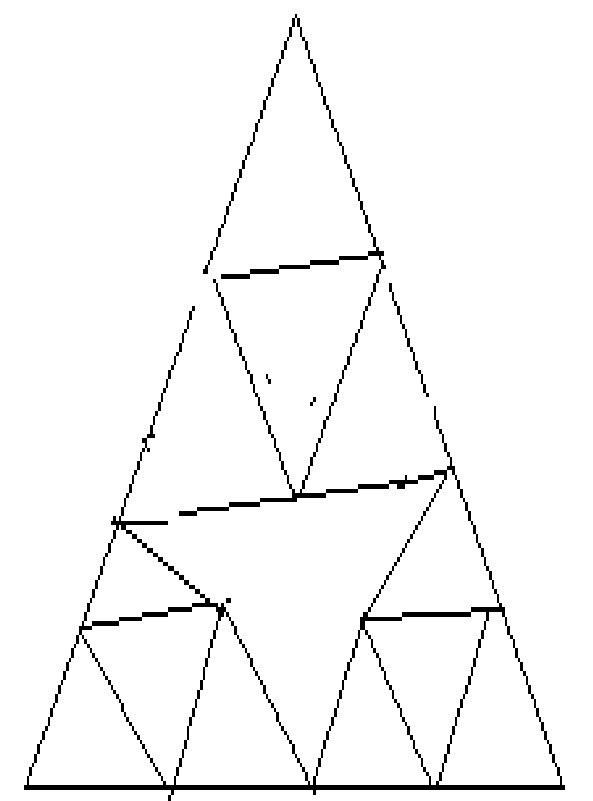
$$\begin{aligned} r(\text{linear}) &= 1 \\ r(\text{area}) &= 1/4 \\ D &= \log N / \log (1/r) = \log 4 / \log 2 = 2 \end{aligned}$$

Fuzzy fractal scaling

4. CONCLUSIONS

•Fuzzy fractals are structures which having the property of Scale-invariance or self-similarity. Self-similarity of a system features of structures are lookalike similar structures at different scales of length. The Scale of length may be fuzzy. Fuzzy Fractal Graphics have the number of applications in designing clothes and crafts. These applications are describes as fractals. Fractal dimension will identify the fractal structures or not. For instance circles are not fractals. The fuzzy fractal structures are studied. The methods and techniques are also proposed for Computer generation of the fractals to simplify the process.

Parallel .generation of Fuzzy Sierpinski gasket is given by



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