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Fuzzy Fractals Nature

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Abstract

All Clouds, Coastline, walking and Mountains are having scale invariance and self-similarity. These structures are imprecise or fuzzy fractals in nature. In this paper, the fuzzy fractal structures are studied. Fuzzy Fractals are structures, have the property of scale invariance or self-similarity. Fuzzy fractals are studied. Fuzzy fractal structures allow dimension of fractals. These structures need computer assistance for a generation. Some methods and techniques are studied for Computer generation of fractals.

Keywords: fuzzy fractals, fractal generation, fractal dimension, iteration, recursion, parallelism

I. INTRODUCTION:

Mandelbrot [2] studied Fractals in Nature. Fractal structures of nature are similar to themselves on different length-scales of observation. The different length of scale may be fuzzy. This geometrical property is studied for a great variety of irregular shapes, Fuzzy

Machine learning model consist of inputs, fuzzy algorithm and output with result from the growth process.'

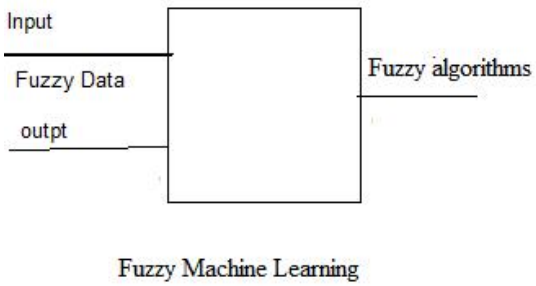

Fig.1.Machine Learning

Artificial Intelligence in Graphics has labeling and searching appropriate label to design fuzzy fractals.

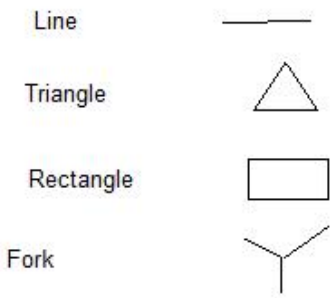

Fig.2. Labeling

Fractals geometry is introduced by Mandelbrot [l} 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, says Dr. Beroit Mandelbrot.

Human expertise is not sufficient to generate Fractals of nature. Fractals need computer assistance. Even Computer programming also requires methods and techniques to generate fractals. In the following, some methods and techniques are proposed for Computer generation of fractals.

Fig.3.Fuzzy Fractal Mountain

Fig.4.Fuzzy Fractal Mountain

II. FUZZY FRACTALS

Zadeh [5] introduced the concept of a fuzzy set as a model of a vague fact. The use of the fuzzy set theory for expert system is now accepted because it is very convenient and believable.

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

Suppose X is a finite set. The fuzzy set A of X may be represented as

$A= \mu_A(x_1)/x_1 + \mu_A(x_2)/x_2 + \ldots\ldots\ldots\ldots\ldots\ldots + \mu_A(x_n)/x_n$

Where "+" is union

For instance, Bell membership function

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

Gaussian membership function

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

Fractals are given by using Gaussian membership function.

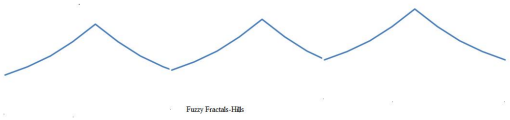

Fig.5.Fuzzy mountain fractal

III. FRACTALS AND DIMENSION:

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 = logN(h)/log(1/h)

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

The fractal demolition will not change for fuzzy fractals.

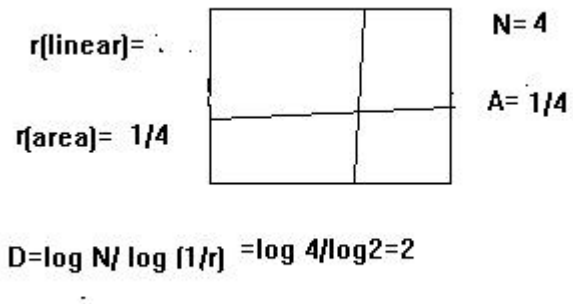

Fig.6. Fuzzy fractal scaling

III. METHODS AND TECHNIQUES:

Computer generation of fractal shell is simplified by introducing methods and techniques. In the following, three methods and techniques are introduced to simplify the complexity of Computer generation of fractals.

A. **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.

This is given by

n = f (n)

For instance, N

1

2

4

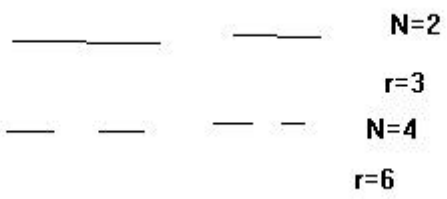

Fig.7. Iteration

= log(2/3) = 0.63 09

Here, the number of self similarities can be defined as N = f(N).

B. 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

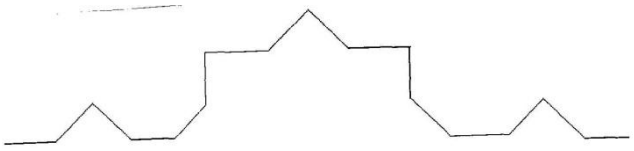

Fig. 8. Recursion

D=log 4/log 3 = log 16/log 9=.26

C. **Parallel fractals**

The parallel processing technique is divide number of sub-task of the task and each task will processed independently with individual processors in the Multiprocessing computer system. This parallel processing technique is proposed for Computer generation of fractals when the large number of computations and having the number of sub-tasks. The computer generation of fractals, in which the fractal can be divides into the number of sub-tasks, and each sub-task will be processed with independent processor and generate the self-similarities.

For instance, consider the Sierpinski gasket in which the triangle is divided into three triangles and each triangle will self-similarly generate with independent processor in Multiprocessing computer system.

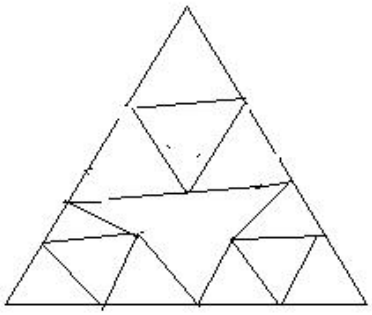

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Fig. 9. Parallel .generation of Fuzzy Sierpinski gasket

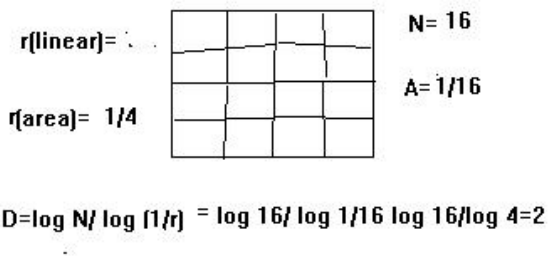

Fig. 10. Parallel generation of fuzzy fractals

V. **CONCLUSION:**

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.

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