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Dichotomous representation of fractal recursivity

Representación dicotómica de la recursividad fractal

RAMOS-ESCAMILLA, María*†

RINOE-Mexico

ID 1st Author: *María, Ramos-Escamilla* / **ORC ID:** 0000-0003-0865-8846, **Researcher ID Thomson:** J-7654-2017, **CVU CONACYT ID:** 349660

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Abstract

Fractals connect immediately with chaos theory and dynamical systems and this brings us very quickly closer to a more harmonious and integral understanding of reality than the geometry used at the time, based on rectangles, circles, triangles, ellipses, this new geometry describes sinuous curves, spirals and filaments that twist on themselves giving elaborate figures whose details are lost in the infinite. In fact we can understand fractal geometry as the geometry of nature, of chaos and order, with forms and sequences that are locally unpredictable, but globally ordered, hence the importance of "intermittency" and "attractors" as information inherent in "iteration".

Fractal, Chaotic, Recursive

Resumen

Los fractales conectan de inmediato con la teoría del caos y a los sistemas dinámicos y esto nos acerca muy rápido a una comprensión un poco más armónica e integral de la realidad al contrario que la geometría utilizada entonces , basada en rectángulos, círculos, triángulos, elipses,esta nueva geometría describe sinuosas curvas, espirales y filamentos que se retuercen sobre sí mismos dando elaboradas figuras cuyos detalles se pierden en el infinito.De hecho podemos entender la geometría fractal como la geometría de la naturaleza, del caos y del orden, con formas y secuencias que son localmente impredecibles, pero globalmente ordenadas por ello la importancia de la “intermitencia” y los “atractores” como información inherente a la “iteración”.

Fractal, Caótico, Recursivo

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* Correspondence to Author (E-mail: ramos@rinoe.org)
† Researcher contributing as first author.

Introduction

Fractals are geometric structures that combine irregularity and structure, although many natural structures have fractal-like structures. A mathematical fractal is an object that has at least one of the following characteristics: it has detail on arbitrarily large or small scales, it is too irregular to be described in traditional geometric terms, it has exact or statistical self-similarity, its Hausdorff-Besicovitch dimension is greater than its topological dimension, or it is recursively defined.

Fractal forms, the forms in which the parts resemble the whole, are present in the economic matter, together with symmetries (the basic forms of trends need only half the information of the prices on the market) and spirals (the forms of growth and development of the basic form towards the occupation of a larger space), i.e. they enable catastrophes (extraordinary events) that give rise to new, more complex realities.

But fractal forms (from this intuitive conception) are not only present in the spatial forms of objects but are also observed in the evolutionary dynamics of complex systems, which consist of cycles (in which, starting from a simple established reality, they end up creating a new, more complex reality) which in turn form part of more complex cycles which in turn form part of the development of the dynamics of another great cycle, and the dynamic evolutions of all these cycles present the similarities typical of chaotic systems.

Fractal creation

We start with the Fractal Matrix:

We start with the Fractal Matrix:

North:$108° \rightarrow 90° - \int_{e}^{N} \frac{ne}{d(NE)}$

South:$270° \rightarrow 180° - \int_{S}^{e} \frac{es}{d(ES)}$

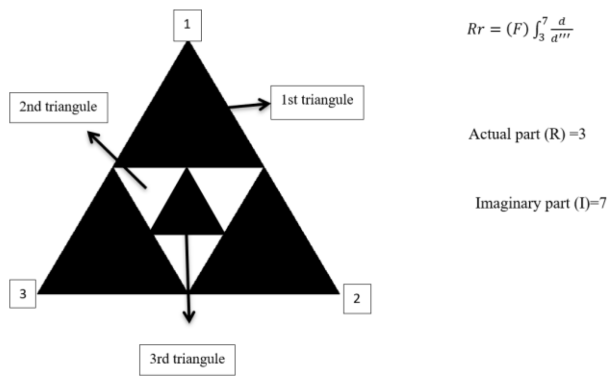
East: $360° \rightarrow 270° - \int_{S}^{O} \frac{os}{d(OS)}$

West: $90° \rightarrow 360° - \int_{O}^{N} \frac{NO}{d(NO)}$

By entering the Fractal Pivot, we get:

$$f(PV) = \int_{\lim d\frac{\left(\frac{ne}{NE}\frac{es}{ES}\frac{os}{OS}\frac{no}{NO}\right)}{1(PV)}pv}^{\lim\,(180°-90°,270°-180°,360°-270°,90°-360°)}, \qquad (1)$$

The prototype of R3 can be the following Fractal:



Hamiltonian:

$$f(PV) = \bar{H}\left|\frac{\frac{d(180°\rightarrow 90)}{d\frac{ne}{NE}}}{\frac{1}{x}} \; \frac{\frac{d(270°-180°)}{d\frac{es}{ES}}}{\frac{1}{y}} \; \frac{\frac{d(360°-270°)}{d\frac{os}{OS}}}{\frac{1}{z}} \; \frac{\frac{d(90°-360°)}{d\frac{no}{NO}}}{\frac{1}{\alpha}}\right| \qquad (2)$$

We derive the level of fractal recursion for the finitesimal body:

$$\overline{RH}\; degree1 = \left[\frac{\frac{\partial d(90°)}{d^{II} ne(-NE)}, \frac{\partial d(90°)}{d\, es(-ES)}, \frac{\partial d(90°)}{d\, os(-OS)}, \frac{\partial d(270°)}{d\, no(-NO)}}{\frac{1(x,y,z)}{\alpha-1}}\right]$$

$$\overline{RH}\; degree2 = \left[\frac{\partial d(90°)^{III}}{\frac{d^{IV} ne\rightarrow es\rightarrow os\rightarrow no}{1-1\int(x,y,z)}}\right]\left[\frac{207°}{no}\right]\left[\frac{\log(PV)}{lm\,(pv)}\right]$$

$$\overline{RH}\; degree3 = \frac{\partial d3-1[\log 90°]}{\frac{1}{d(\alpha)}\int\frac{ne\rightarrow es\rightarrow os}{(x,y,z)}}\; d(\alpha)\left\{\frac{ne-207°}{anti\log\frac{PV}{pv}}\right\}$$

$$\overline{RH}\; degree4 \int\left[\frac{1(ne,es,os)}{d\left(\frac{1}{\alpha}\right)}\right]\frac{-90°}{d(\alpha)} + \frac{\log(PV)-lm\,(pv)}{no-270°}$$

The rescaled range would be the perfect sphere:

We determine the finite walk:

$$\propto_g = \frac{\beta(X),\beta_1(X^{n+1})}{\beta_2(X^{n-1})}\int_{\lim\beta_2\,(n-1)^{\lambda}}^{\lim\beta_1\,(n+1)^{\lambda}}\left[\frac{(n+1)}{n-1}\right]^{1/2} + \left\{\frac{1}{2}\right\}\frac{\beta_1+\beta_2+\beta_n}{\beta_n-\beta_2-\beta_1}\left[\frac{\propto_y}{\propto_{-g}}\right]^{1/2} + \frac{d}{dx}\ldots\ldots\ldots\ldots\ldots.\propto^{+}$$
(3)

We integrate the fractal recursion level for the infinite body:

$$\int\frac{\frac{ne}{-es}+\frac{os}{-\alpha}}{1} + \frac{90°-\alpha}{\frac{d}{x-1}} = \frac{\log(PV)-lm\,(pv)}{no-270°}$$

December 2021, Vol.5 No.9 35-40

$$= \int \frac{\frac{ne+\alpha}{-es+os}}{1} + \frac{\frac{90°\alpha}{x-1}}{\alpha} + \frac{270°}{\frac{\log(PV)}{lm\,(pv)}}$$

$$= \int \frac{\frac{-ne}{es}\left(\frac{\alpha}{os}\right)}{1} - \frac{\alpha^{x+1}}{\frac{90°}{dx}} - \frac{anti\log PV - pv}{270°}$$

$$= \int \frac{\frac{no}{es} - \frac{os}{-\alpha} - \frac{1}{x}}{\frac{\alpha^{x-1}}{d(x)}} - \frac{PV - pv}{anti\log(270°)}$$

$$= \int \frac{-\alpha - anti\log x}{\frac{ne}{es} + \frac{os}{-\alpha}} + \frac{d\left(PV\frac{-\partial}{pv}\right)}{\partial(270°)}\left[\frac{1}{x}\right]$$

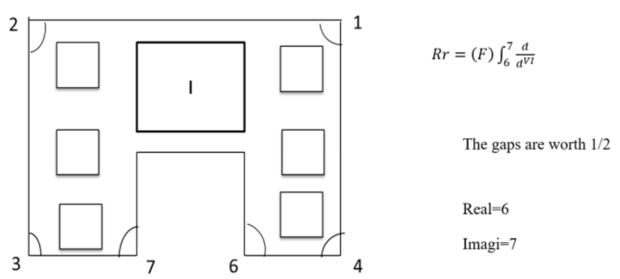
$$= \left[\frac{\frac{1}{x}}{\frac{\frac{ne}{es}}{\frac{os}{-\alpha}}}\right]\left[\frac{\frac{PV}{pv}}{\frac{anti\log}{\frac{270°}{x}}}\right] = \left[\frac{\frac{anti\log}{ne}}{\frac{\frac{es}{os}}{anti\log}} \frac{\left[\frac{1}{-x}\right]}{270°+x}\right]$$

$$= \frac{\log ne}{\text{lm } es - \text{lm }(es)} - \frac{270°}{\frac{1}{x}}$$

$$= \frac{\text{anti}\log ne - es + os}{270° - x}$$

$$= \frac{ne - es + os}{270°} = \alpha$$

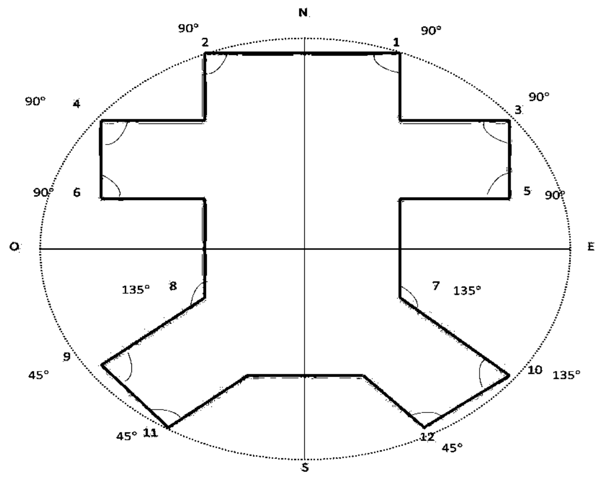
And we return to R3 with limits in Ln-4, represented as follows:



We determine the Infinite Walk:

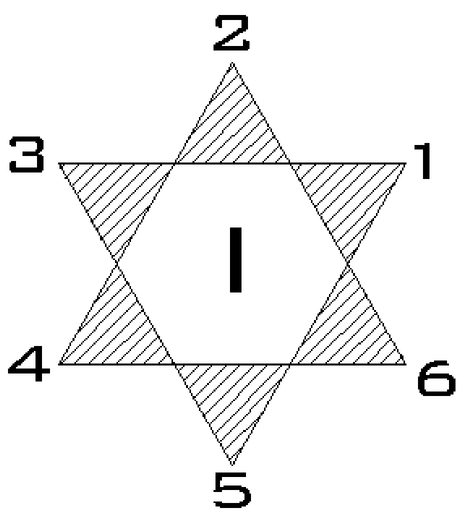
$$\propto_{-g} = \frac{n_1(\lambda),n_1(\lambda^{n+1-\propto})}{n_2(\lambda^{n-1+\alpha})} \int_{\lim n_2(n-1)^{\lambda}}^{\lim n_1(n+1)^{\lambda-1}} \left[\frac{n+1}{\lambda}\ \frac{\lambda}{n-1}\right] + \frac{1/2}{1/\lambda} = \frac{\beta_{0\ldots\beta_n}}{\propto_g + \propto_g} + \frac{d}{dx} \ldots.\propto^{-} \quad (4)$$

We represent the complete fractal structure:



We dimension your fractal network:

$$\int \left[\frac{\rightarrow 90°}{\lambda - E(N)}\right] + \left[\frac{2 \rightarrow 90°}{\lambda - N(0)}\right] + \left[\frac{3 \rightarrow 90°}{\lambda - E(N)}\right] + \left[\frac{4 \rightarrow 90°}{\lambda - N(0)}\right] + \left[\frac{5 \rightarrow 90°}{\lambda - E(N)}\right] + \left[\frac{6 \rightarrow 90°}{\lambda - N(0)}\right] + \left[\frac{7 \rightarrow 135°}{\lambda - S(E)}\right] + \left[\frac{8 \rightarrow 135°}{\lambda - 0(S)}\right] + \left[\frac{9 \rightarrow 90°}{\lambda - 0(S)}\right] + \left[\frac{10 \rightarrow 45°}{\lambda - S(E)}\right] + \left[\frac{11 \rightarrow 45°}{\lambda - 0(S)}\right] + \left[\frac{12 \rightarrow 45°}{\lambda - S(E)}\right] + \frac{d}{d\propto} \quad (5)$$



We obtain the Chaotic fractal - which contains an imaginary part:

R=6

I= 1

*HB with Brownian$\frac{1}{2}$

$Rr = (f)\int_1^6 \frac{d}{d}$

Fractional fractal network:

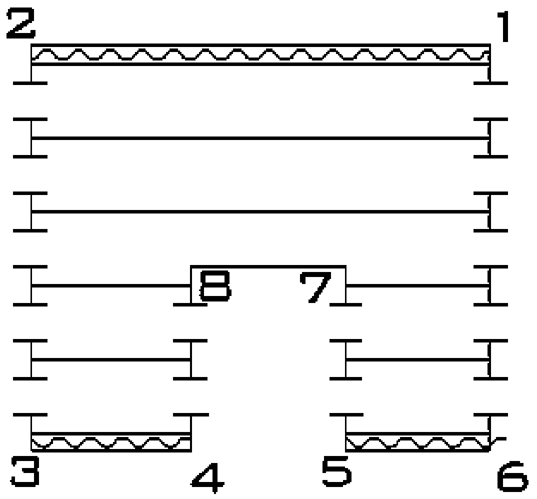
$$\boldsymbol{f} = \left\{\frac{1 \leftrightarrow (90°)^{IV}}{\lambda - \left[\frac{E^{\text{III}}}{6}\right]} + \frac{7 \leftrightarrow (135°)^{II}}{\left[\frac{E}{0(2)}\right]} + \frac{9 \leftrightarrow (45°)^{IV}}{\lambda - \left[\frac{0^{\text{II}}}{E^{\text{II}}(4)}\right]}\right\} \frac{\boldsymbol{d}}{\boldsymbol{d}\propto} \quad (6)$$

ISSN-On line: 2531-2979

December 2021, Vol.5 No.9 35-40

And we obtain the dichotomous ranges from 1 to 0 in their real part:
R=8

I= 3 * Imaginary are all the unbroken lines



* It is fractal.

$$Rr = (f)\int_{3}^{8} \frac{d}{d''}$$

We implement the Fourier scaling with Fresnel scheme for ln-4:

$$f = \frac{\frac{\to 1}{d(90°)}\frac{\to 7}{d(135°)}\frac{\to 9}{d(45°)}}{{}^{1}/_{\lambda}} \left[\frac{E^{IV} + 0^{II}}{6\,[0(2)][E^{II}(4)]}\right] + \frac{d}{d\propto}$$

$$f = \frac{\frac{\to 1}{d\,(1)}\frac{\to 7}{d(1)}\frac{\to 9}{d(1)}}{{}^{1}/_{\lambda}} \left[\frac{E^{IV} - E^{II}(4) + 0^{II}}{12\,(0)}\right] + \frac{d}{d\propto}$$

$$f = \frac{\frac{1\to 7\to 9}{d'''(3)}}{{}^{1}/_{\lambda}} \left[\frac{4(E^{II} + 0^{II})}{\frac{12}{-0}}\right] + \frac{d}{d\propto}$$

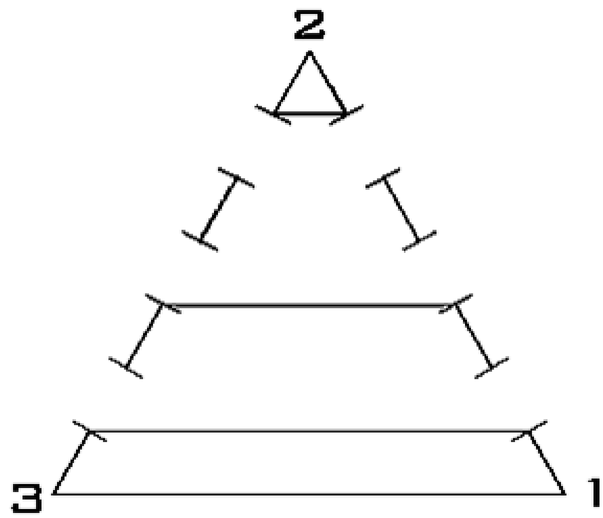
$$f = \frac{1\to 7\to 9}{\frac{3}{-d'''}} \left[\frac{4(E\to 0)^{IV}}{\frac{\frac{12}{-0}}{\frac{1}{\lambda}}}\right] + \frac{d}{d\alpha}$$

$$f = \frac{\left[\left(\frac{1\to 7\to 9}{3(4)+\left[\frac{E\to 0}{-0}\right]}\right)\right]\frac{\frac{IV}{1}}{\lambda}.|d'''|}{-12} + \frac{d}{d\alpha}$$

$$f = \frac{1\to 7\to 9}{\frac{(12)+E}{-12}} \frac{\frac{IV}{1}(d''')}{\lambda} + \frac{d}{d\alpha}$$

$$f = \frac{1+1+1}{12+E+12}\left(\frac{\frac{IV}{1}}{\lambda}\right)\frac{(3)}{d} + \frac{d}{d\alpha}$$

We get the Complex Fractal that has an imaginary part with interaction.



R= 3

I=2

* It is fractal

$$Rr = (f)\int_{2}^{3} \frac{d}{d''}$$

Identify the Infinitesimal Indiscriminant.

$$C_1 \to C_{18} = \int_{\frac{1}{\alpha}}^{2} {}^{1}/_{2} + \int_{\frac{1}{\alpha}}^{4} {}^{1}/_{2} + \int_{\frac{\delta d}{d\alpha}}^{1} {}^{1}/_{2} + \int_{\frac{1}{\alpha}}^{4} {}^{1}/_{2} + \int_{\frac{\delta d}{d\alpha}}^{1} {}^{1}/_{2} + \int_{\frac{1}{\alpha}}^{2} {}^{1}/_{2} + \int_{\frac{1}{\alpha}}^{4} {}^{1}/_{2} + \int_{\frac{\delta d}{d\alpha}}^{1} {}^{1}/_{2} + \int_{\frac{1}{\alpha}}^{4} {}^{1}/_{2} + \int_{\frac{\delta d}{d\alpha}}^{1} {}^{1}/_{2} +$$

$$\int_{\frac{1}{\alpha}}^{2} {}^{1}/_{2} + \int_{\frac{1}{\alpha}}^{4} {}^{1}/_{2} + \int_{\frac{\delta d}{d\alpha}}^{1} {}^{1}/_{2} + \int_{\frac{1}{\alpha}}^{4} {}^{1}/_{2} + \int_{\frac{\delta d}{d\alpha}}^{1} {}^{1}/_{2} + \int_{\frac{1}{\alpha}}^{2} {}^{1}/_{2} + \int_{\frac{1}{\alpha}}^{4} {}^{1}/_{2} + \int_{\frac{\delta d}{d\alpha}}^{1} {}^{1}/_{2} + \xi^{2} \quad (7)$$

We use the Dichotomous Variables - isolated each in its fractal iteration:

$$\log 1 + \ln 2/_{0.618} = 1.12$$

$$\log 2 + \ln 4/_{0.618} = 2.73$$

$$\log 3 + \ln 1/_{0.618} = 0.77$$

$$\log 4 + \ln 4/_{0.618} = 3.22$$

$$\log 5 + \ln 1/_{0.618} = 1.13$$

$$\log 6 + \ln 2/_{0.618} = 2.38$$

$$\log 7 + \ln 4/_{0.618} = 3.61$$

$$\log 8 + \ln 1/_{0.618} = 1.46$$

ISSN-On line: 2531-2979

$\log 9 + \ln 4/_{0.618} = 3.79$

$\log 10 + \ln 1/_{0.618} = 1.62$

$\log 11 + \ln 2/_{0.618} = 2.81$

$\log 12 + \ln 4/_{0.618} = 3.99$

$\sum$ de dichotomous var. = 45.77 Real

Rank = number of var.

$\frac{\Sigma}{rango} = \frac{45{,}77}{18} = 2.54$ Imaginary

Thus, a fractal structure satisfies one or more of the following properties:

(i) It possesses detail at all scales of observation of measurable risk at 2.4%, it possesses some kind of self-similarity, possibly statistically acceptable at 45%, its fractal structure is larger than its topological dimension and its algorithm serving to describe a fractal structure is very simple, and recursive in character.

Conclusions

In an attempt to integrate the aspects that are most relevant in a large number of definitions, the following definition is proposed: Fractals are shapes (either found in nature, or mathematically created, or derived from the graphical characterisation of the behaviour of a system), which possess an irregularity, expressed in a non-integer dimensionality, which is maintained and is characteristic at different scales of analysis, thus fulfilling one of their most remarkable qualities, self-affinity, which means that the part is similar to the whole.

Now that we have a definition with which we can identify a fractal object, we can analyse its fundamental characteristic, namely self-similarity. A structure is said to be self-similar if it can be arbitrarily cut into small pieces, each of which is a small replica of the whole structure.

Strictly speaking, the concept of self-similarity applies only to mathematical fractals, while in natural or physical fractals (those found in nature such as a fern leaf, a bronchial arborisation, blood capillaries, etc.), the concept of self-similarity applies.) the concept of self-affinity applies, since their fractality is only statistical and they possess, consequently, an anisotropic scaling (which does not have the same properties in all dimensions of analysis), which does not allow an amplified part of a figure to maintain exactly the characteristics of the figure as a whole.

It is interesting to note that the irregularity of fractal objects becomes a particular characteristic of the object and accounts for the similarity of its parts to the whole, regardless of the scale of analysis used.

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