Communication with Nature based on a Combined Multiplicative/ Additive Encryption Model. Expanding on the Concept of Fractal

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"No shape is impossible to be submitted,
but no one knows exactly the form
which leads to victory"
Sun Bin

CONTENT

A GENERAL MODEL TO ESTABLISH COMMUNICATION WITH NATURE

The fractals could represent only a small fraction of this communication and they may be only the top of the iceberg in the communication with Nature.
In order to identify and generate a model of communication with Nature, in the sense described above, one could proceed as follows:
Let us consider:

1) a set of n times differentiable functions with (a) elements, which could be, for example, (a) different n grade or higher polynomial functions, or (a) exponential or logarithmic functions;
2) a set of n times integrable functions with (b) elements, which could be, for example, (b) different grade or polynomial functions, or (b) exponential or logarithmic functions;
3) a number of (c) sets of inversable functions to be used for compositions;
4) a number of (d) mixed sets of functions generated according to the above rules.

The new original concept of CSN Matrix is defined in this paper as follows: it is a matrix whose line cells contain compositions of certain functions or differentials or integrals of certain functions, as it will be shown and explained shortly. This CSN Matrix has a number of n columns and a number of lines equal to the number m, as explained below, and it is the main tool the communication model generated in this paper is based upon.
Let us consider a chosen number n, a large number corresponding to the compositions, differentials or integrals performed on the functions in the cells of the CSN Matrix, which is also the number of columns of this communication matrix. Let us consider the number m calculated from a, b, c, d above as: m = a + b + c + d, a large number corresponding to the number of rows of the communication functions matrix.
Then the first (a) lines in the CSN Matrix are generated by successive differentiation of a number of (a) n times differentiable functions, such as considered above. The elements of line j in the CSN Matrix ($1 \le j \le a$) will then be generated in the following way:

$$T_{j,i+1}(x) = T_{j,i}{}'(x) \quad (3)$$

The next (b) lines in the CSN Matrix are generated by successive integration of a (b) n times integrable functions, such as considered above. The elements of line j in the CSN Matrix ($a < j \le a+b$) will then be generated in the following way:

$$T_{j,i+1} = \int T_{ji}(x)dx \quad (4)$$

The next (c) lines in the CSN Matrix are generated by successive composition of a (c) inversable functions, such as considered above. The elements of line j in the CSN Matrix ($a+b < j \le a+b+c$) will then be generated in the following way:

$$T_{j,i+1} = T_{i+1}(T_{j,i}(x)) \quad (5)$$

The next (d) lines in the CSN Matrix are generated by successively mixing the rules presented, such as considered above. The elements of line j in the CSN Matrix ($a+b+c < j \le m$) will then be generated by mixing those above rules (3), (4) and (5) for generating elements in the CSN Matrix.
Depending on a certain input and a chosen encryption key, one can then calculate the corresponding output.

A PARTICULAR CASE OF THE MODEL TO COMMUNICATE WITH NATURE

Let us now consider a particular case of communication with nature, by using some specific chosen functions in the cells of the CSN Matrix and a certain key to encode this communication. For this particular case, a (4 x 4) matrix with the cell functions and the differential and integral transformations bellow, and with an encryption key which assigns a certain transformation depending on the value of the input x considered, has been chosen:

1) Let us consider the following 4 function elements:

$$T_1 = 4x^4 + 3x^3 + 2x^2 + x \quad (6)$$

which is a polynomial function, which is also 4 times differentiable;

$$T_2 = 10^x \quad (7)$$

which is an exponential function, which is also n times differentiable but also n times integrable;

$$T_3 = x + 1 \quad (8)$$

which is a polynomial function, which is also n times integrable;

Using these chosen functions above, based on them, one can generate the elements of the first line in the CSN Matrix such as follows:

$$T_{11}(x) = T_1(x),\ T_{12}(x) = T_{11}(T_2(x),\ T_{13}(x) = T_{12}(T_3(x)),\ T_{14}(x) = T_{13}(T_4(x)) \quad (9)$$

The elements in the second line of CSN Matrix will be generated by successively differentiating the function $T_1(x)$, such as follows:

$$T_{21}(x) = T_1(x),\ T_{22}(x) = T_1'(x),\ T_{23} = T_1''(x),\ T_{24}(x) = T_1'''(x)) \quad (10)$$

The elements in the third line of CSN Matrix will be generated by successively integrating the function $T_3(x)$, such as follows:

$$T_{31}(x) = T_3(x),\ T_{32}(x) = \int T_{31}(x)dx,\ T_{33}(x) = \int T_{32}(x)dx,\ T_{34}(x) = \int T_{33}(x)dx \quad (11)$$

The elements in the fourth line of CSN Matrix will be generated by mixing the rules used in the generation of the elements of the first three lines, for example, such as follows:

$$T_{41}(x) = T_4(x),\ T_{42}(x) = \int T_{41}(x)dx,\ T_{43}(x) = T_1(T_{42}(x)),\ T_{44}(x) = T_{43}'(x) \quad (12)$$

One can choose a certain (4 x 4) CSN Matrix, out of the total number of $(4!)^{4!}$ possible matrices and a certain encryption key and then depending on these, an output is obtained for each chosen input x.
The actual implementation of this particular model is presented in the paper.

CONCLUSIONS

This paper defines and constructs a communication model with Nature, based on a new original concept introduced, namely the CSN Matrix. An algorithm which implements this communication model is generated using either Matlab or Octave software. The main idea of this paper is that unidentified and still unknown rules of Nature may actually be undiscovered transformation rules. This communication model based on the CSN Matrix, defined in this paper, could also be used to find and grasp hidden rules of Nature, possibly also on the realm of quantum phenomena and processes, as already stated in this paper.
The TKey subroutine presented is based on the presented model of communication with nature by implementing the above defined CSN Matrix. This subroutine uses the vectorization of CSN Matrix, in order to generate output elements out of CSN Matrix and thus finds the response of Nature to a certain input.