Universal Evolution Model Based On Theory Of Natural Metric For Functions

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Abstract

In this research investigation, the author has presented a novel scheme of Universal Evolution Model.

Theory Of Natural Metric

One Step Evolution Scheme Of Any Element Of Any Higher Order Sequence Of Primes

Consider any element of any higher Order Sequence Of Primes [1], say

$$^{k}b_h = c_1.c_2.c_3.............c_{k-1}.c_k$$

where $c_1, c_2, c_3, ..., c_{k-1}, c_k$ are Primes (Standard) of First Order.

We now consider any one of c_i, (among $i = 1$ to k) and evolve it by One Step. By One Step Evolution of c_i, we mean if c_i is the g_i^{th} Prime Metric Element of the First Order Sequence Of Primes, i.e., the Standard Primes, then, the $(g_i + 1)^{th}$ Prime Metric Element of this First Order Sequence Of Primes is the One Step Evolved Prime of c_i. Therefore, for k values of c_i, we have k values of b. However, only those cases of Evolution must be considered wherein $^{1}c_{i_{(g_{c_i}+1)}} \neq c_j$ for $j = \{\{1 \; to \; k\} - \{i\}\}$. Here, the notation $^{1}c_{i_{(g_{c_i}+1)}}$ indicates that it is One Step Evolved Prime of c_i. The 1 on the North Left indicates the Order of the Sequence Of Primes to which it belongs and $(g_{c_i} + 1)$ indicates the location number of this element $^{1}c_{i_{(g_{c_i}+1)}}$ along the Prime Metric Basis of Standard Primes. Let us say, we have now l values of b after ruling out such cases of aforementioned kind. We now pick the lowest number of this Set and call this as $^{k}b_{(h+1)}$, with notation being explicit. We call this $^{k}b_{(h+1)}$ as one step Evolved Prime of $^{k}b_h$. Also, one can note that for a set upper limit U, we can find the entire list of k^{th} Order Sequence Of Primes (upto say, U), using [1]. Using this list as well, we can find $^{k}b_{(h+1)}$. A seasoned reader of author's literature can now also infer the One Step Devolution Scheme of Any Higher Order Sequence Of Primes.

One Step Evolution Of Any Given Positive Integer

Firstly, we consider any Positive Integer s, which we know can be written as $s = (p_1)^{a_1}(p_2)^{a_2}(p_3)^{a_3}.........(p_{n-1})^{a_{n-1}}(p_n)^{a_n}$

where $p_i,\ i=1\ to\ n$ are positive integers.

We now re-write s as

$s=q(r_1.r_2.r_3.......r_{m-1}.r_m)$ where $r_i,\ i=1\ to\ m$ are all distinct Primes of First Order and q only has Prime Factors (maybe even repeating) which must be in r_i, or rather the repeating or Non-Repeating Prime Factors of q are the Subset of the Set $\{r_i\}_{i=1\,to\,m}$. We can therefore now write s as

$$s=\overbrace{(r_1.r_2.r_3.......r_{m-1}.r_m)+(r_1.r_2.r_3.......r_{m-1}.r_m)+........+(r_1.r_2.r_3.......r_{m-1}.r_m)}^{q\ times}$$

Now, since we know how to evolve $r_1.r_2.r_3.......r_{m-1}.r_m$, and as $s=q(r_1.r_2.r_3.......r_{m-1}.r_m)$, we can find one step evolved s by first naming $(r_1.r_2.r_3.......r_{m-1}.r_m)$ as ${}^m t_l$, i.e., ${}^m t_l=(r_1.r_2.r_3.......r_{m-1}.r_m)$ and writing one step evolved s as $s=q({}^m t_l)$. A seasoned reader of author's literature can now also infer the One Step Devolution Scheme of any given Positive Integer.

Example:

Considering the number 752

$$752=2\times 376$$

$$=2^4\times 47$$

$$=2^3\times(2\times 47)$$

$$=8\times(2\times 47)$$

$$=\overbrace{(2\times 47)+(2\times 47)+........+(2\times 47)}^{8\ times}$$

One Step Evolution of (2×47)

Cases:

1. $(3 \times 47) = 141$
2. $(2 \times 53) = 106$

Since, 106 is the smallest among all the cases, we say that $(2 \times 53) = 106$ is the One Step Evolved Element of (2×47).

Hence, 752 one step evolved is $8 \times (2 \times 53) = 8 \times 106 = 848$

Hence, the next term of 752 is 848 along the Natural Metric of 752.

One Step Devolution of (2×47)

Cases:

1. $(2 \times 43) = 86$

Therefore, we say that $(2 \times 43) = 86$ is the one step devolved element of (2×47).

Hence, 752 one step devolved is $8 \times (2 \times 43) = 8 \times 86 = 688$

Hence, the previous term of 752is 688 along the Natural Metric of 752. Therefore, now 688, 752 and 848 are along the Natural Metric of 688.

Evolution Of A Set

For a Set S whose elements belong to the Set of positive integers, i.e, $S = \{d_1, d_2, d_3, ..., d_{n-1}, d_n\}$, One Step Evolution $E^1\{S\}$ is considered as described in the following lines:

1. Firstly, One Step Evolution happens in any one term only. Therefore, we note all these cases and arrange these cases of the One Step Evolved Set(s) in ascending order wherein the ascending order is with respect to the sum of the elements of the thusly evolved cases of the Set.
2. Secondly, One Step Evolution happens in any two terms only. Therefore, we note all these cases and arrange these cases of the One Step Evolved

Set(s) in ascending order wherein the ascending order is with respect to the sum of the elements of the thusly evolved Set.

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3. We keep considering One Step Evolution similarly till finally One Step Evolution happens each in all the terms. We now arrange all these results of all these cases in ascending order. Now, $E^1\{S\}$can be given by that particular case of One Step Evolution of the Elements among all the cases of the Set which gives a minimum possible climb for S with regards the sum of the elements of the thusly evolved Set.

Evolution Of A Function

The One Step Evolution of the Product of Two Positive Integers can be taken as the One Step Evolution of the Value of the Product.

The One Step Evolution of the Sum of Two Positive Integers can be taken as the One Step Evolution of the Value of the Sum.

The One Step Evolution of the Positive Difference of Two Positive Integers can be taken as the One Step Evolution of the Value of the Positive Difference.

The One Step Evolution of the Ratio of Two Positive Integers is given by those operations of One Step Evolution of its Numerator and Denominator such that the climb in the value of the ratio is minimum possible, as detailed already.

Fractional Order Evolution Of Any Positive Integer

Case 1: $E^{\frac{e}{f}}\{d_i\}$ denotes that the Element d_i is Evolved $\frac{e}{f}$ times. Here, $e > f$. Note that we can write $\frac{e}{f}$ as $\frac{e}{f} = t + \frac{j}{f}$ or rather $t\frac{j}{f}$.

Therefore, $E^{\frac{e}{f}}\{d_i\} = E^{t\frac{j}{f}}\{d_i\}$ can be written as

$$E^{t\frac{j}{f}}\{d_i\} = E^{t}\{d_i\} + E^{\frac{j}{f}}\{d_i\}$$

$$E^{t\frac{j}{f}}\{d_i\} = E^{t}\{d_i\} + \frac{j}{f}\left\{E^{(t+1)}\{d_i\} - E^{t}\{d_i\}\right\}$$

Case 2: $E^{\frac{e}{f}}\{d_i\}$ denotes that the Element d_i is Evolved $\frac{e}{f}$ times. Here, $e < f$.

Therefore, $E^{\frac{e}{f}}\{d_i\}$ can be written as

$$E^{\frac{e}{f}}\{d_i\} = E^{0}\{d_i\} + \frac{e}{f}\left\{E^{1}\{d_i\} - E^{0}\{d_i\}\right\}$$

$$E^{\frac{e}{f}}\{d_i\} = d_i + \frac{e}{f}\left\{E^{1}\{d_i\} - d_i\right\}$$

Fractional Order Evolution Of Any Positive Integer (Hyper-Refined Version)

Let d_i be some Prime Metric Basis Element belonging to the Sequence of Primes of Order G.

Case 1: $E^{\frac{e}{f}}\{d_i\}$ denotes that the Element d_i is Evolved $\frac{e}{f}$ times. Here, $e > f$. Note that we can write $\frac{e}{f}$ as $\frac{e}{f} = t + \frac{j}{f}$ or rather $t\frac{j}{f}$.

Therefore, $E^{\frac{e}{f}}\{d_i\} = E^{t\frac{j}{f}}\{d_i\}$ can be written as

$$E^{t\frac{j}{f}}\{d_i\} = E^{t}\{d_i\} + E^{\frac{j}{f}}\{d_i\}$$

Here, we consider the ratio

$$\delta = \frac{j^{th}\ \Pr ime\,Metric\,Basis\,Element\,Of\,G^{th}\,Order\,Sequence\,Of\,\Pr imes}{f^{th}\ \Pr ime\,Metric\,Basis\,Element\,Of\,G^{th}\,Order\,Sequence\,Of\,\Pr imes}$$

$$E^{t\frac{j}{f}}\{d_i\} = E^{t}\{d_i\} + \delta\left\{E^{(t+1)}\{d_i\} - E^{t}\{d_i\}\right\}$$

Case 2: $E^{\frac{e}{f}}\{d_i\}$ denotes that the Element d_i is Evolved $\frac{e}{f}$ times. Here, $e < f$. Here, we consider the ratio

$$\mu = \frac{e^{th}\ \Pr ime\,Metric\,Basis\,Element\,Of\,G^{th}\,Order\,Sequence\,Of\,\Pr imes}{f^{th}\ \Pr ime\,Metric\,Basis\,Element\,Of\,G^{th}\,Order\,Sequence\,Of\,\Pr imes}$$

Therefore, $E^{\frac{e}{f}}\{d_i\}$ can be written as

$$E^{\frac{e}{f}}\{d_i\} = E^0\{d_i\} + \mu\{E^1\{d_i\} - E^0\{d_i\}\}$$

$$E^{\frac{e}{f}}\{d_i\} = d_i + \frac{e}{f}\{E^1\{d_i\} - d_i\}$$

The Next Term Of Any Sequence Generating Algorithm

Given the first n terms of a sequence, say

$$R = \{b_1, b_2, b_3, \ldots\ldots\ldots, b_{n-1}, b_n\}$$

We find the differences between b_{i+1} and b_i for $i = 1$ to $n-1$. Let these be represented by $\alpha_{11}, \alpha_{12}, \alpha_{13}, \ldots\ldots., \alpha_{1(n-2)}, \alpha_{1(n-1)}$.

We again find the differences between the newly found differences $\alpha_{11}, \alpha_{12}, \alpha_{13}, \ldots\ldots., \alpha_{1(n-2)}, \alpha_{1(n-1)}$ and name them $\alpha_{21}, \alpha_{22}, \alpha_{23}, \ldots\ldots., \alpha_{2(n-2)}$ and so on so forth till we find the last difference down the inverted pyramid as shown below:

$$\left\{\underbrace{b_2 - b_1}_{\alpha_{11}}, \underbrace{b_3 \to b_2}_{\alpha_{12}}, \quad \ldots\ldots\ldots, \quad \underbrace{b_n \to b_{n-1}}_{\alpha_{1(n-1)}}\right\}$$

$$\left\{\underbrace{\alpha_{12} - \alpha_{11}}_{\alpha_{21}}, \quad \underbrace{\alpha_{13} - \alpha_{12}}_{\alpha_{22}}, \quad \ldots\ldots, \quad \underbrace{\alpha_{1(n-1)} - \alpha_{1(n-2)}}_{\alpha_{2(n-2)}}\right\}$$

$$\left\{ \underbrace{\alpha_{22}-\alpha_{21}}_{\alpha_{31}}, \underbrace{\alpha_{23}-\alpha_{22}}_{\alpha_{32}}, \ldots\ldots, \underbrace{\alpha_{2(n-2)}-\alpha_{2(n-3)}}_{\alpha_{3(n-3)}} \right\}$$

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$$\left\{ \underbrace{\alpha_{(n-3)2}-\alpha_{(n-3)1}}_{\alpha_{(n-2)1}}, \underbrace{\alpha_{(n-3)3}-\alpha_{(n-3)2}}_{\alpha_{(n-2)2}} \right\}$$

$$\left\{ \underbrace{\alpha_{(n-2)2}-\alpha_{(n-2)1}}_{\alpha_{(n-1)1}} \right\}$$

We now consider One Step Evolution of $\alpha_{(n-1)1}$, i.e., $E^1\{\alpha_{(n-1)1}\}$ and using $E^1\{\alpha_{(n-1)1}\}$ and $\alpha_{(n-2)2}$, we find the next term of the Sequence $\{\alpha_{(n-2)1} \to \alpha_{(n-2)2}\}$(as detailed in the following lines). Let this term be denoted by $N\{\alpha_{(n-2)2}\}$. That is,

$$E^1\{\alpha_{(n-1)1}\} = \{N\{\alpha_{(n-2)2}\}\} - \{\alpha_{(n-2)2}\}$$

Now, we find the next term of the Sequence

$\{\alpha_{(n-3)1} \to \alpha_{(n-3)2} \to \alpha_{(n-3)3}\}$ using the relation

$$N\{\alpha_{(n-3)3}\} - \alpha_{(n-3)3} = N\{\alpha_{(n-2)2}\}$$

In a similar fashion, we find $N\{\alpha_{(n-4)4}\}, \ldots\ldots\ldots\ldots\ldots, N\{\alpha_{2(n-2)}\}$, $N\{\alpha_{1(n-1)}\}$ and finally $N\{b_n\}$. This $N\{b_n\}$ is the next term of b_n.

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