

Scheme For Finding The Next Term Of A Sequence Based On Evolution {File Closing Version 2}. ISSN 1751-3030

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Abstract

In this research investigation, the author has detailed a novel method of finding the next term of a sequence based on Evolution.

Theory

Given any Sequence of the kind,

$$S = \{y_1, y_2, y_3, \dots, y_{n-1}, y_n\}$$

We first write them as

$$S = \left\{ \begin{array}{l} y_1 = {}^N P_{j_1 + \delta_1}, y_2 = {}^N P_{j_2 + \delta_2}, y_3 = {}^N P_{j_3 + \delta_3}, \dots, y_{n-1} = {}^N P_{j_{n-1} + \delta_{n-1}}, \\ y_n = {}^N P_{j_n + \delta_n} \end{array} \right\}$$

where in ${}^N P_{j_1 + \delta_1}$, N is the Order Number of the Higher Order Sequence Of Primes in which the number y_1 is slated,

$(j_1 + \delta_1)$ is the position number of the Prime Metric Basis Element. Here, j_i 's are Positive Integers and $0 < \delta_i < 1$.

For Example,

7 which is the 4th Prime Metric Basis Element of the Standard Primes, the Order [1] of which can be taken to 1. Therefore 7 can be written as 1P_4 . In a similar fashion, 8 can be written as

${}^1P_{4+\left(\frac{8-7}{11-7}\right)}$ where 7 is the nearest previous prime number of 8 and 11 is the next nearest prime number of 8. Here, in the

notation ${}^1P_{4+\left(\frac{8-7}{11-7}\right)}$, we can consider $\left(\frac{8-7}{11-7}\right)$ as the δ , the 4 as

the j and the 1 as the N . We can also denote any number in a similar fashion using Higher Order Primes as well. [1] i.e., $N > 1$.

Method of calculating the Decimal (Pseudo) Prime corresponding to $(j + \delta)$ in ${}^N P_{(j+\delta)}$.

If δ_i is equal to $\left(\frac{a_1 a_2 a_3 \dots a_{k-1} a_k}{10^k}\right)$ where $0 < a_l < 10$ for $l = 1$ to k , we write

$${}^N P_{(j_i+\delta_i)} = {}^N P_{j_i} + \left\{ \frac{\left(a_1 a_2 a_3 \dots a_{k-1} a_k \right)^{th} \text{ PrimeNumber of } N^{th} \text{ Order}}{\left(10^k \right)^{th} \text{ PrimeNumber of } N^{th} \text{ Order}} \right\} \left\{ {}^N P_{j_{i+1}} - {}^N P_{j_i} \right\}$$

For Simplicity, we can take $N = 1$.

For our representational simplicity, we label our $S = \{y_1, y_2, y_3, \dots, y_{n-1}, y_n\}$ as

$S = \{ {}_1 y_1, {}_1 y_2, {}_1 y_3, \dots, {}_1 y_{n-1}, {}_1 y_n \}$ where the left south subscript 1 indicates that these numbers are at the level 1 (Base) of the triangle we are going to build.

We now compute the Evolution Orders

$E^{(j+1)y_i} \left({}_j y_i \right) = {}_j y_{(i+1)}$ where $(j+1) y_i$ is the Evolution Order.

By Evolution Order, we mean the difference between the Prime Basis Position Number of ${}_j y_{(i+1)}$ (when slated thusly) and the Prime Basis Position Number of ${}_j y_i$ given that we are considering this in $N = 1$. This means that ${}_j y_i$

needs to be evolved $(j+1) y_i$ times to get ${}_j y_{(i+1)}$. Please see [2] for Evolution method. We repeat this process till we get

$E^{(n)y_i} \left({}_{(n-1)}y_i \right) = {}_{(n-1)}y_{(i+1)}$. We now evolve ${}_{(n-1)}y_{(i+1)}$ by one step using [2] and get $E^1 \left({}_{(n-1)}y_{(i+1)} \right)$. Note that $E^{\{E^1({}_{(n-1)}y_{(i+1)})\}} \left({}_{(n-2)}y_i \right) = {}_{(n-2)}y_{(i+1)}$.

We repeat this procedure, downwards, repeatedly to find $E^{\{(2)y_n\}} \left({}_{(1)}y_n \right) = {}_{(1)}y_{(n+1)}$.

We illustrate this with an Example of three terms.

Considering

$S = \{y_1, y_2, y_3\}$ which we write as

$S = \{{}_1y_1, {}_1y_2, {}_1y_3\}$ for future representational simplicity.

$E^{2y_1} \left({}_1y_1 \right) = {}_1y_2$, $E^{2y_2} \left({}_1y_2 \right) = {}_1y_3$. Now, we write

$E^{3y_1} \left({}_2y_1 \right) = {}_2y_2$. We now evolve ${}_3y_1$ by one step using [2], i.e., perform $E^1 \left({}_3y_1 \right)$. And now, we write $E^{\{E^1({}_3y_1)\}} \left({}_2y_2 \right) = {}_2y_3$. Finally, we write, $E^{(2)y_3} \left({}_1y_3 \right) = {}_1y_4 = y_4$ which is the next term of the sequence $S = \{y_1, y_2, y_3\}$. This method can be used advantageously for forecasting.

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