Universal Forecasting Scheme For Any Time Series Sequence Using The Ananda-Damayanthi-Radha-Rohith Rishi Sequence Trends Of Any Set Of Positive Real Numbers

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ABSTRACT

In this research investigation, the author has detailed the Theory Of Universal Forecasting Scheme For Any Time Series Sequence Using The Ananda-Damayanthi-Radha-Rohith Rishi Sequence Trends Of Any Set Of Positive Real Numbers.

Key Words: Functional Analysis

INTRODUCTION

The aforementioned Sets which form the Prime Like Trends are of much importance in Functional Analysis as it allows us to decompose data into Trends with unique Natural Periodicity.

THEORY (AUTHOR'S MODEL OF THEORY OF HOLISTIC DECOMPOSITION OF ANY SET OF ANY NATURAL NUMBERS AS ONE OR MORE SETS EACH WITH SOME PERIODICTY OF THE NUMBER'S NON INTEGRAL PRIME BASIS POSITION NUMBER)

One Step Universal Evolution Of Any Real Positive Integer [1]

One can note that any Natural Number 's' can be written as

 $s = (p_1)^{a_1} \cdot (p_2)^{a_2} \cdot (p_3)^{a_3} \cdot \cdots \cdot (p_{z-1})^{a_{z-1}} \cdot (p_z)^{a_z} \text{ where } p_1$ $, p_2, p_3, \ldots, p_{z-1}, p_z \text{ are some Primes and } a_1, a_2, a_3, \ldots, a_{z-1}, a_z \text{ are some positive integers.}$

We can write it further as

$$S = \overbrace{(p_1)(p_1)...(p_1)}^{a_1 number of times} \underbrace{(p_2)(p_2)....(p_2)}_{a_{z-1} number of times} \underbrace{(p_3)(p_3)....(p_3)}_{a_{z-1} number of times} \underbrace{(p_2)(p_2)....(p_2)}_{a_z number of times} \underbrace{(p_2)(p_2)....(p_z)}_{a_z number of times}$$

We now consider One Step Evolution of any one p_1 or p_2 or p_3 or.....or p_{z-1} or p_z (among their $a_1, a_2, a_3, \ldots, a_{z-1}, a_z$ number of occurrences respectively such that the increase in s

is minimal. By One Step Evolution of p_j , we mean, if p_j is the j^{th} Prime number then we consider the $(j+1)^{th}$ Prime number as the One Step Evolved version of p_j . This will be illustrated by way of an Example.

Example:

$$s = 40,500 = (2)^2 \cdot (3)^4 \cdot (5)^3$$

which can be written as

$$s = 40,500 = (2 \cdot 2) \cdot (3 \cdot 3 \cdot 3)^4 \cdot (5 \cdot 5 \cdot 5)^3$$

Case 1: Now, considering One Step Evolution of 2 (of one among the two occurrences), we have

$$s = (3 \cdot 2) \cdot (3 \cdot 3 \cdot 3 \cdot 3)^4 \cdot (5 \cdot 5 \cdot 5)^3 = 60,750$$

Case 2: Now, considering One Step Evolution of 3 (of one among the two occurrences), we have

$$s = (2 \cdot 2) \cdot (5 \cdot 3 \cdot 3 \cdot 3)^4 \cdot (5 \cdot 5 \cdot 5)^3 = 67,500$$

Case 3: Now, considering One Step Evolution of 5 (of one among the two occurrences), we have

$$s = (2 \cdot 2) \cdot (5 \cdot 3 \cdot 3 \cdot 3)^4 \cdot (7 \cdot 5 \cdot 5)^3 = 56,700$$

Therefore, One Step Evolution of 40,500 is 56,700 as the aforementioned increase is Minimal in Case 3.

In this fashion, we can Evolve any given Positive Natural Number. We can note that any Positive

Real Number can be written as $\frac{c}{d}$ where c and

d are some Positive Natural Numbers. Therefore,

we can note that $E^1 \left\{ \frac{c}{d} \right\} = \frac{E^1(c)}{E^1(d)}$ where c and

d are some Positive Numbers and E^1 represents the One Step Evolution Operator.

Any Number's Non Integral Prime Basis Position Number

Considering any number say f, we can write its nearest primes on either side as p_k and p_{k+1} , where p_k is the k^{th} Prime and p_{k+1} is the $(k+1)^{th}$ Prime. We can then write $f = p_{N+\alpha}$ where N = k and $\alpha = \left(\frac{f - p_k}{p_{k+1} - p_k}\right)\left(\frac{p_{(f-p_k)}}{p_{(p_{k+1}-p_k)}}\right)$ where the notation is

explicit. Then, $(N + \alpha)$ is the Prime Basis Position Number of f

Method 1 Of Finding The Prime Like Trends Of A Given Set Of Positive Numbers

Say any Set S, is given all of whose elements belong to the Set of Natural Numbers. Let the Cardinality of the Set be n. Furthermore, these numbers are arranged in an ascending order.

We now write down each of its elements as sum of primes as detailed below:

Representation Of Any Natural Number As A Special Sum Of Primes

Note: Here, we consider the following analysis for two cases, namely,

- a) 1 is the First Prime and
- b) 2 is the First Prime. In the second case if the following representation finally gives delta equal to 1, we have two ways to go further
 - (i) we can write it as (3-2) or

(ii)write the sum using primes greater than or equal to 2 only. If it is not possible, we follow scheme a)

Note that since this theoretical research, the experimenter can choose the best option among these which gives the best results.

Firstly, we define Any Number's Non Integral Prime Basis Position Number

We can note that any natural number 'q' can always be written as

 $q = p_{\text{max}1} + \delta_{\text{I}}$ where $p_{\text{max}1}$ is the greatest Prime Number possible and which is less than q and

 $\delta_1 = p_{\text{max}2} + \delta_2$ where $p_{\text{max}2}$ is the greatest Prime Number possible and which is less than δ_1 and

 $\delta_2 = p_{\text{max}3} + \delta_3$ where $p_{\text{max}3}$ is the greatest Prime Number possible and which is less than δ_2 and so on so forth until $\delta_h = 0$ for some positive integer h.

Furthermore, from the given Set S, we write many more sets, namely S as First order Elements Set (of the Sum Expression of the Elements of the Set S as detailed already, which is the set of first terms of the aforementioned sum expression of each element of S), S Second Order Elements Set (of the Sum Expression of the Elements of the Set S as detailed already, which is the set of second terms of the aforementioned sum expression of each element of S), S Third Order elements Set (of the Sum Expression of the Elements of the Set S as detailed already, which is the set of third terms of the aforementioned sum expression of each element of S), etc., to exhaustion till ${}_{h}S$ (the h^{th} Order elements Set (of the Sum Expression of the Elements of the Set S as detailed already, which is the set of third terms of the aforementioned sum expression of each element of S). This notion of Order will be implicitly understood in *Example 2*.

Now, if we represent the elements of the First Order Element Set $_{1}S_{j}$ by $_{1}p_{j}$ then $_{1}S(1)=_{1}p_{j\min}$ and $_{1}S(1,n)=_{1}p_{j\max}$. Here, the index j represents the Prime Basis Position Number of the Prime p. For example, if 1 is considered as the first prime, then the Prime Basis Position Number of the Prime 2 is 2, of the Prime 3 is 3, of the Prime 5 is 4, of the Prime 7 is 5 and so on so forth.

We now create Subsets of First Order Element Set $_{1}S$ in a fashion such that $_{1}S_{r} = \{_{1}p_{j_{\min}, p_{l_{1}}}\}$

with
$$r_1 = 0,1,2,...,g$$
 and $l_1 = 0,1,2,...,\frac{\binom{n-1}{2}}{g_1}$ and $g_1 \le \binom{\frac{n-1}{2}}{g_1}$ for n odd

and $_{1}S_{r} = \{_{1}p_{j_{\min + r_{l_{1}}}}\}$ with $r_{1} = 0,1,2,....,g$ and $l_{1} = 0,1,2,....,\frac{\binom{n}{2}}{g_{1}}$ and $g_{1} \leq \binom{n}{2}$ for $_{1}n$ even.

A simple way to find these sets is detailed below using a method detailed below:

For the given set ₁S, we index the elements with their Prime Position Basis Numbers. Let this Set be

 $_{1}J$. We now do Cartesian cross product of $_{1}J$ with $_{1}J$, i.e., we find $_{1}J\times_{1}J$. Now, for these $_{1}n^{2}$ number of ordered pairs (u1,v1), we find the absolute value of the difference $\delta_{(u1,v1)}$ between them. We now separately collect all the u, v's for $\delta_{(u1,v1)}=1$,

$$\delta_{\scriptscriptstyle (u_1,v_1)} = 2$$
, $\delta_{\scriptscriptstyle (u_1,v_1)} = 3$,...., $\delta_{\scriptscriptstyle (u_1,v_1)} = \left(\frac{{}_{\scriptscriptstyle 1} n-1}{2}\right)$ if ${}_{\scriptscriptstyle 1} n$ is

odd or $\delta_{(n1,n1)} = \left(\frac{n}{2}\right)$ if n is even and call them as a set each. The thusly gotten sets are the desired sets.

Once, we get the locations (Prime Metric Basis Positions Numbers Of The Primes of the given Set $_{1}^{S}$) of the thusly Decomposed Sets of the given Set $_{1}^{S}$, we can now write the Decomposed Sets of Set $_{1}^{S}$ in terms of the Primes representing their Prime Basis Position Numbers.

We now conduct similar analysis for all the rest of the Order Element Sets and finally add the individual components to get the desired Trends as detailed in the following example.

Example 1: When the elements of S are all Primes.

$$S = \{3,5,7,13,29,31,53,61,67\}$$

Then

 $J = \{3,4,5,7,11,12,17,19.20\}$

Here, 1 is taken as the first Prime.

We now create a table of difference between u and v of the ordered pairs of J X J as shown

Table 1: Table of difference between u1 and v1 of the ordered pairs of $J \times J$

	3	4	5	7	11	12	17	19	20
3	0	1	2	4	8	9	14	16	17
4	1	0	1	3	7	8	13	15	16
5	2	1	0	2	6	7	12	14	15
7	4	3	2	0	4	5	10	12	13
11	8	7	6	4	0	1	6	8	9
12	9	8	7	5	1	0	5	7	8
17	14	13	12	10	6	5	0	2	3
19	16	15	14	12	8	7	2	0	1
20	17	16	15	13	9	8	3	1	0

Needless to mention, the Set with (u1,v1) difference equal to 1 is the Set J itself. We now find all the pairs with (u1,v1) difference = 2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17

Table 2: Table of distilled Non Unique Prime Trends

2	{3,5,7}
	{17,19}
3	{4,7}
	{17,20}
4	{3,7,11}
5	{7,12,17}
6	{5,11,17}
7	{4,11}
	{5,12,19}
8	{3,11,19}
	{4,12,20}
9	{3,12}
	{11,20}
10	{7,17}
11	None
12	{5,17}
	{7,19}
13	{7,20}
	{4,17}
14	{3,17}
	{5,19}
15	{4,19}
	{5,20}
16	{3,19}
	{4,20}
17	{3,20}

These Sets

{3,5,7} which is {3,7,13}

{17,19} which is {53,61}

{4,7} which is {5,13}

{17,20} which is {53,67}

{3,7,11} which is {3,13,29}

{7,12,17} which is {13,31,53}

{5,11,17} which is {7,29,53}

{4,11} which is {5,29}

{5,12,19} which is {7,31,61}

{3,11,19} which is {3,29,61}

{4,12,20} which is {5,31,67}

 $\{3,12\}$ which is $\{3,31\}$

{11,20} which is {29,67}

{7,17} which is {13,53}

{5,17} which is {7,53}

{7,19} which is {13,61}

{7,20} which is {13,67}

{4,17} which is {5,53}

 $\{3,17\}$ which is $\{3,53\}$

{5,19} which is {7,61}

{4,19} which is {5,61}

{5,20} which is {7,67}

 $\{3,19\}$ which is $\{3,61\}$

{4,20} which is {5,67}

{3,20} which is {3,67}

can be called the Sets gotten by Holistic Decomposition Of The Given Set S Of Primes As One Or More Sets Each With Some Periodicity Of The Prime Number's Basis Position Number.

This set of Sets can also be called as the *Primality Tree Set* of the given Set S.

Example 2: When the elements of S are not all Primes.

$$S = \{8,27,34\}$$

$$S = \{(7+1+0), (23+3+1), (31+3+0)\}$$

This gives

$$J = \{5,10,12\}$$

$$J = \{1,3,3\}$$

$$_{3}J = \{0,1,0\}$$

For facilitating the addition of Component Prime Trends later on, we can use *Left Sub Pre Tag* and *Right Sub Post Tag* to each of the sum Terms (of *J*) so that later on we know which ones to add on to before and after.

That is, for,

$$S = \{(7+1+0), (23+3+1), (31+3+0)\}$$

We write it as

$$S = \{ (7_1 + 7_0 + 10), (23_3 + 23_1 + 31), (31_3 + 31_0 + 30) \}$$

Then
$$_{1}S = \{(7_{1}), (23_{3}), (31_{3})\}$$

$$S = \{(1_0),(1_3,3_1),(1_3,3_0)\}$$

$$_{3}S = \{(0), (1), (30)\}$$

Doing the Prime Trends Analysis on $_{1}S = \{(7_{1}), (23_{3}), (31_{3})\}$

gives

 $\{10,12\} \Rightarrow \{23,31\}$

$$\{5,12\} \Rightarrow \{7,31\}$$

Similarly,

doing the Prime Trends Analysis on

$$S = \{(1_0), (1_3, 3_1), (1_3, 3_0)\}$$

gives

$$\{1,3\} \Rightarrow \{1,3\}$$

$$\{1,3\} \Rightarrow \{1,3\}$$

Similarly,

doing the Prime Trends Analysis on

$$_{3}S = \{(0),(1),(0)\}$$

gives

$$\{0,1\} \Longrightarrow \{0,1\}$$

Now, using the Primes Sum expression carefully for each term of S, we sum the appropriate terms of the Component Prime Trends, to get the Composite Trends.

This gives us,

$${27,34} = {(23+3+1),(31+3)}$$

$${8,27} = {(7+1), (23+3+1)}$$

$${8,34} = {(7+1),(31+3)}$$

which can be called as the Sets gotten by Holistic Decomposition Of The Given Set Of Natural Numbers As One Or More Sets Each With Some Periodicity Of The Number's Prime Basis Position Number.

This set of Sets can also be called as the *Primality Tree Set* of the Set S.

Method 1 Of Finding The Prime Like Trends Of A Given Set Of Positive Numbers

Say any Set S, is given all of whose elements belong to the Set of Natural Numbers. Let the Cardinality of the Set be n. Furthermore, these numbers are arranged in an ascending order.

For each element of the Set, using the method of One Step Evolution detailed in R. C. Bagadi [1], we find out at what Prime Like Basis Position Number each other element belongs to along its successive One Step Eevolution and also successive One Step Devolution. Once, we write those, we check if they are one step periodic, two, step periodic, and so on so forth to exhaustion. We For each element, we collect all the elements of the given Set that form Prime Like sequences that are either one step periodic, two, step periodic, and so on so forth to exhaustion. In this fashion, we do it for all the elements of the Set. From this, we can now clearly see, all the Prime Like Trends that have some periodicity. By Prime Like Trend, we mean a Sequence whose periodicity is some positive integer multiple of the Non Integral Prime Basis Position Number of its smallest element.

This will be illustrated by an Example.

Example

Considering the Set
$$S = \begin{cases} 2,5,6,7,11,14,15,17,21,23,26,29,30,31,\\ 35,39,41,45,70,84,102,110,130,210,482,1155 \end{cases}$$

Using the method of One Step Evolution detailed in R. C. Bagadi [1], we note that

$$PLT1 = \{2,5,11,17,23,31\} Period = 2$$

$$PLT2 = \{2,17,17,29,41\} \ Period = 3$$
 $PLT3 = \{6,14,21,26,35,39\} \ Period = 2$
 $PLT4 = \{6,15,26,35,45\} \ Period = 3$
 $PLT5 = \{30,70,102,110,130\} \ Period = 2$
 $PLT6 = \{30,84,110\} \ Period = 3$
 $PLT7 = \{210,482,1155\} \ Period = 2$

Here, by Period, we mean the number of times One Step Evolution has to be applied successively on any element (other than the last element of this Sequence) of this Prime Like Trend Sequence to reach to its next element in the aforementioned Sequence.

This set of Sets can also be called as the *Primality Tree Set* of the Set S.

When the Elements of S are Positive Reals, we can make close approximation of each Positive Real as a Rational Number and can take the LCM (Lowest Common Multiple) of the Denominators, and now the Numerator term is the Set of the sequence elements numerators (after the sequence S elements rendered as set of rationals) correspondingly multiplied by the ratio of the aforementioned LCM to the corresponding respective sequence elements denominator. Now, we find all the Prime Like Trend Sequences for the Numerator Set and we finally divide these elements each by the LCM value to get the Final Prime Like Trends. A seasoned reader of author's works would not find this task formidable at all.

The author gratefully and graciously names such Prime Like Trends Of Any Set Of Positive Reals as The *Ananda-Damayanthi-Radha-RohithRishi* Sequence Trends Of Any Set Of Positive Real Numbers, named after his loving Father, Mother, Wife and Son.

Universal Forecasting Scheme Of Any Time Series Sequence Using The Ananda-Damayanthi-Radha-Rohith Rishi Sequence Trends Of Any Set Of Positive Real Numbers.

Given any Set S of Time Series Sequence S, we first assign a time label to each element along the sequence. We now separate all the elements of this Sequence which are smaller than their just previous elements. Let the Set of these be represented by

 $S_{1<}$.

For the rest of the elements represented by the Set $S_{\scriptscriptstyle \rm b}$, we find all the Prime Like Trends Sequences.

In $S_{1\times}$, we again, separate all the elements of this Sequence which are smaller than their just previous elements. Let the Set of these be represented by $S_{2\times}$. For the rest of the elements represented by the Set $S_{2\times}$, we find all the Prime Like Trends Sequences. We repeat this process until we can do so no more, that i.e., till we have thusly found aforementioned subsets of S as the Union of only monotonically increasing subsets of S and monotonically decreasing subsets of S along time.

We then consider all these thusly found Prime Like Trends, some of which will be in Increasing Order along Time, some in Decreasing Order along Time and some Constant along time. and also label each of its element by its Prime Metric Basis Position Number as well, in addition to its Time Label.

We now find the Period of each of the Prime Like Trends, and find the Lowest Common Multiple of the same. Let this be represented by $\delta_{\scriptscriptstyle LCM(N+a)}$. We now successively evolve the last element of any x^{th}

Prime Like trend Sequence by
$$\left(\frac{\delta_{_{LCM(N+\alpha)}}}{Period(PLTx)}\right) = b$$

times successively, and label these as the S(y+1),

S(y+2),....., S(y+b), the newly found terms of S, where y is the number of terms of given Set S.

We now add all the elements having Time Label (y+1), of each of these thusly evolved rime Like Trends.

This will be illustrated by an Example below.

Example

Considering the Set

$$S = \{1,2,3,5,7,11,13,17,19,23,19,17,31\}$$

We now add the Time Label as the Left Subscript and Prime Basis Position Number as the Right Subscript, as follows:

$$S = \left\{ {}_{1}1_{1,2}2_{2,3}3_{3,4}5_{4,5}7_{5,6}11_{6,7}13_{7,8}17_{8,9}19_{9,10}23_{10}, \atop {}_{11}19_{9,12}17_{8,13}31_{12} \right\}$$

We now write all the Increasing Prime Like Trend Sequences as

$$IPLT1 = \left\{ {{_{1}}{1_{1}},{_{2}}{2_{2}},{_{3}}{3_{3}},{_{4}}{5_{4}},{_{5}}{7_{5}},{_{6}}{11_{6}},{_{7}}{13_{7}},{_{8}}{17_{8}}, \right\}$$

This Sequence has Period =1

$$IPLT2 = \{1_1, 3_3, 5_5, 13_7, 19_9\}$$

This This Sequence has Period =2

$$IPLT3 = \{1_1, 4_5, 13_7, 1023_{10}\}$$

This Sequence has Period =3

$$DPLT1 = \{_{11}19_{9},_{12}17_{8}\}$$

This Sequence has Period =1 though negative as this is a Devolving Sequence.

However, the Unique Prime Like Trends are:

$$IPLT1 = \begin{cases} {}_{1}1_{1,2}2_{2,3}3_{3,4}5_{4,5}7_{5,6}11_{6,7}13_{7,8}17_{8}, \\ {}_{9}19_{9,10}23_{10} \end{cases}$$

$$DPLT1 = \{119_9, 17_8\}$$

$$PLT1 = \{_{13}31_{12}\}$$

The LCM of the Periods is found to be 1.

We successively Evolve the last term of $IPLT1 = \begin{cases} {}_{1}1_{1,2}2_{2,3}3_{3,4}5_{4,5}7_{5,6}11_{6,7}13_{7,8}17_{8}, \\ {}_{0}19_{9,10}23_{10} \end{cases}$

by 1 Step which gives us

$$E^{4}(IPLT1) = \begin{cases} {}_{1}1_{1}, {}_{2}2_{2}, {}_{3}3_{3}, {}_{4}5_{4}, {}_{5}7_{5}, {}_{6}11_{6}, {}_{7}13_{7}, {}_{8}17_{8}, \\ {}_{9}19_{9}, {}_{10}23_{10}, {}_{11}29_{11}, {}_{12} \end{cases}$$

We successively Devolve the last term of

$$DPLT1 = \{119_{0}, 17_{1}\}$$

by 1 Step which will give us

$$E^{-1}(DPLT1) = \{_{11}19_{9},_{12}17_{8},_{13}13_{7}\}$$

We successive Evolve the last term of $PLT1 = \{ {}_{13}31_{12} \}$

By one time which gives us

$$E^{1}(PLT1) = \{_{13}31_{12},_{14}37_{13}\}$$

Since, the given Set S has 13 Terms, the 14th term is given by the sum of all the 14th terms of the

thusly Evolved (or Devolved) Prime Like Trends of the given Sequence, which is found to be 37.

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