Higher Order Sequence of Primes

Ramesh Chandra Bagadi, *FIE, CEng(India)*
Owner & Co-Director, texN Consulting Private Limited, Hyderabad, Telengana State, India

***Abstract*- In this research manuscript, the author has presented a novel notion of Higher Order Prime Numbers.**

INTRODUCTION

Since, the dawn of civilization, human kind has been leaning on the Sequence of Primes to devise Evolution Schemes akin to the behavior of the Distribution of Primes, in an attempt to mimic natural phenomenon and be able to forecast useful aspects of science of the aforementioned phenomenon. Many western and as well as oriental Mathematicians and Physicsts have understood the importance of Prime Numbers (in the ambit of Quantum Groups, Hopf Algebras, Differentiable Quantum Manifolds, etc.,) in understanding subatomic processes such as Symmetry Breaking, Standard Model Explanation, etc. In this research note, the author advocates a novel concept of Higher Order Sequence Of Primes.

THEORY (AUTHOR'S MODEL OF THEORY OF HIGHER ORDER SEQUENCE OF PRIMES [1], [2], [3])

A Positive Integer Number is considered as a Prime Number in a Certain Higher Order (Positive Integer ≥ 2) Space, say R, if it is factorizable into a Product of (R-1) factors wherein the factors are (R-1) number of Distinct Non-Reducible Positive Integer Numbers (Primes of 2^{nd} Order Space).

Example: The general Primes that we usually refer to can be called as Primes of 2^{nd} Order Space.

Example:

First Few Elements of Sequence's of Higher Order Space Primes	*R^{th} Order Space*
{2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, …}	R=2
{6 (3x2), 10 (5x2), 14 (7x2), 15 (5x3), 21 (7x3), 22 (11x2), 26 (13x2), 33 (11x3), 34 (17x2), 35 (7x5), 38 (19x2), 39, (13x3), 45 (9x5), ... }	R=3
{30 (5x3x2), 42 (7x3x2), 70 (7x5x2), 84 (7x4x3), 102 (17x3x2), 105 (17x3x2), 110 (11x5x2), 114 (19x3x2), 130 (13x5x2), ...}	R=4
210 (7x5x3x2), 275 (11x5x3x2), 482 (11x7x3x2), 770 (11x7x5x2), 1155 (11x7x5x3), …	R=5

We can note that the Primes of any Integral (Positive Integer ≥ 2) Order Space (say R) can be arranged in an increasing order and their position in this order denotes their Higher Order Space Prime Metric Basis Position Number.

We can generate the Sequence Of Any Integral (Positive Integer ≥ 2) Higher Order Primes in the following fashion:

The First Prime of any R^{th} Order Space Sequence Of Primes can be computed by simply considering consecutively the First (R-1) Number of Primes of 2^{nd} Order Space Sequence Of Primes, starting from the First Prime of 2^{nd} Order Space Sequence Of Primes, i.e., 2 and Forming a Product Term of the Form

$$ {}^{R}p_{1}=\overbrace{\left\{ {}^{2}2_{1}\times {}^{2}3_{2}\times {}^{2}5_{3}\times {}^{2}7_{4}\times ....\left\{ {}^{2}p_{(R-3)}\right\} \times \left\{ {}^{2}p_{(R-2)}\right\} \times \left\{ {}^{2}p_{(R-1)}\right\} \right\}}^{(R-1)\ Number\ Of\ Product\ Forming\ Factors} $$

which becomes the First Prime of any R^{th} Order (Positive Integer ≥ 2) Space Sequence Of Primes as it cannot be factored in terms of R Number of Unique Factors. We Label this Number as ${}^{R}p_{1}$

One Step Evolution [4], [5] of any element of Second Order Space Sequence Of Primes is the next consecutive Second Order Space Prime element of the given element of Second Order Space Sequence Of Primes. For Example, One Step Evolution of 2 is 3 and of 31 is 37.

The Second Prime of any R^{th} Order (Positive Integer ≥ 2) Space Sequence Of Primes can be computed in the following fashion.

Firstly, we consider consecutively the First (R-1) Number of Primes of 2^{nd} Order Space Sequence Of Primes, starting from the First Prime of 2^{nd} Order Space Sequence Of Primes, i.e., 2 and forming a Product Term of the form

$$ {}^{R}p_{1} = \overbrace{\left\{ {}^{2}2_{1} \times {}^{2}3_{2} \times {}^{2}5_{3} \times {}^{2}7_{4} \times .... \left\{ {}^{2}p_{(R-3)} \right\} \times \left\{ {}^{2}p_{(R-2)} \right\} \times \left\{ {}^{2}p_{(R-1)} \right\} \right\}}^{(R-1)\ Number\ Of\ Product\ Forming\ Factors} $$

which becomes the First Prime of any Rth Order (Positive Integer ≥ 2) Space Sequence Of Primes as it cannot be factored in terms of R Number of Unique Factors. We now cause One Step Evolution of that one particular factor among the (R-1) factors such that the Product climb of the value ${}^{R}p_{2}$ over ${}^{R}p_{1}$ is minimum as compared to that gotten by performing the same using any other factor among the (R-1) factors.

We find ${}^{R}p_{3}$ using ${}^{R}p_{2}$ as detailed in the above paragraph, and similarly, we can find any element of the R^{th} Order Sequence Of Primes.

For Example, 210 is the 1st (Higher Order Space Prime Metric Basis Position Number) element of R=5th Order Space Sequence Of Primes.

Similarly, 102 is the 5th (Higher Order Space Prime Metric Basis Position Number) element of R=4th Order Space Sequence Of Primes.

Therefore, any of these Higher Order Space Primes can be represented as follows:

$$ {}^{Higher\ Order\ Space\ Number}(Number)_{\text{Higher Order Space Prime Metric Basis Position Number}} $$

That is,

210 can be written as ${}^{5}210_{1}$ and 102 can be written as ${}^{4}210_{5}$.

Each of the rest of the Positive Integers can be classified to belong to it's Unique Parent Sequence Of Higher Non Integral Order Space Primes, at a particular Prime Metric Basis Position Number.

For Example, One Step Evolution of 40,500 is 56,700, see [3], i.e., if 40,500 is ${}^{R}40500_{d}$, then 56,700 is ${}^{R}56700_{(d+1)}$

Furthermore, as a matter of fact, any of rest of the positive integers other than the Sequence of Primes of Any Higher Order (Positive Integer greater than or equal to 2) Space can be written as follows:

Considering any number say f, we can write its nearest primes of any Rth Order Space, on either side as ${}^{R}p_{k}$ and ${}^{2}p_{k+1}$, where ${}^{R}p_{k}$ is the k^{th} Prime and ${}^{R}p_{k+1}$ is the $(k+1)^{th}$ Prime of the Sequence Of Primes Of the Rth Order (Positive Integer ≥ 2) Space. We can then write $f = {}^{R}p_{k+\alpha}$ where $\alpha = \left(\frac{f - {}^{R}p_{k}}{{}^{R}p_{k+1} - {}^{R}p_{k}} \right) \left(\frac{{}^{R}p_{(f - {}^{R}p_{k})}}{{}^{R}p_{({}^{R}p_{k+1} - {}^{R}p_{k})}} \right)$ with $0 < \alpha < 1$. Then, $(k+\alpha)$ is the Non Integral Prime Basis Position Number of f.

In a similar fashion, any Rational Number $\frac{a}{b}$ can be written as $\frac{a}{b} = \frac{{}^{R}p_{k+\alpha}}{{}^{R}p_{l+\beta}}$ where k, l are some positive integers and $0 < \alpha, \beta < 1$.

REFERENCES

[1] Bagadi, Ramesh Chandra, Classification Of Prime Numbers, January 19th, 2016. http://vixra.org/abs/1601.0213

[2] Bagadi, Ramesh Chandra, The Prime Sequence's (Of Higher Order Space's) Generating Algorithm, September 30th, 2015. http://vixra.org/abs/1509.0291

[3] Bagadi, Ramesh Chandra, Universal Recursive Scheme To Generate The Sequence Of Primes Of Any Order {Say Rth} Space, December 21st, 2015. http://vixra.org/abs/1512.0389

[4] Bagadi, Ramesh Chandra. One Step Universal Evolution Of Any Positive Real Number, January 2019, International Journal Of Innovative Research In Technology, Volume 5, Issue 8, ISSN 2349-6002

[5] http://ijirt.org/master/publishedpaper/IJIRT147501_PAPER.pdf

[6] Bagadi, Ramesh Chandra, One Step Evolution of Any Real Number, September 4th, 2017. http://vixra.org/abs/1709.0031

[7] http://vixra.org/author/ramesh_chandra_bagadi

[8] http://philica.com/advancedsearch.php?author=12897

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