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The Average Computed In Primes Basis {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 average of a sequence in Primes Basis.

Theory

Given any Sequence of the kind,

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

We first write them as

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

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 ${}^1 p_4$. In a similar fashion, 8 can be written as ${}^1 p_{4+\left(\frac{8-7}{11-7}\right)}$ where 7 is the nearest previous prime number of 8 and 11 is the next nearest prime number of 8. Here, in the

notation ${}^{1}p_{4+\left(\frac{8-7}{11-7}\right)}$, 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., $N > 1$.

We then compute the sum $\left(\frac{\sum_{i=1}^{n}(j_i+\delta_i)}{n}\right)$. Let this be $(k+\beta)$. Now, we find ${}^{N}p_{(k+\beta)}$. This ${}^{N}p_{(k+\beta)}$ can be used as the Average Computed in the Primes Basis.

Example.

Considering, S={2, 4, 6}, we note that they are actually, ${}^{N=1}p_1$, ${}^{N=1}p_{1+\left(\frac{4-3}{5-3}\right)}$ and ${}^{N=1}p_{3+\left(\frac{6-5}{7-5}\right)}$. Therefore, $\left(\frac{\sum_{i=1}^{n}(j_i+\delta_i)}{n}\right)=2$.

Hence the average computed in Primes Basis is 3 as 3 is the 2nd Prime of the Standard Primes whose order can be taken to be 1.

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