PRIME NUMBER DISTRIBUTION SERIES

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In this paper, *Prime Number Distribution Series* (*PNDS*), that calculates exact number of prime numbers (P_N) less than any given integer (P), is quoted, without proof, as;

$$P_N = \left| (j+m)\left(3(m+1) - \frac{3}{2} + \frac{-1^{m+1}}{2}\right) + \text{-}1^{j+m} - (1+m) + (u)\left(3(j+m+1) + (3(j-2+m) + (-1)^{(j-2+m)})\right) \right|$$

where,

$$m = 1..2,\ j = 1..<< P, u = 0..<< P$$

PNDS may be thought of as the equation of order of the disorder of prime numbers, as expressed in the *Nuclear Strategy, Inc. (NSI)* website[1]. *PNDS* equation may be reduced into other formats, such as where $m = 1..4$ or $m = 1$, without loss of generality.

The terms of the *PNDS*, and of its inverse, locate all primes less than integer P where $2 < P < \infty$.

1. Visit www.NuclearStrategy.co.uk for further information and updates

Finding the number of primes less than an integer P depends on counting the terms of the *PNDS* less than P. In computing terms, however, counting the terms of the *PNDS* can be significantly faster than the conventional division testing for primes and counting or sieving methods.

Two important properties of *PNDS*, one favorable and other not, are worth noting. On the down side, *PNDS* produce repeated roots, and double counting of the same root is not permissible. However, *PNDS* is an orderly series and, the repeated roots also exist in orderly fashion. By the use of *PNDS Repeat Series (RS),* multiple counting can be averted; thus permitting *PNDS* to operate as a simple counter. *RS* is not currently published; however, reader may deduce *RS* simply by writing out the terms of *PNDS* or plotting the *PNDS* in the extended plane.

On the positive side; the orderly existence of *PNDS* allows for *block counting*, i.e. where certain increments will take just as long to count irrespective of P, and this corresponds to higher computing efficiency as $P \to \infty$. As an example, the *NSI website*[1] *PNDS* software example evaluates P_N where $P = 1e12$ in less than 10 seconds by the use of block counting run on a personal computer. There is further scope to improve on the counting efficiency.

NSI website[1] *PNDS* software does not require or assign computer memory allocation; hence, it cannot be considered as a sieving method. Furthermore, this example makes use of block counting by the advanced computational methods for first integer solution of Diophantine equation and combinatory mathematics.

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RIEMANN HYPOTHESIS

Plotting the *PNDS* in the extended plane makes apparent how an orderly series can be perceived as disorderly. Given neither PNDS nor its inverse is a complex variable function, and that *PNDS* uniquely produces exact count of prime numbers for a given integer P, where $2 < P < \infty$, it may be concluded that the distribution of prime numbers is *not* a complex variable problem and *Riemann Zeta Function* may not be pertinent to the subject matter.

SIEVING SOLUTIONS

It is not favorable to use PNDS as sieving solution since it will not possible to make use of block counting. *NSI* website software uses *PNDS* to compute P_N without memory use. *NSI* website C++ open source code uses *PNDS* with optional memory use for pattern verification.

MULTITHREADING

PNDS can be modified for parallel processing to improve computation times.

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