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A New Approach to Understanding the Behavior of Prime Numbers

Mazin Badr Faris Alsaad[1,*]

[1] *Department of Electrical Engineering, Belgrade University, Beograd, Serbia*

Abstract

Many studies and research have been conducted to understand the behavior of prime numbers. In this research, we aim to focus on a different perspective to understand the behavior and locations of prime numbers, which are often accused of having random behavior. This perspective involves using non-prime numbers, called composite numbers, that follow an organized mathematical formula through which an indirect prediction the location of prime numbers can be achieved, and when the process toward infinity we will approve that the prime numbers disappeared, and we will have only non-prime numbers.

Keywords: Prime numbers; Riemann hypotheses; Zeta faction; Non-prime numbers.

1. Introduction

To study the properties of composite numbers and how to determine the locations (position) where prime numbers appear, which follow a sequential pattern and remain consistent in both the number of positions and location, matching the original group in terms of the number of position and location [1].

2. Methods and Proposed Methodology

To prove this, the following steps were taken:

1. Divide the numbers into groups, with each group containing 210 numbers, 105 odd numbers, and 105 even numbers [2], and to element the even array (all multiples of 2 in the group). For instance, the first group (A) includes numbers from 1 to 209, and the second group (B) includes numbers from 211 to 419.

2. Choosing a specific group and determining the prime numbers and positions in it.

   Choose group (B):

*Corresponding author (mznbader50@gmail.com)

$B = m_1, m_2, m_3 \ldots, m_{105}$

Let m_1, m_2, m_3: integer number, from 211 to 419.

$m_1 = n.$

$m_2 = n + 2.$

$m_3 = n + 4.$

$m_{105} = n + 210.$

$B = n, n+2, n+4, \ldots, n+210$; $n = 1 + 2.i$, $i = 0, 1, 2, 3, \ldots, \infty$ for group B: $i = 105 \Rightarrow n = 1 + 2 \times 105 = 211.$

The total prime number is (35) as in Table 1.

211	223	227	229	233	239	241	251	257	263
269	271	277	281	283	293	307	311	313	317
331	337	347	349	353	359	367	373	379	383
389	397	401	409	419	X	X	X	X	X

Table 1:

3. The remaining numbers in group (B) are non-prime numbers $= 105 - 35 = 70$ composite numbers are expressed by all following formulas are shown below:

   $3 \times (1 + 2n)$; $n = 0, 1, 2, \ldots, \infty$

   $5 \times (5 + 6n)$; $n = 0, 1, 2, \ldots, \infty$

   $5 \times (7 + 6n)$; $n = 0, 1, 2, \ldots, \infty$

   $7^2, 7^x(11, 13, 17, \ldots, \infty)$

   $11^2, 11^x(13, 17, 19, \ldots, \infty)$

   $13^2, 13^x(17, 19, 23, \ldots, \infty)$

   $17^2, 17^x(19, 23, 29, \ldots, \infty)$

   $19^2, 19^x(23, 29, 31, \ldots, \infty)$

   $P_n^2, P_n(P_{n+1}, P_{n+2}, P_{n+3}, \ldots, \infty), P_n^2 < i + 210$ for group (B) $i = 211$

   We first need to determine their prime factors [3, 4]. The method "Trial Division" allows you to find a factor of a given integer by trying to divide this number by all prime numbers $(3, 5, 7, 11, \ldots, P_n^2 < i + 210)$ for group (B) $i = 210$.

4. After determining the prime factor, multiply all these prime factors as shown below: (Recurring prime factors are counted as one prime factor).

   $P_{F1} = 2.P_1.P_2.P_3 \ldots P_n$ group (B), $P_n = P_{70}$

   This number (PF1) the product of prime numbers is added to every number in the main group. (B) will create a new group (B1):

$B_1 = m_1 + P_{F1}, m_2 + P_{F1}, m_3 + P_{F1}, \ldots, m_{105} + P_{F1}$

5. Now we have a new group (B1) to repeat the same procedure with group (B), determining the prime numbers and the prime factor for non-prime numbers. The prime numbers in the group (B1) are (16) as in Table 2.

9,699,913	9,699,917	9,699,919	9,699,923
9,699,929	9,699,941	9,699,953	9,699,959
9,699,973	9,700,003	9,700,027	9,700,039
9,700,063	9,700,073	9,700,079	9,700,099

Table 2:

In this new group (B1), the new prime factor is also calculated: $105 - 16 = 89$ prime factor.

$P_{F2} = P_{21}.P_{22}.P_{23} \ldots_{2n}$ group (B1), $P_{2n} = P_{89}$

$B_2 = B_1 + P_{F2}$

$B_2 = m_1 + (P_{F1} + P_{F2}), m_2 + (P_{F1} + P_{F2}), \ldots, m_{105} + (P_{F1} + P_{F2})$

We will notice that all the prime numbers of group (B1) appear in the same position of the main group (B), and the number of cells or positions in this new group (B1) mirrors to the positions in the original group (B), indicating a consistent pattern of prime number positions.

6. Now we have a new group (B3) to repeat the same procedure with a group (B2), determining the prime numbers and the prime factor for non-prime numbers. The prime numbers group (B3) are "zero" numbers. In this new group (B3), the new prime factor is also calculated: The number of prime factors $= 105 - 0$.

$P_{F3} = P_{31}.P_{32}.P_{33} \ldots P_{3n}$ group (B3), $P_{3n} = P105$

$B_3 = B_2 + P_{F3}$

$B_3 = m_1 + (P_{F1} + P_{F2} + P_{F3}), m_2 + (P_{F1} + P_{F2} + P_{F3}), \ldots, m105 + (P_{F1} + P_{F2} + P_{F3})$

7. The position of prime numbers in the base set will be fixed and repeated when the number is doubled to infinity.

$B_4 = B_3 + P_{F3}$

$B_5 = B_4 + P_{F3}$

$B_5 = m_1 + (P_{F1} + P_{F2} + P_{F3}) + 2.P_{F3}, m2 + (P_{F1} + P_{F2} + P_{F3}) + 2.P_{F3}, \ldots, m_{105} + (P_{F1} + P_{F2} + P_{F3}) + 2.P_{F3}$.

Let $P_r = (P_{F1} + P_{F2} + P_{F3})$.

$B_5 = m_1 + P_r + 2.P_{F3}, m_2 + P_r + 2.P_{F3}, \ldots, m_{105} + P_r + 2.P_{F3}$.

Group B_j will toward infinity with 105 non-prime numbers only [5, 6].

$B_j = m_1 + P_r + 2.j.P_{F3}, m_2 + P_r + 2.j.P_{F3}, \ldots, m_{105} + P_r + 2.j.P_{F3}; \; j = 1, 2, 3 \ldots, \infty$.

3. Conclusion

In the new group, fixed positions and new prime numbers were identified. However, the number of these prime numbers is less than the prime numbers in the original group, and the density of prime numbers decreases as the integer value increases. If this process is repeated, as outlined in B1 and B2, it will eventually result in fixed positions without any prime numbers. This suggests that the groups will gradually lose their prime numbers, leading to a sequential decline. The position of prime numbers in the base set will be fixed and repeated when the number is doubled to infinity.
The rule: when we repeat the process to infinity, we will see that the prime numbers disappear, and we will have only non-prime numbers.

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