Advances in Applied Mathematics and Computing
ISSN: 3125-5167, Volume – 2, Issue – 2, 2026
DOI: https://doi.org/10.63456/aamc-2-2-111

TRESEARCH

CODING/DECODING NUMBER ARRAYS COUNTING IN TRIPLETS

[1]RUSLAN POZINKEVYCH

[1]Faculty of Information Technologies and Mathematics

Ruslan Pozinkevych: galagut@protonmail.com

Corresponding author: RUSLAN POZINKEVYCH

ABSTRACT

Following research of the same author on 'Logical Principles in Ternary Mathematics,' we would like to improve the model that was proposed in the aforementioned article by the diagram that links decimal numbers, number arrays, and triplets. The latter has to undergo some specification. Here the term 'trits' implies not only a set of three numbers as in (3,4,5) It is also a three-component vector $v = \langle v_1, v_2, v_3 \rangle$ It's a very important provision because it links a vector space, an integer, and a number array; each of them being an independent unit.[6]

Understanding concepts like 'vector space,' 'integer,' and 'triplet' can be challenging, especially for someone new to the topic. It's easy to feel confused by the terminology used.[9] So, let's move on swiftly and illustrate this idea with an example:

$$\sum_{i,j=0}^{n} (x_i)_j = e_{ijk} = \begin{cases} 1 & : \left| x_i = \dfrac{n}{n-i} = 2k+1 : \right| k = \{1,2 \dots n\} \\ 2 & : \left| x_i = \dfrac{n}{n-i} = 2k : \right| k = \{1,2 \dots n\} \\ 0 & : \left| x_i = \dfrac{n}{n-i} = k : \right| k = \{1,2 \dots n\} \end{cases} \tag{1}$$

$$V \leftrightarrows Z^+$$

This principle will define our analysis given below.

Keywords - trits, vector field, complex conditionals

1. INTRODUCTION

Formula (1) states that we can classify a group of integers according to their divisibility and then relate this group to the components of a vector $\langle i, j, k \rangle$, which in its turn will define the length of the array.[3] Such a relation needs further discussion. We will use functional analysis in our research.[8] So what are those groups?

They are odd, even, and prime numbers. Check, please:

$$x_i = \frac{n}{n-i} = 2k+1 : | \; k = \{1,2 \dots n\}$$
$$x_i = \frac{n}{n-i} = 2k : | \; k = \{1,2 \dots n\}$$
$$x_i = \frac{n}{n-i} = k : | \; k = \{1,2 \dots n\}$$

When we do our next step conversion, it makes no difference because correspondence will be set in the following order: 1 for odd, 2, for even, 0 for primes, thus encoding the arrays of integers. But how shall we decode them?[11][12] The answer to this question lies in the nature of the system that we are going to analyze.[2]

2. MATERIALS AND METHODS

Having a quick look at Formula (1) makes it clear that divisibility tests will not apply to the primes and that this particular set of numbers remains neglected.[7] Instead of trying to compute the sum of primes for each particular array of integers, we are going to use a pseudo sum S'_n and calculate its equivalent independently.[5][10] So the transformation of Formula (1) will look now:

$$S_n = \sum_{i=0}^{n} \sum_{j=0}^{n} x_{ij} = e_{ijk} = \begin{cases} 1 & : \left| x_i = \dfrac{n}{n-i} = 2k+1 : \right| k = \{1,2 \dots n\} \\ 2 & : \left| x_i = \dfrac{n}{n-i} = 2k : \right| k = \{1,2 \dots n\} \\ 0 & : \left| x_i = \dfrac{n}{n-i} = k : \right| k = \{1,2 \dots n\} \longrightarrow S'_n = S_n + \dbinom{n-i}{3} - k \end{cases} \tag{2}$$

ISSN: 3125-5167, Volume – 2, Issue – 2, 2026
DOI: https://doi.org/10.63456/aamc-2-2-111

TRESEARCH

3. METHODOLOGY

With regard to what has been said, there arises a need for a universal algorithm that would return a pseudo-sum value S_n' as an output and take an input of n [11] Let's try and write such an algorithm:

If (x_{ij} is odd or even then $S_n' = S_n$ else ($S_n' = S_n + \binom{n-i}{3} - k$) Sum of entries S_n we can make equal the sum of diagonal entries $\sum_{i,j=0}^{n} x_{ij} = A_{ij}$;

4. DISCUSSION

The proposed algorithm clearly shows morphism between different fields e.g., the field of Ternary, Binary and Real numbers Here is an example:

We want to find a ratio between $\frac{\binom{n}{3}}{\binom{n}{2}}$ This ratio must satisfy the following conditions:

- $\exists k \Rightarrow \frac{\binom{n}{3}}{\binom{n}{2}} = \frac{P(x)}{Q(x)} : |Q(x) \neq 0;$

Proof: $\binom{8}{3} = 56; \binom{8}{2} = 28 \Rightarrow \frac{56}{28} = 2 \Rightarrow \frac{56}{28} \equiv \frac{P(x)}{Q(x)};$

$$\frac{\binom{n}{3}}{\binom{n}{2}} = \frac{n-2}{3} \Rightarrow \frac{n-2}{3} = x \Rightarrow n - 2 = 3x \Rightarrow n = 3x + 2;$$

Our final formula for combinations with repetitions will become:

- $\binom{3x+2}{x} = k : |\langle k, x\rangle \in Z$ (3)

Since the formula (3) satisfies the conditions set in formula (1), namely, $x_i = \frac{n}{n-i} = 2k + 1 \vee x_i = \frac{n}{n-i} = 2k \vee x_i = \frac{n}{n-i} = k : |\ k = \{1,2 \dots n\}$ we have the proof of our initial condition (by definition of the binomial) These are necessary conditions Let's prove they are sufficient enough Again as the formula (1) suggests e_{ijk} takes 3 values: $e_{ijk} = \begin{cases} 1 \\ 2 \\ 0 \end{cases}$,

that depend on the cardinality of the symbols i, j, k Since values of the i, j, k are real numbers and $e_{ijk} \rightleftarrows \binom{n}{k}$ by definition, we may attribute 3 values to the symbol e_{ijk}

In simple words, there exists such combination $\binom{n}{k}$, that for any real non-negative entry:

$$\exists \binom{n}{k} \Rightarrow \langle \binom{n}{k} | k \rangle \tag{4}$$

5. CONCLUSION

Formulas (1) and (2) can be regarded as an algorithm that sets up the relation between various types of numbers and various fields i.e., $V \leftrightharpoons Z^+$ Its importance lies in the fact that transition between various fields can be made with the help of the algorithm and is programmable

In conclusion, we can assert that the morphism [4] between different fields of numbers does exist. It is executable in the form of various formulas and algorithms and a vector field (e.g., balanced and unbalanced ternary).[1][13]

REFERENCES

[1] Pozinkevych, R. (2021). *Ternary Mathematics and 3D Placement of Logical Elements Justification*. *Asian Journal of Research in Computer Science*, 11–15. https://doi.org/10.9734/ajrcos/2021/v11i230257
[2] Arnold, V. I. (Ed.). (2005). *Arnold's Problems*. Springer Berlin Heidelberg. https://doi.org/10.1007/b138219
[3] Boas, M. L. (2006). *Mathematical methods in the physical sciences*. John Wiley & Sons. ISBN-10: 0471198269.
[4] Myers, D. (1997). An interpretive isomorphism between binary and ternary relations. In *Lecture Notes in Computer Science* (pp. 84–105). Springer Berlin Heidelberg. https://doi.org/10.1007/3-540-63246-8_6
[5] Pozinkevych, R. (2026). *Developments of the Optimization in Ternary Calculus*. *Advances in Applied Mathematics and Computing*, 2(1), 33–34. https://doi.org/10.63456/aamc-2-1-84
[6] Pozinkevych, R. (2021). Logical Principles in Ternary Mathematics. *Asian Journal of Research in Computer Science*, 49–54. https://doi.org/10.9734/ajrcos/2021/v7i330181

ISSN: 3125-5167, Volume – 2, Issue – 2, 2026
DOI: https://doi.org/10.63456/aamc-2-2-111

[7] *A Summary from Euclid's Elements*. (1973). Taken, with permission, from T. L. Heath, *The Thirteen Books of Euclid's Elements* (Cambridge University Press, New York, 1926). In *An Introduction to Non-Euclidean Geometry* (pp. 257–261). Elsevier. https://doi.org/10.1016/B978-0-12-274850-9.50013-1
[8] Andrews, C. L. (1975). *Almost All About Waves* by John R. Pierce. Reviewed. *American Journal of Physics*, 43(2), 200–201. https://doi.org/10.1119/1.9889
[9] Blatt, F. J. (1992). John M. Blatt. *Physics Today*, 45(1), 84–84. https://doi.org/10.1063/1.2809506
[10] Clements, R. R. (2007). *Advanced Vector Analysis for Scientists and Engineers* by M. Rahman. *The Aeronautical Journal*, 111(1124), 668–669. https://doi.org/10.1017/S0001924000087261
[11] Nijenhuis, A., Krishnamurthy, V., Tucker, A., Williamson, S. G., Stanton, D., & White, D. (1988). *Combinatorics Theory and Applications*. *The American Mathematical Monthly*, 95(4), 363. https://doi.org/10.2307/2323584
[12] Hall, M. (1943). Projective planes. *Transactions of the American Mathematical Society*, 54(2), 229–277. https://doi.org/10.1090/S0002-9947-1943-0008892-4
[13] Kravchuk, O. M. (2013). *Workshop on Analytical Geometry*. ISBN 978-966-600-607-6.