Four-component tuples splitting

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Abstract. We consider a problem of splitting of the four-component tuples of integer numbers into two two-component tuples, providing a minimum of the difference of sums of the corresponding their components. We conjecturing with the corresponding algorithm for its solution. The corresponding examples are given.

1. Four-component tuples of integer numbers

Let us consider Four-component tuples of integer numbers:

$V \subset \mathbf{R}^4$, $V := (i, j, m, n)$, $i, j, m, n \subset \mathbf{N}$.

Let us find an algorithm that allows for any fixed vector:

$V_0 = (i_0, j_0, m_0, n_0)$, to split it on two Two-component tuples:

$E_1^0 = (k_0, l_0)$, $E_2^0 = (s_0, t_0)$, wherein: $k_0, l_0, s_0, t_0 \subset V_0$, so that

it provides a minimum of the difference of the corresponding sums of the E_1^0 and E_2^0 components: $|\ (k_0 + l_0) - (s_0 + t_0)\ |$.

For example, let $V_0 = (6, 3, 4, 1)$. Then, splitting:

$E_1^0 = (6, 1)$, $E_2^0 = (4, 3)$, is a solution, since:

$|\ (6 + 1) - (4 + 3)\ | = |\ 7 - 7| = 0$ provides the minimum.

The corresponding graph illustration: (V_0, E_1^0, E_2^0) can be given.

2. Algorithm's solution Conjecture

Conjecture. Let $p_0 = \max \{k_0, l_0, s_0, t_0\}$, $q_0 = \min \{k_0, l_0, s_0, t_0\}$.

We conjecturing that $E_1^0 = (p_0, q_0)$, $E_2^0 = (r_0, u_0)$,

$r_0, u_0 \in V_0 \setminus p_0 \cup q_0$.

For example, let $V_0 = (9, 3, 4, 1)$. Then, splitting:

$E_1^0 = (9, 1)$, $E_2^0 = (4, 3)$, is a solution, where:

$|(9 + 1) - (4 + 3)| = |10 - 7| = 3 = \min$.

3. Open problems

Note that this problem can be generalized for n-component tuples, for any finite number n and splittings.

4. Conclusion

We consider a problem of splitting of the four-component tuples of integer numbers into two two-component tuples, providing a minimum of the difference of sums of the corresponding their components. We conjecturing with the corresponding algorithm for its solution. The corresponding examples are given. We suggested to develop generalizations of the problem as well.

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