

Some New Solutions of a Discrete Isoperimetric Problem in the Hamming Space

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Let A be a subset of the n -dimensional unit cube B^n and $|A| = m$. A vertex $\alpha \in A$ is called the inner vertex if the ball of radius 1 centered in α is in A . We consider the problem of specification of all subsets of B^n with maximum number of inner vertices among all the m -element subsets.

One of the extremal subsets for each value of m is known for almost 50 years due to L.H. Harper, but as examples show it is not unique in general. For a number of cardinalities the solutions of the isoperimetric problem might differ greatly. However, the cases when the solution is unique (up to isomorphism) are of particular interest.

We present some new cases when the solution is either unique or “almost unique”, i.e. the solutions for these values of m differ very slightly from the standard one.