On the number of functions in a class of k-valued logic

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Abstract

Given a function f, the essential variables in f are defined as variables which occur in f and weigh with the values of that function. The number of essential variables is an important measure of complexity for discrete functions. We shall obtain a few results concerning simplifying of functions by identification of variables. The essential arity gap (gap) of Boolen functions are deeply investigated in [1, 2, 3]. In [4] R. Willard proved that if $n > k$ then $gap(f) \leq 2$.

Given an n-ary $k-$valued function f, $gap(f)$ denotes the essential arity gap of f. We obtain an explicit determination of n-ary $k-$valued functions f with $2 < gap(f) \leq n \leq k$. Our methods yield new combinatorial results about the number of $k-$valued functions with given gap.

Key words: essential variable, identification minor, essential arity gap.
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