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REGIONS OF INFLUENCE IN SIMPLE DECOMPOSITION FORMS OF FINITE FUNCTIONS [1]

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ABSTRACT

The subject of the presented paper is the decomposition of finite functions. We characterize functions by their changes and use transition sets and their size as a rough measure of their complexity. We offer regions of influence as criteria for evaluation of simple decomposition forms and study their properties. The obtained results suggest that the adopted criteria can be used as a basis for a more general theory of functional decomposition.

Keywords: Finite functions, decomposition, transitions, region of influence.

1. Introduction

The research presented in this paper deals with the problem of decomposition of finite functions. The decomposition methods arose in the practice of constructing digital electronic circuits and were a field of active study in the seventies. The behavior of the main electronic components provided by the technology at that time can be described by logical functions of two variables. Constructing more complicated circuits by the available elements at as lower price as possible was of vital importance and the decomposition methods were one of the approaches used to work on this problem. Later the appearance of VLSI integrated circuits at affordable price gave a convenient technological solution to most of the practical problems. Nowadays logical functions of much more than two variables can be implemented directly in a single chip. Still the decomposition methods are of value for several reasons: the use of the ordinary two input components is still unavoidable; although the price optimization might not be very significant because of its small effect at the moment, the optimization of the power consumption and the space occupied by the components is quite important for the contemporary technology; since the decomposition methods are not bound to any particular collection of elements it is possible to use the VLSI as a new component

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