BOOLEAN ALGEBRA FOR CALCULATIONS OF RELIABILITY

Siarhey Kandratsenka

Department of Information Technologies, State Economic University, Partizan Ave. 26, 220672, Minsk, Belarus
zaitseva@bseu.minsk.by

The reliability is very important characteristic of complex system. It is used in many applications. For example, reliability is one characteristic to describe a computer system, economic system, banks, etc.

The Boolean algebra is used for definition and analysis of reliability. There are many results in this area. But there is one problem to employ Boolean algebra for reliability. It is offered the theoretical development in area of Boolean algebra adapted to use in the theory of reliability in the given work.

The reliability of complex system is a property of this system to function if external and internal parameters change. Any complex system can be represented by a graph. The important moment in the theory of reliability is the definition of the shortest ways and cuts.

Way is such subset of graph's edges which allows to connect two terminal nodes. This ways can be much enough, in the column with two poles. The way can include loops (to pass more once through the same top). Concept of the minimal way therefore is entered. Minimal way is such subset graph's edges which allows to connected two terminal nodes, but the exception even one edge from this subset makes such situation that the stayed subset of the edges is not way.

Cut of not directed graph with two poles is such subset of it edges, which removal breaks off the whole ways of the graph. Minimal cut of the graph is such subset of it edges, which removal breaks off the whole ways of the graph, but the introduction even one edge of this subset forms even one way.

In this paper is proposed to describe the graph of the systems for its reliability as a logic formula. The product terms in this formula are minimal way, which is defined a lower estimation of reliability. The sets of the variables, which presented in every product terms is forms the minimal cut.

The decisions making support system Reliability is proposing to analyze the reliability. The reliability has representated by the logic formulas in this system.