Intersections of Faith and Culture: AMERICAN Journal of Religious and Cultural Studies
Volume 01, Issue 03, 2023 ISSN (E): 2993-2599

Theoretical Foundations of Jigalkin Algebra

Tojiyev Nuriddin Shukur o'g'li
Samarkand Institute of Economics and Service, teacher

Adilova Dinora Ablaqul qizi
Samarkand State University, student

Abstract: Jigalkin algebra is a mathematical structure that extends logical algebra and provides a basis for studying logical operations and polynomials. It is named after Anatoly Ivanovich Jigalkin, a Soviet mathematician who made a significant contribution to the field.

Keywords: Jigalkin algebra, logical algebra, orthogonal system, operations, polynomials, logical circuits, applications.

Jigalkin algebra is a logical algebra: Boolean algebra is the basis for Jigalkin algebra. It deals with logical operations on binary variables (true and false) and provides a mathematical structure for parsing and manipulating logical expressions.

Orthogonal system: In Jigalkin algebra, an orthogonal system refers to the set of polynomials that are the basis for representing logical functions. These polynomials are called orthopairs and play a crucial role in the analysis of logical functions.

Operations: Jigalkin algebra includes various operations, including conjunction (AND), disjunction (OR), negation (NOT), and implication (IMPLIES). These operations allow manipulation and transformation of logical expressions.

Polynomials: In Jigalkin algebra, polynomials are used to represent logical functions. These polynomials are constructed using orthopyres and can be manipulated using operations such as conjunction and disjunction.

Logic Circuits: Jigalkin Algebra finds applications in the design and analysis of logic circuits. Using the algebraic properties of Jigalkin algebra, logic circuits can be optimized and evaluated for their functionality and performance.

Applications: Jigalkin algebra has applications in various fields, including computer science, digital electronics, cryptography, and artificial intelligence. It provides a mathematical framework for the analysis and design of logic systems and plays an important role in circuit optimization, theorem proving, and algorithm development.

Introduction: DJigalkin algebra is a mathematical structure that extends the concepts of Boolean algebra, providing a basis for the analysis of Boolean operations and polynomials. Named after the famous Soviet mathematician Anatoly Ivanovich Jigalkin, this algebraic system has been used in various fields such as computer science, digital electronics, cryptography, and artificial intelligence. This article aims to review Jigalkin algebra, its basic concepts, basic operations and its importance in various applications.

Basics of Jigalkin algebra:

1.1 Logical algebra:Before studying Jigalkin algebra, it is necessary to understand Boolean algebra. Boolean algebra deals with logical operations on binary variables (true and false) and provides a mathematical framework for analyzing and manipulating logical expressions. This forms the basis of Jigalkin algebra.

1.2 Jigalkin algebra:DJigalkin algebra extends Boolean algebra by introducing the notion of an orthogonal system. An orthogonal system consists of polynomials called orthopairs, which are the basis for expressing logical functions. These orthopairs are essential for the analysis of logical functions and serve as building blocks in Jigalkin algebra.

Operations in Jigalkin algebra:

DJigalkin algebra includes several operations that allow manipulation and transformation of logical expressions. The main operations include:

2.1 Associative (AND): Associative joins two logical expressions and returns true if both expressions are true.

2.2 Disjunction (OR): A disjunction joins two logical expressions and returns true if at least one of the expressions is true.

2.3 Negation (NOT): Negation changes the truth value of a boolean expression. If the expression is true, the negation makes it false and vice versa.

2.4 Implication (IMPLIES): Implication expresses logic

REFERENCES:

1. Gindikin [Гиндикин], Semen Grigorʹevich [Семен Г.] (1972). Algebraic logic алгебра логики в задачах [Algebraic Logic] (in Russian) (1 ed.). Moscow, Russia: Наука [Nauka]. ISBN 0-387-96179-8. (288 pages) (NB. Translation: Springer-Verlag, 1985.[1])
2. Perkowski, Marek A.; Grygiel, Stanislaw (1995-11-20). "6. Historical Overview of the Research on Decomposition". A Survey of Literature on Function Decomposition. Version IV. Functional Decomposition Group, Department of Electrical Engineering, Portland University, Portland, Oregon, USA. pp. 21–22. CiteSeerX 10.1.1.64.1129. (188 pages)