

Abstract

The thesis investigates how to transform one Latin square into another using local changes, and applies this approach to develop algorithms for finding Latin squares orthogonal to a given one. In the first chapter, we work with the concept of a improper Latin square, which extends the well-known concept of a Latin square. We introduce an alternative approach to proving the connectivity of the graph of the extended Latin square space. In the second chapter, we connect Jacobson and Matthews' algorithm, which implements random walk on the graph, with a method for generating a binary operation orthogonal to two given binary operations. We propose two heuristic algorithms for finding a binary operation orthogonal to a given Latin square and approximating a Latin square. Finally, we compare both algorithms in computational experiments on a test set of Latin squares of orders 7-10.