Abstract

In this paper, the extended Karnaugh Map representation (EKMR) scheme has been proposed as an alternative to the traditional matrix representation (TMR) which caused the multi-dimensional array operation to be inefficient when extended to dimensions higher than two. Multi-dimensional arrays are widely used in a lot of scientific studies but still some issues have been encountered regarding efficient operations of these multi-dimensional arrays. EKMR
scheme has managed to successfully optimize the performance of the multi-dimensional array operations to the nth dimension of the array. The basic concept EKMR is to transform the multi-dimensional array in to a set of two-dimensional arrays. EKMR scheme implies Karnaugh Map which is a technique used to reduce a Boolean expression. It is commonly represented with the help of a rectangular map which holds all the possible values of the Boolean expression. Then the efficient data parallel algorithms for multi-dimensional matrix multiplication operation using EKMR are presented in this study which outperformed those data parallel algorithms for multi-dimensional matrix multiplication operation which used the TMR scheme. The study encourages designing data parallel algorithms for multi-dimensional dense and sparse multi-dimensional arrays for other operations as well using the EKMR scheme since this scheme produces the efficient performance for all dimensions and for all operations of the arrays.

Reference

A New Approach for Representation of Multi-dimensional Matrix Multiplication Operations

University Press, Baltimore, Maryland 21218, 1989.

Index Terms

Computer Science Parallel Computing

Key words
Matrix Multiplication Algorithm EKMR TMR