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
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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 into 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

University Press, Baltimore, Maryland 21218, 1989.


Index Terms

Computer Science
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Key words

Matrix Multiplication Algorithm  EKMR  TMR