Multidimensional arrays product

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December 18, 2019

A product of multidimensional arrays is defined, denoted here by "$\diamond$", as follows. If A is an $r \times c \times d$ array and B is a $c \times e$ array (matrix) then $C = A \diamond B$ is the $r \times e \times d$ array such that $C[i, j, k] = \sum_{m=1}^{c} A[i, m, k]B[m, j]$. In words, the multidimensional array A works like a sequence of d matrices $r \times c$ and each one is multiplied by the matrix B to form the third dimension of C. If A is an $r \times c \times d$ array and B is a $c \times e \times f$ array then $C = A \diamond B$ is the $r \times e \times d \times f$ array such that $C[i, j, k, l] = \sum_{m=1}^{c} A[i, m, k]B[m, j, l]$. In words, the multidimensional array A works like a sequence of d $r \times c$ matrices and each one is multiplied by a sequence of f matrices $c \times e$ to form the third and fourth dimensions of C. If A is an $r \times c$ array and B is a $c \times e \times f$ multidimensional array, then $C = A \diamond B$ is the $r \times e \times f$ array such that $C[i, j, k] = \sum_{m=1}^{c} A[i, m]B[m, j, k]$. Notice that when the multidimensional array is a matrix, the $\diamond$ product is the usual matrix product.

An `R` language (R Core Team, 2018) implementation of the proposed multidimensional arrays product "$\diamond$" is given in function `%m%`.

See the MultiDimensionalArrayProduct-example.R to compare to other multidimensional arrays products.

References

R Core Team (2018). R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria. `https://www.R-project.org/`

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