Package 'TensorDB'

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Type Package

Title X

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Imports abind,
Hmisc,
MASS,
plyr

Suggests

Description Data

License GPL (>= 2)

LazyLoad yes

LazyData true

RoxygenNote 7.0.2

R topics documented:

A2M *Converts Array to matrix*

Description

Converts Array to matrix

Usage

```
A2M(
  A,
  n,
  p = if (is.character(n)) {     setdiff(names(dimnames(A), n)) } else {
    setdiff(1:length(dim(A)), n) }
)
```

Arguments

A	An (eventually named) array
n	a subvector of 1:length(dim(A)) or names(dimnames(A)).
p	a subvector of 1:length(dim(A)) or names(dimnames(A)).

extractA *Extracts dimension from array*

Description

Extracts dimension from array

Usage

```
extractA(A, a, ...)
```

Arguments

A	a named array
a	a list of dimensions of A (a subvector of 1:length(dim(A)) or a subvector of dimnames(A))
...	a vector the same length of a of integers. necessarily ...[i]<=dim(A)[a[i]]

Examples

```
A=array(1:(prod(2:4)),2:4);
dimnames(A)<-sapply(dim(A),seq_len)
names(dimnames(A))<-paste0("x",2:4)
extractA(A,integer(0),integer(0));
extractA(A,"x3",2);
extractA(A,c("x4","x3"),1,2);
```

`%.%` *Define a tensor product*

Description

Define a tensor product

Usage

```
A %.% B
```

Arguments

A	An (eventually named) array of dimension $\dim(A) = (a_i)_{i \in I_A}$
B	An (eventually named) array of dimension $\dim(B) = (b_j)_{j \in I_B}$
I_A	a named list of subvectors from names(dimnames(A)) or from 1:length(dim(A)). $I_A = (I_A^{(c)}, I_A^{(n)}, I_A^{(p)})$.
I_B	a named list of subvectors from names(dimnames(B)) or from 1:length(dim(B)). $I_B = (I_B^{(c)}, I_B^{(p)}, I_B^{(q)})$. Necessarily, $(\dim(A))_{I_A^{(p)}} = (\dim(B))_{I_B^{(p)}}$ (e.g dim(A)[I_A$p]==dim(B)[I_B$p] and $(\dim(A))_{i \in I_A^{(c)}} = (\dim(B))_{i \in I_B^{(c)}}$ e.g dim(A)[I_A$c]==dim(B)[I_B$c])

Value

C=AB the array of dimension $\left((a_\ell)_{\ell \in I_A^{(c)}}, (a_i)_{i \in I_A^{(n)}} (b_j)_{j \in I_B^{(q)}}\right)$ defined by

$$\forall (\ell_1, \ldots, \ell_C) \in \prod_{i \in I_A^{(c)}} \{1, \ldots, a_i\},$$

$$\forall (i_1, \ldots, i_N) \in \prod_{i \in I_A^{(n)}} \{1, \ldots, a_i\},$$

$$\forall (j_1, \ldots, j_Q) \in \prod_{j \in I_B^{(q)}} \{1, \ldots, b_j\},$$

$$C[\ell_1, \ldots, \ell_C, i_1, \ldots, i_N, j_1, \ldots, j_Q] = \sum_{k_1=1}^{K_1} \ldots \sum_{k_P=1}^{K_P} A^\star[\ell_1, \ldots, \ell_C, i_1, ..., i_q, k_1, ..., k_p] \times B^\star[\ell_1, \ldots, \ell_C, k_1, ..., k_p, j_1, ..., j_n]$$

where $A^\star$ and $B^\star$ are multidimensional transposition of A and B and $K_1, \ldots, K_P = \dim(A)_{I_A^{(p)}}$.

Examples

```
A=array(1:(prod(2:6)),2:6);
dimnames(A)<-sapply(dim(A),seq_len)
names(dimnames(A))<-paste0("x",2:6)
B=array(1:(prod(3:7)),3:7);
dimnames(B)<-sapply(dim(B),seq_len)
names(dimnames(B))<-paste0("y",3:7)
I_A=list(c=c("x3","x5"),n=c("x2","x4"),p="x6")
I_B=list(c=c("y3","y5"),q=c("y4","y7"),p="y6")
"%.%"(A,B)
"%.%"(A,B,I_A,I_B)
W%.%.%.%t(X);
```

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