Package ‘keep’

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Type Package
Title Arrays with Better Control over Dimension Dropping
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Description Provides arrays with flexible control over dimension dropping when subscripting.
Depends methods
Suggests Oarray
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**R topics documented:**

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**Description**

Carrying out an array a subset operation in traditional R will result in dimensions being dropped when those dimensions have a size of 1. We can circumvent this behaviour by setting `drop=FALSE` but this is an all or nothing approach and often we require a more refined control over which dimensions will be dropped. This extension provides the means to better control dropping behaviour.
Usage

karray(data = NA, dim = length(data), dimnames = NULL)
kOarray(data = NA, dim = length(data), dimnames = NULL, offset = rep(1, length(dim)),
        drop.negative = TRUE)
as.karray(x, ...)
as.kOarray(x, offset = rep(1, length(dim)), drop.negative = TRUE)
keep(index)
## S3 method for class 'keep'
as.array(x, ...)

Arguments

data, dim, dimnames, drop
   As in the function array
offset
   Vector of first index values for each extent (defaults to 1s); a length-one argu-
   ment will be silently recycled to the appropriate length
drop.negative
   Should negative subscripts indicate exclusion?
x
   an array or Oarray created with karray or kOarray respectively to be subsetted
...
   arguments to specify how to subset x
index
   an index or index range in a subsetting operation

Details

karray delegates to array to create an array of given size and initialisation but adds the S3 class
attribute keep to it. The keep S3 class designation is used to direct the dispatch of array subsetting
to the overloaded [ operator method, which in turn provides the added control over dimension drop-
ning. [] method merely acts as a man in the middle, delegating the actual subsetting to the handler
for the array S3 class. It then re-attributes the result with the appropriate dimension attributes.
kOarray behaves in the same manner except the base S3 class is now Oarray instead of array. Note
that Oarray is a package extension that must be installed and loaded if you wish to make use of
kOarray.
as.karray casts an array into a karray in a similar manner to as.array. Likewise as.kOarray
casts an Oarray into a kOarray.

Traditional R will drop dimensions if the size of that dimension is 1. This can cause major
headaches if you wish to write programs in R that use array subsetting with variable subsetting
constraints. Consider for example,

M <- array(1:12, c(1,3,4))
for (i in 1:4) print(dim(M[,i:i:4]))

which produces the output,

[1] 3 4
[1] 3 3
[1] 3 2
NULL
The first thing to notice is that the first dimension has been dropped even though we wouldn’t necessarily expect it to as we provided an empty argument in the subsetting expression. As it has a size of 1 it has been dropped. The second point to notice is that for the case of \( i = 4 \) another dimension was dropped as 4:4 results in a dimension of size 1. Now look at the same case but with karray instead.

```r
M <- karray(1:12, c(1,3,4))
for (i in 1:4) print(dim(M[,i:4]))
```

which produces the output,

```
[1] 1 3 4
[1] 1 3 3
[1] 1 3 2
[1] 1 3
```

In this case the first dimension is preserved because for S3 class keep an empty indexing argument implies we want to keep the dimension. However, we still have the issue that if an indexing argument evaluates to 1 then it will be dropped. However, we can stop this behaviour by making use of the \texttt{keep()} function which flags the index dimension to be kept as a side effect of the function call. In this case,

```r
M <- karray(1:12, c(1,3,4))
for (i in 1:4) print(dim(M[,keep(i:4)]))
```

produces the output,

```
[1] 1 3 4
[1] 1 3 3
[1] 1 3 2
[1] 1 3 1
```

**Value**

\texttt{karray} and \texttt{as.karray} returns an \texttt{array} with additional S3 class designation of \texttt{keep}.
\texttt{k0array} and \texttt{as.k0array} returns an \texttt{Oarray} with additional S3 class designation of \texttt{keep}.
\texttt{as.array} returns an \texttt{array} with the additional S3 class designation removed.
\texttt{keep} returns the index passed in. The function is used for its side effect of marking a dimension for preservation.

**Note**

Whilst this package references the \texttt{Oarray} package internally it does not make this dependency explicit. It does so to avoid having to have the package installed in cases where you are not going to be using \texttt{Oarray}. If you wish to use the \texttt{Oarray} related support you will need to ensure that the package is installed and loaded yourself.

If you are going to be using \texttt{keep} arrays in S4 classes then you can make reference to the appropriate array type through the package defined class unions \texttt{karray} and \texttt{k0array}. For example,

```r
setClass("MyS4Class", representation(Array1="karray",Array2="karray", ...))
```
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See Also
array, Oarray

Examples

# Normal R array
M <- array(1:12, c(4,3,1))

# First dimension dropped because it has size 1
print(M[,2,])

# Normal R array but with keep class
M2 <- karray(1:12, c(4,3,1))

# First dimension preserved
print(M2[,2,])

# middle dimension dropped for i=3 because 3:3 has length 1
for (i in 1:3) print(M2[,i:3])

# use keep() to preserve middle dimension
for (i in 1:3) print(M2[,keep(i:3)])

# indexing through arrays works as normal
ind <- as.matrix(expand.grid(1:4,1:3,1:1))
M2[ind]
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