Package 'kdtools'

October 6, 2018

Type Package

Title Tools for Working with Multidimensional Data

Version 0.3.1

Description Provides various tools for working with multidimensional data in R and C++, including extremely fast nearest-neighbor- and range-queries without the overhead of linked tree nodes.

License MIT + file LICENSE

Encoding UTF-8

LazyData true

Imports Rcpp (>= 0.12.14)

LinkingTo Rcpp, strider, BH

Suggests testthat, knitr, rmarkdown, covr, ggplot2, tidytext, printr, scales

VignetteBuilder knitr

RoxygenNote 6.0.1

URL https://github.com/thk686/kdtools

BugReports https://github.com/thk686/kdtools/issues

NeedsCompilation yes

Author Timothy Keitt [aut, cre]

Maintainer Timothy Keitt <tkeitt@gmail.com>

Repository CRAN

Date/Publication 2018-04-26 21:16:32 UTC

R topics documented:

kd_lower_bound *Search sorted data*

Description

Search sorted data

Usage

```
kd_lower_bound(x, v)

kd_upper_bound(x, v)

kd_range_query(x, l, u)

kd_binary_search(x, v)
```

Arguments

x	an object sorted by kd_sort
v	a vector specifying where to look
l	lower left corner of search region
u	upper right corner of search region

Examples

```
x = matrix(runif(200), 100)
y = matrix_to_tuples(x)
kd_sort(y, inplace = TRUE)
y[kd_lower_bound(y, c(1/2, 1/2)),]
y[kd_upper_bound(y, c(1/2, 1/2)),]
kd_binary_search(y, c(1/2, 1/2))
kd_range_query(y, c(1/3, 1/3), c(2/3, 2/3))
```

kd_nearest_neighbors *Find nearest neighbors*

Description

Find nearest neighbors

Usage

```
kd_nearest_neighbors(x, v, n)

kd_nearest_neighbor(x, v)
```

Arguments

x	an object sorted by kd_sort
v	a vector specifying where to look
n	the number of neighbors to return

Examples

```
x = matrix(runif(200), 100)
y = matrix_to_tuples(x)
kd_sort(y, inplace = TRUE)
y[kd_nearest_neighbor(y, c(1/2, 1/2)),]
kd_nearest_neighbors(y, c(1/2, 1/2), 3)
```

---

kd_sort *Sort multidimensional data*

Description

Sort multidimensional data

Usage

```
kd_sort(x, ...)

kd_is_sorted(x)
```

Arguments

x	a matrix or arrayvec object
...	other arguments

Details

The algorithm used is a divide-and-conquer quicksort variant that recursively partions an range of tuples using the median of each successive dimension. Ties are resolved by cycling over successive dimensions. The result is an ordering of tuples matching their order if they were inserted into a kd-tree.

Note

The matrix version will be slower because of data structure conversions.

See Also

arrayvec

Examples

```
x = kd_sort(matrix(runif(200), 100))
kd_is_sorted(x)
plot(x, type = "o", pch = 19, col = "steelblue", asp = 1)
```

lex_sort *Sort a matrix into lexicographical order*

Description

Sort a matrix into lexicographical order

Usage

```
lex_sort(x, ...)
```

Arguments

x	a matrix or arrayvec object
...	other parameters

Details

Sorts a range of tuples into lexicographical order.

Examples

```
x = lex_sort(matrix(runif(200), 100))
plot(x, type = "o", pch = 19, col = "steelblue", asp = 1)
```

matrix_to_tuples *Convert a matrix to a vector of arrays*

Description

Convert a matrix to a vector of arrays

Usage

```
matrix_to_tuples(x)

tuples_to_matrix(x)
```

Arguments

x	object to be converted

Details

The algorithms in kdtools can accept either matrices or an arrayvec object. When a matrix is passed, it is converted to an arrayvec object internally and the results are converted back to a matrix. For optimal performance, pre-convert matrices.

Examples

```
x = matrix(1:10, 5)
y = matrix_to_tuples(x)
str(x)
str(y)
y[1:2, ]
```

`print.arrayvec` *Support for C++ vector of arrays*

Description

Support for C++ vector of arrays

Usage

```
## S3 method for class 'arrayvec'
print(x, ...)

## S3 method for class 'arrayvec'
dim(x)

## S3 method for class 'arrayvec'
as.matrix(x, ...)

## S3 method for class 'arrayvec'
as.data.frame(x, ...)

## S3 method for class 'arrayvec'
x[i, j, drop = TRUE]

## S3 method for class 'arrayvec'
x[[...]]
```

Arguments

`x`	an arrayvec object
`...`	other parameters
`i`	row
`j`	column
`drop`	drop singleton dimensions if true

Details

Because `kdtools` is implemented in C++, it operates natively on a vector of arrays. An `arrayvec` object is a wrapper around a pointer to a vector of arrays. These functions provide some ability to manipulate the data as if it were a matrix.

Index