Package 'hilbert'

April 8, 2022

Title Coordinate Indexing on Hilbert Curves

Version 0.2.1

Description Provides utilities for encoding and decoding coordinates to/from Hilbert curves based on the iterative encoding implementation described in Chen et al. (2006) <doi:10.1002/spe.793>.

URL https://hilbert.justinsingh.me, https://github.com/program--/hilbert

BugReports https://github.com/program--/hilbert/issues

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Encoding UTF-8

RoxygenNote 7.1.2

SystemRequirements C++11

Suggests bit64 (>= 4.0.0), testthat (>= 3.0.0), covr, knitr, rmarkdown

LinkingTo cpp11

Config/testthat/edition 3

VignetteBuilder knitr

NeedsCompilation yes

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R topics documented:

coords_to_position *Convert Coordinates to Grid Positions*

Description

Convert Coordinates to Grid Positions

Usage

```
coords_to_position(x, ..., n = 10L, extent = NULL)

## S3 method for class 'data.frame'
coords_to_position(x, ..., n, extent, coords = c(1, 2), attach = TRUE)

## S3 method for class 'matrix'
coords_to_position(x, ..., n, extent, coords = c(1, 2), attach = TRUE)

## S3 method for class 'numeric'
coords_to_position(x, y, ..., n, extent)

## S3 method for class 'double'
coords_to_position(x, y, ..., n, extent)

## S3 method for class 'integer'
coords_to_position(x, y, ..., n, extent)

coords_to_position64(x, ..., n = 10L, extent = NULL)

## S3 method for class 'data.frame'
coords_to_position64(x, ..., n, extent, coords = c(1, 2), attach = TRUE)

## S3 method for class 'matrix'
coords_to_position64(x, ..., n, extent, coords = c(1, 2), attach = TRUE)

## S3 method for class 'numeric'
coords_to_position64(x, y, ..., n, extent)

## S3 method for class 'double'
coords_to_position64(x, y, ..., n, extent)

## S3 method for class 'integer'
coords_to_position64(x, y, ..., n, extent)
```

Arguments

x	One of: Numeric vector, `data.frame`, or `matrix`. If a numeric vector, then it corresponds to X coordinates.

...	Unused.
n	Exponent to the dimensions of the underlying grid. The Hilbert Curve indices are based on a 2^n x 2^n grid. This number must be less than 15 due to the 32-bit implementation of R.
extent	Named vector with names xmax, xmin, ymax, ymin. Corresponds to the bounding box of the given coordinates. If extent is NULL, then the bounding box is found from the given coordinates.
coords	Column names or indices of a data.frame/matrix that contain the coordinates.
attach	If TRUE, adds the position as new columns to the given data.frame/matrix. This will *replace* the coordinate columns.
y	Numeric vector corresponding to Y coordinates.

Value

A data.frame containing the positions as integer columns x and y, or the original object (data.frame or matrix) with the coordinates replaced with the grid positions. When n is greater than 15, the positions are of type bit64::integer64.

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index *Index positions to a Hilbert Curve*

Description

Index positions to a Hilbert Curve

Usage

```
index(x, ..., n = 10L)

## S3 method for class 'data.frame'
index(x, ..., n, coords = c(1, 2), attach = TRUE)

## S3 method for class 'matrix'
index(x, ..., n, coords = c(1, 2), attach = TRUE)

## S3 method for class 'double'
index(x, y, ..., n)

## S3 method for class 'numeric'
index(x, y, ..., n)

## S3 method for class 'integer'
index(x, y, ..., n)

index64(x, ..., n = 10L)
```

```
## S3 method for class 'data.frame'
index64(x, ..., n, coords = c(1, 2), attach = TRUE)

## S3 method for class 'matrix'
index64(x, ..., n, coords = c(1, 2), attach = TRUE)

## S3 method for class 'double'
index64(x, y, ..., n)

## S3 method for class 'integer'
index64(x, y, ..., n)

## S3 method for class 'numeric'
index64(x, y, ..., n)

## S3 method for class 'integer64'
index64(x, y, ..., n)

## S3 method for class 'character'
index64(x, y, ..., n)

## S3 method for class 'bitstring'
index64(x, y, ..., n)
```

Arguments

x	One of: Numeric vector, data.frame, or matrix. If a numeric vector, then it corresponds to the rows of a position.
...	Unused.
n	Exponent to the dimensions of the underlying grid. The Hilbert Curve indices are based on a 2^n x 2^n grid. This number must be less than 15 due to the 32-bit implementation of R.
coords	Column names or indices of a data.frame/matrix that contain the position coordinates.
attach	If TRUE, adds the indices as a new column to the given data.frame/matrix. If x is a data.frame, then the column is named h; otherwise, it is an unnamed column at the end of the matrix.
y	Numeric vector. Corresponds to the columns of a position.

Value

An integer vector of Hilbert indices, or when attach is TRUE, the original object (data.frame or matrix) with a new integer column (h for data.frame) containing the Hilbert indices. When n is greater than 15, the vector is of type bit64::integer64.

position *Get index positions from a Hilbert Curve*

Description

Get index positions from a Hilbert Curve

Usage

```
position(h, ..., n = 10L)

## S3 method for class 'data.frame'
position(h, ..., n, idx = 1, attach = TRUE)

## S3 method for class 'matrix'
position(h, ..., n, idx = 1, attach = TRUE)

## S3 method for class 'numeric'
position(h, ..., n)

## S3 method for class 'integer'
position(h, ..., n)

position64(h, ..., n = 10L)

## S3 method for class 'data.frame'
position64(h, ..., n, idx = 1, attach = TRUE)

## S3 method for class 'matrix'
position64(h, ..., n, idx = 1, attach = TRUE)

## S3 method for class 'double'
position64(h, ..., n)

## S3 method for class 'integer'
position64(h, ..., n)

## S3 method for class 'numeric'
position64(h, ..., n)

## S3 method for class 'integer64'
position64(h, ..., n)

## S3 method for class 'character'
position64(h, ..., n)

## S3 method for class 'bitstring'
```

```
position64(h, ..., n)
```

Arguments

h	One of: Integer vector, data.frame, or matrix.
...	Unused.
n	Exponent to the dimensions of the underlying grid. The Hilbert Curve indices are based on a 2^n x 2^n grid. This number must be less than 15 due to the 32-bit implementation of R. This *must* be the same as the n used in index.
idx	Column name or index containing the Hilbert Curve indices.
attach	If TRUE, adds the position as new columns to the given data.frame/matrix. If h is a data.frame, then the columns are named x and y; otherwise, it is two unnamed columns at the end of the matrix.

Value

A data.frame containing the positions as integer columns x and y, or the original object (data.frame or matrix) with the columns attached. When n is greater than 15, the positions are of type bit64::integer64.

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position_to_coords *Convert Grid Positions to Coordinates*

Description

Convert Grid Positions to Coordinates

Usage

```
position_to_coords(x, ..., n = 10L, extent = NULL)

## S3 method for class 'data.frame'
position_to_coords(x, ..., n, extent, coords = c(1, 2), attach = TRUE)

## S3 method for class 'matrix'
position_to_coords(x, ..., n, extent, coords = c(1, 2), attach = TRUE)

## S3 method for class 'numeric'
position_to_coords(x, y, ..., n, extent)

## S3 method for class 'double'
position_to_coords(x, y, ..., n, extent)

## S3 method for class 'integer'
position_to_coords(x, y, ..., n, extent)
```

```
position_to_coords64(x, ..., n = 10L, extent = NULL)

## S3 method for class 'data.frame'
position_to_coords64(x, ..., n, extent, coords = c(1, 2), attach = TRUE)

## S3 method for class 'matrix'
position_to_coords64(x, ..., n, extent, coords = c(1, 2), attach = TRUE)

## S3 method for class 'numeric'
position_to_coords64(x, y, ..., n, extent)

## S3 method for class 'double'
position_to_coords64(x, y, ..., n, extent)

## S3 method for class 'integer64'
position_to_coords64(x, y, ..., n, extent)

## S3 method for class 'bitstring'
position_to_coords64(x, y, ..., n, extent)
```

Arguments

x	One of: Integer vector, data.frame, or matrix. If a numeric vector, then it corresponds to Row positions.
...	Unused.
n	Exponent to the dimensions of the underlying grid. The Hilbert Curve indices are based on a 2^n x 2^n grid. This number must be less than 15 due to the 32-bit implementation of R.
extent	Named vector with names xmax, xmin, ymax, ymin. Corresponds to the bounding box of the given coordinates. If extent is NULL, then the function will throw an exception.
coords	Column names or indices of a data.frame/matrix that contain the positions.
attach	If TRUE, adds the coordinates as new columns to the given data.frame/matrix. This will *replace* the position columns.
y	Integer vector corresponding to Column positions.

Value

A data.frame containing the coordinates as numeric columns x and y, or the original object (data.frame or matrix) with the positions replaced with the coordinates.

Index