Package 'dualtrees'

October 24, 2019

Title Decimated and Undecimated 2D complex dual-tree wavelet transform

Version 0.0.1

Description What the package does (one paragraph).

Depends R (>= 3.5.0)

License What license is it under?

Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

R topics documented:

blossom *Two meteorologists in front of cherry blossoms*

Description

A very beautiful image.

Usage

```
blossom
```

Format

A 512x512 matrix of gray-scale values

Source

real life

Examples

```
image(blossom, col=gray.colors(32,0,1))
```

boys *Two stromchasers in the sun*

Description

Another classic image.

Usage

```
boys
```

Format

A 256x256 matrix of gray-scale values

Source

real life

Examples

```
image(boys, col=gray.colors(32,0,1))
```

c2q — *Transform six fields of complex coefficients back into four trees.*

Description

This function takes the the six directional complex daughter wavelet coefficients and re-constructs the three combinations of high- and low passes from the four trees (ab, ba, aa, bb).

Usage

```
c2q(comp)
```

Arguments

comp	complex array of dimnesions nx, ny, 6

Value

a list of low- and high-pass components from the four trees, names LoaHia, LobHib, etc.

Examples

```
c2q( comp )
```

decimate — *delete every second row of a matrix*

Description

delete every second row of a matrix

Usage

```
decimate(mat, odd = FALSE, dec = TRUE)
```

dtcwt — *The 2D forward dualtree complex wavelet transform*

Description

This function performs the dualtree complex wavelet analysis, either with or withour decimation

Usage

```
dtcwt(mat, fb1 = near_sym_b, fb2 = qshift_b, J = NULL, dec = TRUE,
  mode = NULL, verbose = TRUE, boundaries = "periodic")
```

Arguments

mat	the real matrix we wish to transform
fb1	A list of analysis filter coefficients for the first level. Currently only near_sym_b and near_sym_b_bp are implemented
fb2	A list of analysis filter coefficients for all following levels. Currently only qshift_b and qshift_b_bp are implemented
J	number of levels for the decomposition. Defaults to log2(min(Nx,Ny)) in the decimated case and log2(min(Nx,Ny)) - 3 otherwise
dec	whether or not the decimated transform is desired
mode	how to perform the convolutions, either "direct" or "FFT"

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holes *insert holes into a filter?*

Description

insert holes into a filter?

Usage

```
holes(fil, second = TRUE)
```

---

idtcwt *The 2D inverse dualtree complex wavelet transform*

Description

The 2D inverse dualtree complex wavelet transform

Usage

```
idtcwt(pyr, fb1 = near_sym_b, fb2 = qshift_b, mode = "direct",
  verbose = TRUE, boundaries = "periodic")
```

---

make_square *Padded boundary conditions*

Description

Padded boundary conditions

Usage

```
make_square(picture, N, Ny = N, value = min(picture, na.rm = TRUE))
```

my_conv *Convolve the columns of a matrix in a varitey of ways*

Description

This function convolves the columns of a matrix mat with a filter fil.

Usage

```
my_conv(mat, fil, dec = TRUE, mode = "direct", odd = FALSE,
  boundaries = "periodic")
```

Arguments

mat	a matrix
fil	the filter to convolve the columns with

Examples

```
require( fields )
data( lennon )
my_conv( lennon, c(-1,1) )
```

near_sym_b *A q-shift filter for the second to last levels*

Description

Data from a QTL experiment on gravitropism in

Usage

```
data(qshift_b)
```

Format

A list of high- and low-pass filters for analysis and synthesis

Source

dtcwt python package

Examples

```
data(qshift_b)
```

near_sym_b_bp *A q-shift filter for the second to last levels*

Description

Data from a QTL experiment on gravitropism in

Usage

```
data(qshift_b)
```

Format

A list of high- and low-pass filters for analysis and synthesis

Source

dtcwt python package

Examples

```
data(qshift_b)
```

period_bc *Periodic boundary conditions*

Description

Periodic boundary conditions

Usage

```
period_bc(x, N, Ny = N)
```

put_in_mirror *Reflective boundary conditions*

Description

Reflective boundary conditions

Usage

```
put_in_mirror(x, N, Ny = N)
```

q2c *Transform data from the four trees to six fields of complex coefficients.*

Description

This function takes the four combinations of high- and low passes from the four trees (ab, ba, aa, bb) and re-arranges them into the six directional complex daughter wavelets.

Usage

```
q2c(q)
```

Arguments

q	a list of wavelet coefficients named LoaHia, LobHib, HiaLoa, ...

Value

a complex array of size nx, ny, 6

Examples

```
q2c( q )
```

qshift_b *A q-shift filter for the second to last levels*

Description

Data from a QTL experiment on gravitropism in

Usage

```
data(qshift_b)
```

Format

A list of high- and low-pass filters for analysis and synthesis

Source

dtcwt python package

Examples

```
data(qshift_b)
```

qshift_b_bp — *A q-shift filter for the second to last levels*

Description

Data from a QTL experiment on gravitropism in

Usage

```
data(qshift_b)
```

Format

A list of high- and low-pass filters for analysis and synthesis

Source

dtcwt python package

Examples

```
data(qshift_b)
```

shift1 — *shift a matrix forward or backward by one row*

Description

shift a matrix forward or backward by one row

Usage

```
shift1(x, forward = TRUE)
```

upsample — *add rows with zeroes to a matrix*

Description

add rows with zeroes to a matrix

Usage

```
upsample(mat, odd = TRUE)
```

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