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aggts

Aggregates a tsvreq_classic object across a set of timescales; also the constructor function for class vreq_classic_ag.

Description

All the components of a tsvreq_classic object can be aggregated across an arbitrary set of timescales, producing a new variance ratio equation - this function performs that aggregation. The function returns a vreq_classic_ag object, and is the constructor function of that class. The vreq_classic_ag class has slots com, comnull, vr, which are the same as a vreq object, but also has slot ts, which is the timescales over which aggregation was performed to get the object. The class inherits from vreq, which inherits from list.

Usage

aggts(obj, ts)

Arguments

- obj: A tsvreq_classic object
- ts: The timescales to aggregate over

Details

Before aggregation is performed, the argument ‘ts’ is intersected with the canonical Fourier timescales greater than or equal to the Nyquist timescale, and the resulting timescales are then reflected about the Nyquist timescale. This is to account for the symmetry of Fourier transforms about the Nyquist frequency. The ‘ts’ slot of the output object shows the intersected, reflected timescales that were actually used for aggregation. See the examples.
cospect

Calculate the cospectrum between all pairs of time series

Description
This function is used to calculate the cospectra between pairs of time series, including each time series with itself. These are based on simple ffts without smoothing.

Usage
`cospect(X)`

Arguments
X a matrix with counts or densities arranged in species by time step.
Value

cospect return a list with elements

frequency a vector from 0 to 1 of the frequencies used
cospectrum a 3D array, with cospectrum range in species by species by frequency

Author(s)

Lei Zhao, <lei.zhao@cau.edu.cn>; Daniel Reuman, <reuman@ku.edu>

Examples

X<-matrix(runif(200,1,100), 10, 20)
ans<-cospect(X)

---

cv2 Calculates various measures of population and community variability

Description

Calculates various measures of population and community variability

Usage

cv2(X, type)

Arguments

X A matrix with counts or densities arranged in species by time step
type If pop, calculate CVpop2. If com, calculate CVcom2. If comip, calculate CVcomip2. See the vignette for definitions of these quantities.

Value

cv2 returns the value of population or community variability.

Author(s)

Lei Zhao, <lei.zhao@cau.edu.cn>; Daniel Reuman, <reuman@ku.edu>; Shaopeng Wang, <shaopeng.wang@pku.edu.cn>

References

Zhao et al, (In prep) Decomposition of the variance ratio illuminates timescale-specific population and community variability.
cv2f

See Also

vreq_classic, vreq_LdM, cv2f, browseVignettes("tsvr")

Examples

X<-matrix(runif(200,1,100), 10, 20)
ans<-cv2(X, type="com")

---

**cv2f**

*Compute a frequency-specific version of CVcom or CVcomip*

Description

Compute a frequency-specific version of CVcom or CVcomip.

Usage

cv2f(X, type)

Arguments

- **X**: A matrix with counts or densities arranged in species by time step
- **type**: If `com`, calculate a frequency-specific CVcom2. If `comip`, calculate a frequency-specific CVcomip2. See the vignette for definitions of these quantities.

Value

cv2f returns an object of type list consisting of

- **frequency**: a vector from 0 to 1 (not including 0 and 1)
- **cv2**: A vector of frequency-specific population or community variability

Author(s)

Shaopeng Wang, <shaopeng.wang@pku.edu.cn>; Lei Zhao, <lei.zhao@cau.edu.cn>; Daniel Reuman, <reuman@ku.edu>

References

Zhao et al, (In prep) Decomposition of the variance ratio illuminates timescale-specific population and community variability.

See Also

tsvreq_classic, cv2, browseVignettes("tsvr")
Examples

X<-matrix(runif(200,1,100), 10, 20)
ans<-cv2f(X, type="com")

errcheck_data

Error check a data matrix.

Description

Error check a data matrix.

Usage

errcheck_data(X, calledby)

Arguments

X a matrix with counts or densities arranged in species by years. No NAs or negative values allowed, constant species not allowed.
calledby the function calling this one

Value

errcheck_data returns nothing but throws and error if the inputs do not meet the requirements

Author(s)

Daniel Reuman, <reuman@ku.edu>

errcheck_tsvreq

Error check inputs for the creator function for the tsvreq class.

Description

Error check inputs for the creator function for the tsvreq class.

Usage

errcheck_tsvreq(ts, com, comnull, tsvr, wts)
**errcheck_vreq**

**Arguments**
- **ts**: Timescales, should be a numeric vector of nonnegative numbers.
- **com**: Should be a vector of nonnegative numbers, equal to `comnull*tsvr`.
- **comnull**: Should be a vector of nonnegative numbers.
- **tsvr**: Should be a vector of nonnegative numbers.
- **wts**: Should be a vector of nonnegative numbers.

**Value**

`errcheck_vreq` returns nothing but throws an error if the inputs do not meet the requirements of a `vreq` object.

**Author(s)**

Daniel Reuman, <reuman@ku.edu>

---

**Description**

Error check inputs for the creator function for the `vreq` class.

**Usage**

`errcheck_vreq(com, comnull, vr)`

**Arguments**

- **com**: Should be a positive number, equal to `comnull*vr`.
- **comnull**: Should be a positive number.
- **vr**: Should be a positive number.

**Value**

`errcheck_vreq` returns nothing but throws an error if the inputs do not meet the requirements of a `vreq` object.

**Author(s)**

Daniel Reuman, <reuman@ku.edu>
JRGdat

Percent cover data from Jasper Ridge Biological Preserve serpentine grassland site

Description

A data set of percent cover of plant species in a plot from Jasper Ridge Biological Preserve serpentine grassland site. See Hallett et al (2014), Ecology for details. Subplot 3 from block 3 from the control treatment was used. Plot size was 1 m^2. Values are percents. Values occasionally sum across species to more than 100 because of overlapping plant canopies.

Usage

JRGdat

Format

A data frame with 28 rows and 27 columns. First column is the year of measurement, subsequent columns correspond to individual species, named in the column headers.

References


print.summary_tsvr

Print method for summary_tsvr class

Description

Print method for summary_tsvr class

Usage

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

Arguments

x A summary_tsvr object

... Not currently used. Included for argument consistency with existing generics.

Value

print.summary_tsvr is called for its effect of printing to the screen.
set_ts

Author(s)
Daniel Reuman, <reuman@ku.edu>

See Also
vreq_methods, vreq_classic_methods, vreq_LdM_methods, vreq_classic_ag_methods, tsvreq_methods, tsvreq_classic_methods, browseVignettes("tsvr")

Examples
res<-vreq(2,1,2)
summary(res)

set_ts

Set and get methods for classes in the tsvr package

Description
Set and get methods for classes in the tsvr package. There are methods for each slot of each class, named set_* and get_* for * the slot name. Below are listed function specs for the generics and the default methods.

Usage
set_ts(obj, newval)

## Default S3 method:
set_ts(obj, newval)

set_tsvr(obj, newval)

## Default S3 method:
set_tsvr(obj, newval)

set_wts(obj, newval)

## Default S3 method:
set_wts(obj, newval)

get_ts(obj)

## Default S3 method:
get_ts(obj)

get_tsvr(obj)
Arguments

- **obj**
  - An object of one of the classes defined in the package

- **newval**
  - A new value of the slot in question, for the `set_*` methods

Details

There are methods for S3 classes defined in the package. See documentation for the generator functions for these classes (which in all cases have the same name as the class) for lists of slots for each class.
Value

set_* methods throw an error - setting of individual slots is not allowed, as it breaks consistency with the other slots. get_* just returns the value in question.

Author(s)

Daniel Reuman, <reuman@ku.edu>

See Also

vreq

Examples

res<-vreq(com=2,comnull=1,vr=2)
get_com(res)

---

Description

The tsvreq (timescale-specific variance ratio equation) class is for storing functional equations based on a timescale-specific variance ratio. This is a general class from which other classes inherit (only tsvreq_classic at this point). tsvreq inherits from the list class.

Usage

tsvreq(ts, com, comnull, tsvr, wts)

Arguments

ts A vector of timescales
com A numeric vector of the same length as ts containing nonnegative quantities
comnull Another such
tsvr Another such
wts Another such

Value

tsvreq returns an object of class tsvreq. Slots are:
ts the input
com the input, equal to comnull*tsvr
comnull the input
tsvr the input
wts the input
Author(s)

Shaopeng Wang, <shaopeng.wang@pku.edu.cn>; Lei Zhao, <lei.zhao@cau.edu.cn>; Daniel Reuman, <reuman@ku.edu>

See Also

tsvreq_methods, tsvreq_classic, vreq, browseVignettes("tsvr")

Examples

res<-tsvreq(ts=1:10,com=2*c(1:10),comnull=1:10,tsvr=rep(2,10),wts=rep(3,10))

Description

The tsvreq_classic (timescale-specific variance ratio equation, classic variance ratio) class is for storing functional equations based on a timescale specific version of the classic variance ratio. Inherits from tsvreq, which inherits from list.

Usage

tsvreq_classic(X)

Arguments

X a matrix with counts or densities arranged in species by time step

Value

tsvreq_classic returns a tsvreq_classic object. Slots are:

  ts a vector of timescales
  com a timescale-specific decomposition of CVcom2
  comnull a timescale-specific decomposition of CVcomip2
  tsvr a timescale-specific version of the classic variance ratio
  wts a vector of weights, same length as all the above

Author(s)

Daniel Reuman, <reuman@ku.edu>

References

Zhao et al, (In prep) Decomposition of the variance ratio illuminates timescale-specific population and community variability.
See Also

```
  tsvreq_classic_methods, tsvreq.vreq_classic, browseVignettes("tsvr")
```

Examples

```
X <- matrix(runiform(10*100),10,100)
res <- tsvreq_classic(X)
```

---

### tsvreq_classic_methods

*Basic methods for the tsvreq_classic class*

**Description**

Set, get, summary, print and plot methods for the tsvreq_classic class.

**Usage**

```
## S3 method for class 'tsvreq_classic'
summary(object, ...)

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

## S3 method for class 'tsvreq_classic'
plot(x, filename = NA, ...)

## S3 method for class 'tsvreq_classic'
set_ts(obj, newval)

## S3 method for class 'tsvreq_classic'
set_com(obj, newval)

## S3 method for class 'tsvreq_classic'
set_comnull(obj, newval)

## S3 method for class 'tsvreq_classic'
set_tsvr(obj, newval)

## S3 method for class 'tsvreq_classic'
set_wts(obj, newval)

## S3 method for class 'tsvreq_classic'
get_ts(obj)
```

```
get_com(obj)
## S3 method for class 'tsvreq_classic'
get_comnull(obj)
## S3 method for class 'tsvreq_classic'
get_tsvr(obj)
## S3 method for class 'tsvreq_classic'
get_wts(obj)

Arguments

object, x, obj  An object of class tsvreq_classic
...  Passed to plot. Not currently used for other methods, included there only for
       argument consistency with existing generics.
filename  A filename, no extension, could have a path. Used for saving a plot as a pdf.
       The default value NA causes the default plotting device to be used.
newval  A new value, for the set_* methods

Value

summary.tsvreq_classic produces a summary of a tsvreq_classic object. Methods print.tsvreq_classic
and plot.tsvreq_classic are also available. For tsvreq_classic objects, set_* and get_*
methods are available for all slots (see the documentation for tsvreq_classic for a list). The
set_* methods just throw an error, to prevent breaking the consistency between the slots of a
tsvreq_classic object.

Author(s)

Daniel Reuman, <reuman@ku.edu>

References

Zhao et al, (In prep) Decomposition of the variance ratio illuminates timescale-specific population
and community variability.

See Also

tsvreq_classic

Examples

X<-matrix(runif(10*100),10,100)
res<-tsvreq_classic(X)
get_ts(res)
print(res)
summary(res)
**tsvreq_methods**

----

**Basic methods for the tsvreq class**

---

**Description**

Set, get, summary, print and plot methods for the `tsvreq` class.

**Usage**

```r
## S3 method for class 'tsvreq'
summary(object, ...)

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

## S3 method for class 'tsvreq'
plot(x, filename = NA, ...)

## S3 method for class 'tsvreq'
set_ts(obj, newval)

## S3 method for class 'tsvreq'
set_com(obj, newval)

## S3 method for class 'tsvreq'
set_comnull(obj, newval)

## S3 method for class 'tsvreq'
set_tsvr(obj, newval)

## S3 method for class 'tsvreq'
set_wts(obj, newval)

## S3 method for class 'tsvreq'
get_ts(obj)

## S3 method for class 'tsvreq'
get_com(obj)

## S3 method for class 'tsvreq'
get_comnull(obj)

## S3 method for class 'tsvreq'
get_tsvr(obj)

## S3 method for class 'tsvreq'
get_wts(obj)
```
Arguments

object, x, obj  An object of class tsvreq
...
filename  A filename, no extension, could have a path. Used for saving a plot as a pdf. The default value NA causes the default plotting device to be used.
newval  A new value, for the set_* methods

Value

summary.tsvreq produces a summary of a tsvreq object. Methods print.tsvreq and plot.tsvreq are also available. For tsvreq objects, set_* and get_* methods are available for all slots (see the documentation for tsvreq for a list). The set_* methods just throw an error, to prevent breaking the consistency between the slots of a tsvreq object.

Author(s)

Daniel Reuman, <reuman@ku.edu>

See Also

tsvreq

Examples

res<-tsvreq(ts=1:10,com=2*c(1:10),comnull=1:10,tsvr=rep(2,10),wts=rep(3,10))
gt.get Ts(res)
print(res)
summary(res)
plot(res)

vr  Compute the classic or Loreau-de Mazancourt variance ratio

Description

This function is used to compute the classical or Loreau-de Mazancourt variance ratio for a community in a single plot.

Usage

vr(X, method = "classic")
Arguments

- **X**: A matrix with counts or densities arranged in species by time steps
- **method**: If "classic" (default), use the classical method. If "LdM", use the Loreau-de Mazancourt method (see reference).

Value

vr returns the value of variance ratio

Author(s)

Lei Zhao, <lei.zhao@cau.edu.cn>; Daniel Reuman, <reuman@ku.edu>

References

Loreau & Mazancourt, Species Synchrony and Its Drivers: Neutral and Nonneutral Community Dynamics in Fluctuating Environments. 2008, Am. Nat. 172(2)

Zhao et al, (In prep) Decomposition of the variance ratio illuminates timescale-specific population and community variability.


See Also

vrf, vreq, vreq_classic, vreq_LdM, browseVignettes("tsvr")

Examples

```r
X <- matrix(runif(200, 1, 100), 10, 20)
vr(X, method="LdM")
vr(X, method="classic")
```

---

**vreq**

Creator function for the vreq S3 class

Description

The vreq (variance ratio equation) class is for storing equations based on a variance ratio, as in Wang S. & Loreau M. (2016) Biodiversity and ecosystem stability across scales in metacommunities, Ecol Lett, 19, 510-518. This is a general class from which other classes inherit (vreq_classic, vreq_LdM). vreq inherits from the list class.

Usage

vreq(com, comnull, vr)
Arguments

com  A single positive number
comnull  Another single positive number
vr  Another single positive number

Value

vreq returns an object of class vreq. Slots are:
com  a single positive number equal to comnull*vr
comnull  a single positive number
vr  a single positive number

Author(s)

Shaopeng Wang, <shaopeng.wang@pku.edu.cn>; Lei Zhao, <lei.zhao@cau.edu.cn>; Daniel Reuman, <reuman@ku.edu>

References

Zhao et al, (In prep) Decomposition of the variance ratio illuminates timescale-specific population and community variability.

See Also

vreq_methods, vreq_classic, vreq_LdM, vreq_classic_ag_methods, browseVignettes("tsvr")

Examples

res<-vreq(com=2,comnull=1,vr=2)

vreq_classic  Creator function of vreq_classic S3 class

Description

The vreq_classic (variance ratio equation, classic variance ratio) class is for storing equations based on the classic variance ratio. Inherits from the vreq class, which inherits from the list class.

Usage

vreq_classic(X)
vreq_classic_ag_methods

Arguments

X  A matrix with counts or densities arranged in species by years

Value

vreq_classic returns a vreq_classic object. Slots are:

com  the squared community CV, CVcom2
comnull  CVcomip2
vr  the classic variance ratio

Author(s)

Daniel Reuman, <reuman@ku.edu>

References


See Also

vreq_classic_methods, vreq, vreq_LdM, vreq_classic_ag_methods, browseVignettes("tsvr")

Examples

X<-matrix(runif(10*100),10,100)
res<-vreq_classic(X)

vreq_classic_ag_methods

Basic methods for the vreq_classic_ag class

Description

Set, get, summary, and print methods for the vreq_classic_ag class.

Usage

## S3 method for class 'vreq_classic_ag'
summary(object, ...)

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

## S3 method for class 'vreq_classic_ag'
set_com(obj, newval)
## S3 method for class 'vreq_classic_ag'
set_comnull(obj, newval)
## S3 method for class 'vreq_classic_ag'
set_vr(obj, newval)
## S3 method for class 'vreq_classic_ag'
set_ts(obj, newval)
## S3 method for class 'vreq_classic_ag'
get_com(obj)
## S3 method for class 'vreq_classic_ag'
get_comnull(obj)
## S3 method for class 'vreq_classic_ag'
get_vr(obj)
## S3 method for class 'vreq_classic_ag'
get_ts(obj)

Arguments

object, x, obj An object of class vreq_classic_ag
... Not currently used. Included for argument consistency with existing generics.
newval A new value, for the set_* methods

Value

summary.vreq_classic_ag produces a summary of a vreq_classic_ag object. A print.vreq_classic_ag
method is also available. For vreq_classic_ag objects, set_* and get_* methods are available
for all slots (see the documentation for aggts for a list). The set_* methods just throw an error, to
prevent breaking the consistency between the slots of a vreq_classic_ag object.

Author(s)

Daniel Reuman, <reuman@ku.edu>

References

Zhao et al, (In prep) Decomposition of the variance ratio illuminates timescale-specific population
and community variability.

See Also

aggts, tsvreq_classic, vreq_classic, vreq_LdM, vreq, browseVignettes("tsvr")
vreq_classic_methods

Examples

```r
X <- matrix(runif(10*100), 10, 100)
h <- tsvreq_classic(X)
inp <- aggts(h, h$ts[h$ts > 4])
print(inp)
summary(inp)
```

Description

Set, get, summary, and print methods for the vreq_classic class.

Usage

```r
## S3 method for class 'vreq_classic'
summary(object, ...)

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

## S3 method for class 'vreq_classic'
set_com(obj, newval)

## S3 method for class 'vreq_classic'
set_comnull(obj, newval)

## S3 method for class 'vreq_classic'
set_vr(obj, newval)

## S3 method for class 'vreq_classic'
get_com(obj)

## S3 method for class 'vreq_classic'
get_comnull(obj)

## S3 method for class 'vreq_classic'
get_vr(obj)
```

Arguments

- `object`, `x`, `obj` An object of class vreq_classic
- `...` Not currently used. Included for argument consistency with existing generics.
- `newval` A new value, for the `set_*` methods
Value

summary.vreq.classic produces a summary of a vreq.classic object. A print.vreq.classic method is also available. For vreq.classic objects, set_* and get_* methods are available for all slots (see the documentation for vreq.classic for a list). The set_* methods just throw an error, to prevent breaking the consistency between the slots of a vreq.classic object.

Author(s)

Daniel Reuman, <reuman@ku.edu>

References


See Also

vreq.classic

Examples

X<-matrix(runif(10*100),10,100)
res<-vreq.classic(X)
print(res)
summary(res)

---

vreq.LdM

Creator function of vreq.LdM S3 class

Description

The vreq.LdM (variance ratio equation, Loreau-de Mazancourt variance ratio) class is for storing equations based on the L-dM variance ratio. Inherits from the vreq class, which inherits from the list class.

Usage

vreq.LdM(X)

Arguments

X A matrix with counts or densities arranged in species by years
Value

vreq_LdM returns a vreq_LdM object. Slots are:

- **com**: the squared community CV, CVcom2
- **comnull**: CVpop2
- **vr**: the L-dM variance ratio

Author(s)

Daniel Reuman, <reuman@ku.edu>

References

Loreau & Mazancourt, Species Synchrony and Its Drivers: Neutral and Nonneutral Community Dynamics in Fluctuating Environments. 2008, Am. Nat. 172(2)

See Also

vreq_LdM_methods, vreq_classic, vreq, browseVignettes("tsvr")

Examples

```r
X<-matrix(runif(10*100),10,100)
res<-vreq_LdM(X)
```

---

vreq_LdM_methods: Basic methods for the vreq_LdM class

Description

Set, get, summary, and print methods for the vreq_LdM class.

Usage

```r
## S3 method for class 'vreq_LdM'
summary(object, ...)

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

## S3 method for class 'vreq_LdM'
set_com(obj, newval)

## S3 method for class 'vreq_LdM'
set_comnull(obj, newval)
```
## S3 method for class 'vreq_LdM'
set_vr(obj, newval)

## S3 method for class 'vreq_LdM'
get_com(obj)

## S3 method for class 'vreq_LdM'
get_comnull(obj)

## S3 method for class 'vreq_LdM'
get_vr(obj)

### Arguments

- **object, x, obj** An object of class `vreq_LdM`
- **...** Not currently used. Included for argument consistency with existing generics.
- **newval** A new value, for the `set_*` methods

### Value

`summary.vreq_LdM` produces a summary of a `vreq_LdM` object. A `print.vreq_LdM` method is also available. For `vreq_LdM` objects, `set_*` and `get_*` methods are available for all slots (see the documentation for `vreq_LdM` for a list). The `set_*` methods just throw an error, to prevent breaking the consistency between the slots of a `vreq_LdM` object.

### Author(s)

Daniel Reuman, <reuman@ku.edu>

### References

Loreau & Mazancourt, Species Synchrony and Its Drivers: Neutral and Nonneutral Community Dynamics in Fluctuating Environments. 2008, Am. Nat. 172(2)

### See Also

- `vreq_LdM`

### Examples

```r
X <- matrix(runif(10*100), 10, 100)
res <- vreq_LdM(X)
print(res)
summary(res)
```
vreq_methods

Basic methods for the vreq class

Description

Set, get, summary, and print methods for the vreq class.

Usage

```r
## S3 method for class 'vreq'
summary(object, ...)

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

## S3 method for class 'vreq'
set_com(obj, newval)

## S3 method for class 'vreq'
set_comnull(obj, newval)

## S3 method for class 'vreq'
set_vr(obj, newval)

## S3 method for class 'vreq'
get_com(obj)

## S3 method for class 'vreq'
get_comnull(obj)

## S3 method for class 'vreq'
get_vr(obj)
```

Arguments

- `object, x, obj` An object of class vreq
- `...` Not currently used. Included for argument consistency with existing generics.
- `newval` A new value, for the `set_*` methods

Value

`summary.vreq` produces a summary of a vreq object. A `print.vreq` method is also available. For vreq objects, `set_*` and `get_*` methods are available for all slots (see the documentation for vreq for a list). The `set_*` methods just throw an error, to prevent breaking the consistency between the slots of a vreq object.
**Author(s)**

Daniel Reuman, <reuman@ku.edu>

**See Also**

vreq

**Examples**

```r
res <- vreq(com = 2, comnull = 1, vr = 2)
print(res)
```

---

**vrf** *Compute the frequency-specific variance ratio*

**Description**

This function computes the frequency-specific variance ratio for a community in a single plot.

**Usage**

```r
vrf(X)
```

**Arguments**

- `X`  
  a matrix with counts or densities arranged in species by time step

**Value**

`vrf` returns a list consisting of

- `frequency`  
  a vector from 0 to 1 (not including 0 and 1)

- `vr`  
  a vector of frequency-specific or frequency-decomposition of VR

**Author(s)**

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**References**

<Lei's paper>

**See Also**

vr
**wts**

**Examples**

```r
X <- matrix(runif(200, 1, 100), 10, 20)
ans <- vrf(X)
```

---

**wts**  
*Compute the weights (wts)*

**Description**

This function is used to compute weights (wts).

**Usage**

```r
wts(X)
```

**Arguments**

- **X**  
a matrix with counts or densities arranged in species by time step

**Value**

- **wts** returns an object of class list consisting of
  - **frequency**  
a vector from 0 to 1 (not include 0 and 1)
  - **wts**  
a vector of wts

**Author(s)**

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**References**

*<Lei paper>*

**Examples**

```r
X <- matrix(runif(200, 1, 100), 10, 20)
ans <- wts(X)
```
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