Package 'UStatBookABSC'

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Title A Companion Package to the Book ``U-Statistics, M-Estimation and Resampling''

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Description A set of functions leading to multivariate response L1 regression. This includes functions on computing Euclidean inner products and norms, weighted least squares estimates on multivariate responses, function to compute fitted values and residuals. This package is a companion to the book ``U-Statistics, M-estimation and Resampling'', by Arup Bose and Snigdhansu Chatterjee, to appear in 2017 as part of the ``Texts and Readings in Mathematics'' (TRIM) series of Hindustan Book Agency and Springer-Verlag.

Depends R (>= 3.2.3)

Suggests MASS

License GPL-3

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Repository CRAN

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Contents

CCU12_Precip   *Precipitation for June-September 2012 recorded in Kolkata*

Description

Precipitation for June-September 2012 recorded in Kolkata

Usage

```
data(CCU12_Precip)
```

Format

A data frame with columns

Date The data in Year-Month-Day format

Precip Precipitation in millimeters

TMax Maximum temperature, in Celcius

TMin Minimum temperature, in Celcius

Examples

```
Precip <-CCU12_Precip$Precip
TMax <-CCU12_Precip$TMax
plot(TMax, Precip)
```

FitAndResiduals   *Computes a linear regression fit and residuals on possibly multivariate responses*

Description

Computes a linear regression fit and residuals on possibly multivariate responses

Usage

```
FitAndResiduals(Y, X, BetaHat)
```

Arguments

Y	a numeric matrix, to act as response
X	a numeric matrix, to act as covariates
BetaHat	a numeric matrix, to act as slope

Value

a list consisting of two vectors, the fitted values and residuals

Examples

```
 ## Not run:
 DataY = cbind(CCU12_Precip$Precip, CCU12_Precip$TMax);
DataX = cbind(rep(1, length(CCU12_Precip$Precip)), CCU12_Precip$TMin)
BetaHat.New = WLS(DataY, DataX)
Results.New = FitAndResiduals(DataY, DataX, BetaHat.New);

## End(Not run)
```

IdentityMatrix *Obtains the identity matrix of dimension n*

Description

Obtains the identity matrix of dimension n

Usage

```
IdentityMatrix(n)
```

Arguments

n   an integer

Value

an identity matrix

Examples

```
I.3 = IdentityMatrix(3)
print(I.3)
```

InnerProduct   *Computes the Euclidean inner product*

Description

Computes the Euclidean inner product

Usage

```
InnerProduct(a, b, na.rm)
```

Arguments

a   a numeric vector

b   another numeric vector

na.rm   logical

Value

a real number

Examples

```
x <- c(1, 2, 3)
y <- c(3, 0, 1)
InnerProduct(x, y)
```

L1Regression   *Computes a L1 multivariate regression This is the equivalent of me-dian regression when the response is possibly multivariate*

Description

Computes a L1 multivariate regression This is the equivalent of median regression when the re-sponse is possibly multivariate

Usage

```
L1Regression(Data.Y, Data.X, Weights,
InitialValue = "WLS", MaxIteration, epsilon, lambda)
```

Arguments

`Data.Y`	a numeric matrix, to act as response
`Data.X`	a numeric matrix, to act as covariates
`Weights`	a numeric matrix, to act as weights
`InitialValue`	a character, to denote how the initial estimate will be computed currently the only available option is WLS
`MaxIteration`	an integer, for the maximum number of iterations allowed
`epsilon`	a positive real number, as tolerance value for convergence
`lambda`	a real number between 0 and 1, to control the amount of update allowed in each iteration

Value

a list consisting of the iteration value at the last step, the difference in norms between the last two iterations, and the estimate of slope

Examples

```
 ## Not run:
DataY = cbind(CCU12_Precip$Precip, CCU12_Precip$TMax);
DataX = cbind(rep(1, length(CCU12_Precip$Precip)), CCU12_Precip$TMin)
A2 = L1Regression(DataY, DataX)

## End(Not run)
```

Norm	*Computes the Euclidean norm*

Description

Computes the Euclidean norm

Usage

```
Norm(a, na.rm)
```

Arguments

`a`	a numeric vector
`na.rm`	logical

Value

a real number

Examples

```
x <- c(1, 2)
Norm(x)
```

WLS	*Computes a weighted least squares linear regression on possibly multivariate responses*

Description

Computes a weighted least squares linear regression on possibly multivariate responses

Usage

```
WLS(Y, X, W)
```

Arguments

Y	a numeric matrix, to act as response
X	a numeric matrix, to act as covariates
W	a numeric matrix, to act as weights

Value

a vector of regression coefficients

Examples

```
 ## Not run:
 DataY = cbind(CCU12_Precip$Precip, CCU12_Precip$TMax);
DataX = cbind(rep(1, length(CCU12_Precip$Precip)), CCU12_Precip$TMin)
BetaHat.New = WLS(DataY, DataX)

## End(Not run)
```

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