Package 'npmlda'

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Type Package

Title Nonparametric Models for Longitudinal Data

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Description

Support the book: Wu CO and Tian X (2018). Nonparametric Models for Longitudinal Data. Chapman & Hall/CRC (to appear); and provide fit for using global and local smoothing methods for the conditional-mean and conditional-distribution based models with longitudinal Data.

License GPL (>= 2)

BugReports https://github.com/npmldabook/npmlda/issues

URL https://github.com/npmldabook/npmlda/

Encoding UTF-8

LazyData true

Depends R (>= 3.0)

Imports splines

RoxygenNote 6.0.1

NeedsCompilation no

Repository CRAN

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R topics documented:

`BDIdata` *BDIdata dataset*

Description

This dataset includes 557 depressed patients (total 7117 observations) in the cognitive behavior therapy arm in the Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) study.

Usage

```
data(BDIdata)
```

Format

A data frame with 7117 rows and 5 variables.

Details

- ID. Subject ID
- time. Study visit time (in days) since randomization
- BDI. Beck Depression Inventory (BDI) score
- med. Antidepressant medication use
- med.time. The starting time of medication

References

1. Wu, C. O., Tian, X. and Bang, H. A varying-coefficient model for the evaluation of time-varying concomitant intervention effects in longitudinal studies. Statistics in Medicine, 27:3042-3056, 2008.
2. Wu, C. O., Tian, X. and Jiang, W. A shared parameter model for the estimation of longitudinal concomitant intervention effects Biostatistics, 12(4):737-749, 2011.

BMACS *BMACS CD4 dataset*

Description

This dataset is from the Baltimore site of the Multi-center AIDS Cohort Study (BMACS), which included 400 homosexual men who were infected by the human immunodeficiency virus (HIV) between 1984 and 1991.

Usage

```
data(BMACS)
```

Format

A data frame with 1817 rows and 6 variables.

Details

- ID. Subject ID
- Time. Subject's study visit time
- Smoke. Cigarette baseline smoking status
- age. Age at study enrollment
- preCD4. Pre-infection CD4 percentage
- CD4. CD4 percentage at the time of visit

References

Kaslow, R. A., Ostrow, D. G., Detels, R., Phair, J. P., Polk, B. F. and Rinaldo, C. R. The Multi-center AIDS Cohort Study: rationale, organization and selected characteristics of the participants. American Journal of Epidemiology, 126:310-318, 1987.

CVlm *Leave one-subject cross-validation score for local linear fit*

Description

Leave one-subject cross-validation score for local linear fit

Usage

```
CVlm(Xvec, Yvec, bw, ID, Wt)
```

Arguments

Xvec, Yvec	numeric vectors of data values, Xvec and Yvec must have the same length.
bw	a bandwidth of the Epanechnikov kernel
ID	subject ID of the data value
Wt	a weight vector, may be subject-specific. a weight vector or a constant. For longitudinal data, Wt=1/N corresponds to measurement uniform weight and Wt=1/(nni) corresponds subject uniform weight.

CVspline *Leave one-subject cross-validation score for spline fit*

Description

Leave one-subject cross-validation score for spline fit

Usage

```
CVspline(Xvec, Yvec, ID, nKnots, Degree, Wt)
```

Arguments

Xvec, Yvec	numeric vectors of data values, Xvec and Yvec must have the same length.
ID	subject ID of the data value
nKnots	number of equally-spaced knots
Degree	degree of polynomial splines
Wt	a weight vector. For longitudinal data, Wt=1/N corresponds to measurement uniform weight and Wt=1/(nni) corresponds subject uniform weight.

References

Wu, C.O. and Tian, X. Nonparametric Models for Longitudinal Data. Chapman & Hall/CRC. To appear.

HSCT *HSCT dataset*

Description

This dataset consists of 20 patients with hematologicmalignancies who had allogeneic hematopoietic stem cell transplantation (HSCT) between 2006 and 2009 at the National Institutes of Health (NIH). The variables are as follows:

Usage

```
data(HSCT)
```

Format

A data frame with 271 rows and 8 variables.

Details

- ID. Subject ID
- Days. Subject's study visit time relative to time of transplant (day 0)
- Granu. Granulocytes (K/uL)
- LYM. Lymphocytes (K/uL)
- MON. Monocytes (K/uL)
- G-CSF. Granulocyte colony-stimulating factor level (pg/mL)
- IL-15. IL-15 level (pg/mL)
- MCP-1. monocyte chemotactic protein-1 level (pg/mL)

References

Melenhorst, J.J., Tian, X., Xu, D., Sandler, N.G., Scheinberg, P., Biancotto, A., et al. Cytopenia and leukocyte recovery shape cytokine fluctuations after myeloablative allogeneic hematopoietic stem cell transplantation. Haematologica, 97(6):867-73, 2012.

kernel.fit *Nadaraya-Watson Kernel estimator*

Description

Nadaraya-Watson Kernel estimator

Usage

```
kernel.fit(Xint, Xvec, Yvec, bw, Kernel = "Ep", Wt = 1)
```

Arguments

Xint	a vector of x interval to generate the local linear fit
Xvec, Yvec	numeric vectors of data values, Xvec and Yvec must have the same length.
bw	a bandwidth of the kernel
Kernel	a character string indicating which kernel function is to be used. Use of "Ep", "Bw", or "Nm" for Epanechnikov, Biweight or Normal kernel function.
Wt	a weight vector

References

1. Fan, J. and Gijbels, I. Local Polynomial Modeling and Its Applications. Chapman & Hall, London, United Kingdom, 1996.
2. Wu, C.O. and Tian, X. Nonparametric Models for Longitudinal Data. Chapman & Hall/CRC. To appear.

Examples

```
X <- seq(0, 1, len=100)
Y <- (X- 0.5)^3 - 2*(X-0.5)^2+ rnorm(100, 0, 0.1)
kernel.fit(seq(0,1,0.1), X, Y, Kernel="Ep", bw=0.1, Wt=1   )
```

Kh.Bw *Biweight kernel*

Description

Biweight kernel

Usage

```
Kh.Bw(datavec, Bndwdth)
```

Arguments

`datavec`	a numeric vector
`Bndwdth`	a bandwidth of the kernel

Value

kernel function result

Examples

```
# same usage as Kh.Ep
```

`Kh.Ep` *Epanechnikov Kernel*

Description

Epanechnikov Kernel

Usage

```
Kh.Ep(datavec, Bndwdth)
```

Arguments

`datavec`	a numeric vector
`Bndwdth`	a bandwidth

Value

kernel function result

Examples

```
Kh.Ep(2:7,5)
```

Kh.Nm *Normal kernel*

Description

Normal kernel

Usage

```
Kh.Nm(datavec, Bndwdth)
```

Arguments

datavec	a numeric vector
Bndwdth	a bandwidth of the kernel

Value

kernel function result

Examples

```
Kh.Nm(2:7,5)
```

LocalLm *Local linear fit with Epanechnikov kernel*

Description

Local linear fit with Epanechnikov kernel

Usage

```
LocalLm(Xint, Xvec, Yvec, bw, Wt = 1)
```

Arguments

Xint	a vector of x interval to generate the local linear fit
Xvec, Yvec	numeric vectors of data values, Xvec and Yvec must have the same length.
bw	a bandwidth of the kernel
Wt	a weight vector

Examples

```
data(BMACS)
Time.int<- seq(0.1,5.9,  by=0.1)
LocalFit.Y <- with(BMACS, LocalLm(Time.int, Time, CD4, bw=0.9, Wt=1))
```

LocalLm.X0 *Local linear fit at X0 with Epanechnikov kernel*

Description

Local linear fit at X0 with Epanechnikov kernel

Usage

```
LocalLm.X0(Xvec, Yvec, X0, Bndwdth, Wt = 1)
```

Arguments

Xvec, Yvec	numeric vectors of data values, Xvec and Yvec must have the same length.
X0	a given value
Bndwdth	a bandwidth of the kernel
Wt	a weight vector or a constant. For longitudinal data, Wt=1/N corresponds to measurement uniform weight and Wt=1/(nni) corresponds subject uniform weight.

Examples

```
# see usage of LocalLm
```

NW.WtKernel *Title Nadaraya-Watson Kernel estimator at x0*

Description

Title Nadaraya-Watson Kernel estimator at x0

Usage

```
NW.WtKernel(Xvec, Yvec, X0, Kernel = "Ep", Bndwdth, Wt = 1)
```

Arguments

Xvec, Yvec	numeric vectors of data values, Xvec and Yvec must have the same length.
X0	a given value
Kernel	a character string indicating which kernel function is to be used. Use of "Ep", "Bw", or "Nm" for Epanechnikov, Biweight or Normal kernel function.
Bndwdth	a bandwidth of the kernel
Wt	a weight vector or a constant. For longitudinal data, Wt=1/N corresponds to measurement uniform weight and Wt=1/(nni) corresponds subject uniform weight.

Value

The kernel estimator at x0

References

1. Fan, J. and Gijbels, I. Local Polynomial Modeling and Its Applications. Chapman & Hall, London, United Kingdom, 1996.
2. Wu, C.O. and Tian, X. Nonparametric Models for Longitudinal Data. Chapman & Hall/CRC. To appear.

Examples

```
X <- seq(0, 1, len=100)
Y <- (X- 0.5)^3 - 2*(X-0.5)^2+ rnorm(100, 0, 0.1)
NW.WtKernel(X, Y,  X0=0.5, Kernel="Ep", Bndwdth=0.3, Wt=1 )
NW.WtKernel(X, Y,  X0=0.5, Kernel="Nm", Bndwdth=0.3, Wt=1 )
```

Spline.fit *Polynomial-spline fit with equally-spaced knots*

Description

Polynomial-spline fit with equally-spaced knots

Usage

```
Spline.fit(Xint, Xvec, Yvec, nKnots = 2, Degree = 3, Wt = 1)
```

Arguments

Xint	a vector of x interval to generate the local linear fit
Xvec, Yvec	numeric vectors of data values, Xvec and Yvec must have the same length.
nKnots	number of equally-spaced knots
Degree	degree of polynomial splines
Wt	a weight vector or a constant. For longitudinal data, Wt=1/N corresponds to measurement uniform weight and Wt=1/(nni) corresponds subject uniform weight.

References

Wu, C.O. and Tian, X. Nonparametric Models for Longitudinal Data. Chapman & Hall/CRC. To appear.

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