Package 'isotonic.pen'

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Type Package

Title Penalized Isotonic Regression in one and two dimensions

Version 1.0

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Author Mary C Meyer, Jiwen Wu, and Jean D. Opsomer

Maintainer Mary Meyer <meyer@stat.colostate.edu>

Description Given a response y and a one- or two-
dimensional predictor, the isotonic regression estimator is calculated with the usual orderings.

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Depends graphics, grDevices, stats, utils, coneproj, Matrix

NeedsCompilation no

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Contents

`isotonic.pen-package` *Penalized Isotonic Regression in one and two dimensions*

Description

Given a response y and a one- or two-dimensional predictor, the isotonic regression estimator is calculated with the usual orderings. The user can specify a penalty to tame spiking, or a default value can be used.

Details

Package:	isotonic.pen
Type:	Package
Version:	1.0
Date:	2014-04-04
License:	GPL-2 | GPL-3

Author(s)

Mary C Meyer, Jiwen Wu, and Jean D Opsomer

Maintainer: Mary C Meyer <meyer@stat.colostate.edu>

References

Meyer, M.C. (2013) A Simple New Algorithm for Quadratic Programming with Applications in Statistics, *Communications in Statistics*, **42(5)**, 1126-1139.

`iso_pen` *Penalized Isotonic Regression in one and two dimensions*

Description

Given a response vector y and a predictor matrix xmat with (one or two) columns, the isotonic regression estimator is returned, with the usual (complete or partial) ordering.

Usage

```
iso_pen(y, xmat, wt = 1, pen = TRUE, default = TRUE, lambda = 0, nsim = 0, alpha = 0.05)
```

Arguments

`y`	The response vector of length n
`xmat`	Either a one-dimensional predictor vector or an n by 2 matrix of two-dimensional predictor values.
`wt`	Optional weights – a positive vector of length n.
`pen`	If pen=FALSE, no penalty is applied to tame spiking. Default is pen=TRUE.
`default`	If default=FALSE, the user must specify a penalty value.
`lambda`	Optional penalty. If pen=0, an unpenalized isotonic regression is performed. If not supplied a default penalty is used.
`nsim`	The number of simulations used in the computation of approximate point-wise confidence intervals. The default is nsim=0, and no confidence intervals are returned.
`alpha`	The confidence level of the confidence intervals. Default is alpha=.05 (i.e., 95 percent confidence intervals)

Details

The least-squares isotonic regression is computed using the coneA function of the R package coneproj.

Value

`fit`	The fitted values; i.e., the estimated expected response
`sighat`	The estimated model standard deviation
`upper`	The upper points of the point-wise confidence intervals, returned if nsim>0
`lower`	The lower points of the point-wise confidence intervals, returned if nsim>0

Author(s)

Mary C Meyer, Professor, Department of Statistics, Colorado State University

References

Meyer, M.C. (2013) A Simple New Algorithm for Quadratic Programming with Applications in Statistics, *Communications in Statistics*, **42(5)**, 1126-1139.

Examples

```
### plot the estimated expected lung volume of children given age and height
data(FEV)
x1=FEV[,1]   ## age
x2=FEV[,3]   ## height
y=FEV[,2]
ans=iso_pen(y,cbind(x1,x2))
persp(ans$xg1,ans$xg2,ans$xgmat,th=-40,tick="detailed",xlab="age",ylab="height",zlab="FEV")
```

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