

# Package ‘scpropreg’

May 9, 2026

**Type** Package

**Title** Simplicially Constrained Regression Models for Proportions

**Version** 1.2

**Date** 2026-04-15

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**Maintainer** Michail Tsagris <mtsagris@uoc.gr>

**Depends** R (>= 4.0)

**Imports** nnsolve, Rfast, Rfast2

**Description** Simplicially constrained regression models for proportions in both sides. The constraint is always that the betas are non-negative and sum to 1. References: Iver-son S.J., Field C., Bowen W.D. and Blanchard W. (2004) ``Quantitative Fatty Acid Signature Analysis: A New Method of Estimating Predator Diets". Ecological Mono-graphs, 74(2): 211-235. <doi:10.1890/02-4105>.

**License** GPL (>= 2)

**NeedsCompilation** no

**Repository** CRAN

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scpropreg-package

*Simplicially Constrained Regression Models for Proportions*

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**Description**

Simplicially Constrained Regression Models for Proportions. The constraint is always that the betas are non-negative and sum to 1.

**Details**

Package: scpropreg  
Type: Package  
Version: 1.2  
Date: 2026-04-15

**Maintainers**

Michail Tsagris <mtsagris@uoc.gr>.

**Author(s)**

Michail Tsagris <mtsagris@uoc.gr>

**References**

Iverson Sara J., Field Chris, Bowen W. Don and Blanchard Wade (2004) Quantitative Fatty Acid Signature Analysis: A New Method of Estimating Predator Diets. *Ecological Monographs*, 74(2): 211-235.

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Positive and unit sum constrained least squares

*Positive and unit sum constrained least squares*

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**Description**

Positive and unit sum constrained least squares.

**Usage**

pcls(y, x)  
mpcls(Y, x)

**Arguments**

y	The response variable. For the pcls() a numerical vector with observations, but for the mpcls() a numerical matrix, where each columns sums to 1.
Y	The response variable, a numerical matrix, where each column sums to 1.
x	A matrix with independent variables, the design matrix.

**Details**

The constraint is that all beta coefficients are positive and sum to 1. That is  $\min \sum_{i=1}^n (y_i - \mathbf{x}_i \top \boldsymbol{\beta})^2$  such that  $0 \leq \beta_j \leq 1$  and  $\sum_{j=1}^d \beta_j = 1$ . The pcls() function performs a single regression model, whereas the mpcls() function performs a regression for each column of y. Each regression is independent of the others.

**Value**

A list including:

coefficients	A numerical matrix with the positively constrained beta coefficients.
value	A numerical vector with the mean squared error.

**Author(s)**

Michail Tsagris.

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>.

**See Also**

[kld](#), [mkld](#)

**Examples**

```
x <- matrix(runif(30 * 8), ncol = 30)
x <- t( x / rowSums(x) )
y <- runif(30)
y <- y / sum(y)
pcls(y, x)
```

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QFASA diet estimates for many predators using various distances

*QFASA diet estimates for many predators using various distances*

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**Description**

QFASA diet estimates for many predators using various distances.

**Usage**

```

mkld(Y, x, tol = 1e-8, maxit = 50000, alpha = 0.1)
mait(Y, x, tol = 1e-8, maxit = 50000, alpha = 0.01)
mlsq(Y, x, tol = 1e-8, maxit = 50000, alpha = 0.01)
mlr(Y, x, tol = 1e-8, maxit = 100)

```

**Arguments**

Y	The response variable, a matrix with values between 0 and 1 that sum to 1. For some functions, zero values are allowed. Every column corresponds to the food composition of a predator. The column-wise sums are equal to 1.
x	A matrix with independent variables, values between 0 and 1. Each column contains a prey's diet. The column-wise sums are equal to 1.
tol	The tolerance value to terminate the algorithm.
maxit	The maximum iterations allowed.
alpha	The step-size parameter of the fixed points iteration algorithm. This is similar to the $\eta$ parameter in the gradient descent algorithm.

**Details**

The function estimates the betas that minimize a distance. The fitted values are linear constraints of the observed xs. The constraint is that all beta coefficients are positive and sum to 1. That is  $\hat{y}_i = \sum_{j=1}^d x_{ij}\beta_j$  such that  $0 \leq \beta_j \leq 1$  and  $\sum_{j=1}^d \beta_j = 1$ .

**Value**

A list including:

coefficients	A numerical matrix with the positively constrained beta coefficients.
value	A numerical vector with the value of the objective function.
iters	The number of iterations required until termination of the algorithm.

**Author(s)**

Michail Tsagris.

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>.

**References**

Iverson Sara J., Field Chris, Bowen W. Don and Blanchard Wade (2004) Quantitative Fatty Acid Signature Analysis: A New Method of Estimating Predator Diets. *Ecological Monographs*, 74(2): 211-235.

**See Also**

[kld](#), [mpcls](#)

**Examples**

```
x <- matrix(runif(30 * 6), ncol = 30)
x <- t( x / rowSums(x) )
Y <- matrix(runif(30 * 10), ncol = 30)
Y <- t( Y / rowSums(Y) )
mkld(Y, x)
```

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QFASA diet estimates using various distances

*QFASA diet estimates using various distances*

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**Description**

QFASA diet estimates using various distances.

**Usage**

```
klld(y, x, tol = 1e-8, maxit = 50000, alpha = 0.1)
ait(y, x, tol = 1e-8, maxit = 50000, alpha = 0.01)
lsq(y, x, tol = 1e-8, maxit = 50000, alpha = 0.01)
jsd(y, x, tol = 1e-8, maxit = 300000, alpha = 0.01)
lr(y, x, tol = 1e-8, maxit = 100)
```

**Arguments**

y	The response variable. The predator's food composition. A vector with values between 0 and 1 that sum to 1. For some functions, zero values are allowed.
x	A matrix with independent variables, values between 0 and 1. Each column contains a prey's diet. The column-wise sums are equal to 1.
tol	The tolerance value to terminate the algorithm.
maxit	The maximum iterations allowed.
alpha	The step-size parameter of the fixed points iteration algorithm. This is similar to the $\eta$ parameter in the gradient descent algorithm.

**Details**

The function estimates the betas that minimize a distance. The fitted values are linear constraints of the observed xs. The constraint is that all beta coefficients are positive and sum to 1. That is  $\hat{y}_i = \sum_{j=1}^d x_{ij} \beta_j$  such that  $0 \leq \beta_j \leq 1$  and  $\sum_{j=1}^d \beta_j = 1$ .

**Value**

A list including:

coefficients	A numerical matrix with the positively constrained beta coefficients.
value	A numerical vector with the value of the objective function.
iters	The number of iterations required until termination of the algorithm.

**Author(s)**

Michail Tsagris.

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>.

**References**

Iverson Sara J., Field Chris, Bowen W. Don and Blanchard Wade (2004) Quantitative Fatty Acid Signature Analysis: A New Method of Estimating Predator Diets. *Ecological Monographs*, 74(2): 211-235.

**See Also**

[mkld](#), [pcls](#)

**Examples**

```
x <- matrix(runif(30 * 8), ncol = 30)
x <- t( x / rowSums(x) )
y <- runif(30)
y <- y / sum(y)
kld(y, x)
ait(y, x)
lsq(y, x)
lr(y, x)
```

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