

# Package ‘Styperidge.reg’

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**Type** Package

**Title** S-Type Ridge Regression

**Version** 0.1.0

**Description** Implements S-type ridge regression, a robust and multicollinearity-aware linear regression estimator that combines S-type robust weighting (via the 'Stype.est' package) with ridge penalization; automatically selects the ridge parameter using the 'ridgregextra' approach targeting a close to 1 variance inflation factor (VIF), and returns comprehensive outputs (coefficients, fitted values, residuals, mean squared error (MSE), etc.) with an easy x/y interface and optional user-supplied weights. See Sazak and Mutlu (2021) [doi:10.1080/03610918.2021.1928196](https://doi.org/10.1080/03610918.2021.1928196), Karadag et al. (2023) <https://CRAN.R-project.org/package=ridgregextra> and Sazak et al. (2025) <https://CRAN.R-project.org/package=Stype.est>.

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**Encoding** UTF-8

**Depends** R (>= 4.0.0)

**Imports** stats, mctest, isdals, ridgregextra, Stype.est

**Suggests** knitr, rmarkdown

**URL** <https://github.com/filizkrdg/Styperidge.reg>

**BugReports** <https://github.com/filizkrdg/Styperidge.reg/issues>

**RoxygenNote** 7.3.3

**NeedsCompilation** no

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| regstyperidge | <i>Full regression results using the S-type robust ridge regression estimators</i> |
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### Description

Full regression results using the S-type robust ridge regression estimators

### Usage

```
regstyperidge(x, y)
```

### Arguments

|   |  |
|---|--|
| x | Explanatory variables (data.frame, matrix) |
| y | Dependent variables (data.frame, vector)   |

### Value

A list of lists

### Examples

```
library("mctest")
x <- Hald[,-1]
y <- Hald[,1]
regstyperidge(x,y)
```

```
library(isdals)
data(bodyfat)
x <- bodyfat[,-1]
y <- bodyfat[,1]
regstyperidge(x,y)
```

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 Weightedridge.reg      *Weighted ridge regression*


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### Description

Fits a ridge regression model with observation-specific weights. The weights can be supplied as a vector, data frame, or a square weight matrix. If a vector or data frame is supplied, it is internally converted to a diagonal weight matrix. In the example below, the weight vector  $W$  is generated from a  $\text{Uniform}(0, 1)$  distribution purely to illustrate how to call the function. In practice, users should provide weights that reflect the structure of their data.

### Usage

```
Weightedridge.reg(x, y, W)
```

### Arguments

- |     |  |
|-----|--|
| $x$ | Explanatory variables. A data.frame or matrix with observations in rows and predictors in columns.   |
| $y$ | Dependent variable. A numeric vector, data.frame, or matrix. For a univariate response, this should be a length- $n$ vector or an $n \times 1$ matrix.   |
| $W$ | Observation weights. Can be <ul style="list-style-type: none"> <li>• a numeric vector of length <math>n</math>, or</li> <li>• a single-column data.frame of length <math>n</math>, or</li> <li>• an <math>n \times n</math> weight matrix.</li> </ul> If $W$ is a vector or data.frame, the function converts it to $\text{diag}(W)$ internally. |

### Value

A list with the following components:

- cc** Numeric scalar. The selected ridge parameter  $k$ .
- beta** Numeric matrix ( $p \times 1$ ). Ridge regression coefficients on the standardized scale (no intercept).
- betaor** Numeric matrix ( $(p+1) \times 1$ ). Coefficients on the original (unstandardized) scale, including the intercept in the first row.
- e** Numeric matrix ( $n \times 1$ ). Residuals on the standardized scale ( $y_r - \hat{y}_{\text{hat}}$ ).
- ew** Numeric matrix ( $n \times 1$ ). Weighted residuals ( $W^{1/2} \%* \% e$ ).
- yhat** Numeric matrix ( $n \times 1$ ). Fitted values on the standardized scale ( $x_r \%* \% \text{beta}$ ).
- yhatw** Numeric matrix ( $n \times 1$ ). Fitted values in the weighted standardized space ( $x_{rw} \%* \% \text{beta}$ ).
- yhator** Numeric matrix ( $n \times 1$ ). Fitted values on the original scale using **betaor**.
- MSE** Numeric scalar. Mean squared error (MSE) computed from weighted residuals.
- F** Numeric scalar. Overall model F statistic based on the weighted ANOVA decomposition.
- sig** Numeric scalar. P-value associated with F.

**varbeta** Numeric matrix ( $p \times p$ ). Estimated covariance matrix of beta on the standardized scale.

**stdbeta** Numeric vector (length  $p$ ). Standard errors of beta.

**R2** Numeric scalar. Weighted coefficient of determination (R-squared).

**R2adj** Numeric scalar. Adjusted weighted R-squared.

**anovatable** A data.frame. ANOVA-style table with sums of squares, degrees of freedom, mean squares, F, and p-value.

**confint** Numeric matrix ( $2 \times p$ ). Confidence intervals for beta; first row is lower, second row is upper.

### Examples

```
## Example: Weighted ridge regression using the bodyfat data from isdals
library(isdals)
data(bodyfat)

## Explanatory variables (x) and response (y)
x <- bodyfat[ , -1] # all columns except the first: predictors
y <- bodyfat[ , 1]  # first column: response (body fat percentage)

## Generate observation weights uniformly on [0, 1]

n <- nrow(x)
W <- runif(n, min = 0, max = 1)

## Fit the weighted ridge regression model
fit <- Weightedridge.reg(x, y, W)

## Inspect some key outputs
fit$beta      # coefficients in the standardized scale
fit$betaor    # coefficients in the original scale (including intercept)
fit$R2        # R-squared
fit$R2adj     # Adjusted R-squared
fit$anovatable # ANOVA table
```

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