Package: robustsur (via r-universe)

September 17, 2024

Version 0.0-7

Date 2021-10-03

Title Robust Estimation for Seemingly Unrelated Regression Models

Maintainer Claudio Agostinelli <claudio.agostinelli@unitn.it>

Description Data sets are often corrupted by outliers. When data are
multivariate outliers can be classified as case-wise or
cell-wise. The latters are particularly challenge to handle. We
implement a robust estimation procedure for Seemingly Unrelated
Regression Models which is able to cope well with both type of
outliers. Giovanni Saraceno, Fatemah Alqallaf, Claudio
Agostinelli (2021) <arXiv:2107.00975>.

Depends R (>= 3.0.0), robustbase, robreg3S

Imports Matrix, GSE

Suggests systemfit

License GPL (>= 2)

NeedsCompilation no

Author Claudio Agostinelli [aut, cre]
(<https://orcid.org/0000-0001-6702-4312>), Giovanni Saraceno
[aut] (<https://orcid.org/0000-0002-1753-2367>)

Date/Publication 2021-10-04 08:40:02 UTC

Repository https://claudioagostinelli.r-universe.dev

RemoteUrl https://github.com/cran/robustsur

RemoteRef HEAD

RemoteSha 1f7d4ef7f441a8f7363e9be48513064b97f96485

Contents

---

eigenkronecker   *Spectral Decomposition of a kronecker product of a matrix with an identity matrix*

Description

Computes eigenvalues and eigenvectors of the kronecker product of a matrix with an identity matrix.

Usage

```
eigenkronecker(x, n)
```

Arguments

x   a numeric or complex symmetric matrix whose spectral decomposition is to be computed. Logical matrices are coerced to numeric.

n   dimension of the identity matrix.

Details

Only symmetric matrices are considered.

Value

The spectral decomposition of kronecher product between x and an identity matrix of dimesion n is returned as a list with components

values   a vector containing the eigenvalues.

vectors   a matrix whose columns contain the eigenvectors.

Author(s)

Claudio Agostinelli and Giovanni Saraceno

References

R.A. Horn and C.R. Johnson (1994) Topics in Matrix Analysis, Cambridge University Press. Theorem 4.2.12.

See Also

[eigen](#) and [kronecker](#).

Examples

```
eigenkronecker(x=cbind(c(1,-1), c(-1,1)), n=2)
```

---

summary.surerob   *Summary of surerob estimation*

Description

These functions create and print summary results of the estimated equation system.

Usage

```
## S3 method for class 'surerob'
summary(object, residCov=TRUE, equations=TRUE, ...)
## S3 method for class 'summary.surerob'
print(x, digits=max(3, getOption("digits")-1),
    residCov=x$printResidCov, equations=x$printEquations, ...)
```

Arguments

object	an object of class surerob.
x	an object of class summary.surerob.
residCov	logical. If TRUE, the residual correlation matrix, the residual covariance matrix, and its determinant are printed.
equations	logical. If TRUE, summary results of each equation are printed. If FALSE, just the coefficients are printed.
digits	number of digits to print.
...	not yet used.

Value

Applying summary on an object of class surerob returns a list of class summary.surerob. An object of class summary.surerob contains all results that belong to the whole system. This list contains one special object: eq. This is a list and contains objects of class summary.lmrob. These objects contain the results that belong to each of the estimated equations.

The objects of classes summary.surerob have the following components

method	estimation method.
residuals	residuals.
residCovEst	residual covariance matrix used for estimation.
residCov	estimated residual covariance matrix.
residCor	correlation matrix of the residuals.
detResidCov	determinant of residCov.
rweights	matrix of robust weights.
eq	a list containing the summary from function summary.lmrob and ssr: residual sum of squares, eqnNo: equation number and eqnLabel: equation label.

df	degrees of freedom, a 2-vector, where the first element is the number of coefficients and the second element is the number of observations minus the number of coefficients.
coefficients	a matrix with columns for the estimated coefficients, their standard errors, t-statistic and corresponding (two-sided) p-values.
ssr_weighted	weighted residual sum of squares.
r.squared	R^2 value.
adj.r.squared	adjusted R^2 value.
coefCov	estimated covariance matrix of the coefficients.
printResidCov	argument residCov.
printEquations	argument equations.
control	list of control parameters used for the estimation.
call	the matched call of surerob.

Author(s)

Claudio Agostinelli and Giovanni Saraceno

References

Giovanni Saraceno, Fatemah Alqallaf and Claudio Agostinelli (2021?) A Robust Seemingly Unrelated Regressions For Row-Wise And Cell-Wise Contamination, submitted

See Also

surerob

Examples

```
library(systemfit)
data("Kmenta")
eqDemand <- consump~price+income
eqSupply <- consump~price+farmPrice+trend
system <- list(demand=eqDemand, supply=eqSupply)

## Robust estimation
fitrob <- surerob(system, data=Kmenta)
summary(fitrob)
```

---

surerob | *Robust estimation for Seemingly Unrelated Regression Models*

Description

Robust estimation for Seemingly Unrelated Regression Models in presence of cell-wise and case-wise outliers performed using a three-stage procedure. In the first step estimation of the coefficients in each single-equation model is obtained using a Robust Regression procedure, robust estimation of the residual covariance is obtained by a Two-Step Generalized S-estimator, a weighted least square is performed on the whole system to get final estimates of the regression coefficients.

Usage

```
surerob(formula, data, control=lmrob.control(), ...)
## S3 method for class 'surerob'
print(x, digits=max(3, getOption("digits")-1), ...)
```

Arguments

formula	a list of objects of class formula for multiple-equation models; for single-equation models use function lmrob.
data	a list of objects of class data.frame. Each data.frame contains the data for the corresponding model and all the data.frames must have the same number of observations.
control	list of control parameters. The default is constructed by the function lmrob.control, and it is passed to function lmrob.
...	arguments passed to the function TSGS.
x	an object of class surerob.
digits	number of digits to print.

Details

The estimation of systems of equations with unequal numbers of observations is not implemented.

Value

surerob returns a list of the class surerob and contains all results that belong to the whole system. This list contains one special object: "eq". It is a list and contains one object for each estimated equation. These objects are of the class lmrob and contain the results that belong only to the regarding equation.

The objects of the class surerob have the following components:

eq	a list that contains the results that belong to the individual equations.
call	the matched call.
method	estimation method.

rank	total number of linear independent coefficients.
coefficients	vector of all estimated coefficients.
fitted.values	matrix of fitted values.
residuals	matrix of residuals
imp.residuals	imputed residuals from [TSGS]().
residCovEst	residual covariance matrix used for estimation.
residCov	estimated residual covariance matrix.
rweights	matrix of robust weights.
TSGS	object from function [TSGS]().
control	list of control parameters used for the estimation.
df.residual	degrees of freedom of the whole system.
y	response observations used in the second step.
x	design matrix used in the second step.

Author(s)

Claudio Agostinelli and Giovanni Saraceno

References

Giovanni Saraceno, Fatemah Alqallaf and Claudio Agostinelli (2021?) A Robust Seemingly Unrelated Regressions For Row-Wise And Cell-Wise Contamination, submitted

See Also

[lmrob](), [lm]() and [systemfit]()

Examples

```
library(systemfit)
data("Kmenta")
eqDemand <- consump~price+income
eqSupply <- consump~price+farmPrice+trend
system <- list(demand=eqDemand, supply=eqSupply)

## Robust estimation
fitrob <- surerob(system, data=Kmenta)
print(fitrob)
```

Index