Package ‘localgauss’

November 14, 2016

Type Package

Title Estimating Local Gaussian Parameters

Version 0.40

Date 2016-11-14

Author Tore Selland Kleppe <tore.kleppe@uis.no>

Maintainer Tore Selland Kleppe <tore.kleppe@uis.no>

Depends MASS, foreach, matrixStats

Description Computational routines for estimating local Gaussian parameters. Local Gaussian parameters are useful for characterizing and testing for non-linear dependence within bivariate data. See e.g. Tjostheim and Hufthammer, Local Gaussian correlation: A new measure of dependence, Journal of Econometrics, 2013, Volume 172 (1), pages 33-48 <DOI:10.1016/j.jeconom.2012.08.001>.

License GPL-2

LazyLoad yes

NeedsCompilation yes

Repository CRAN

Date/Publication 2016-11-14 23:02:36

R topics documented:

localgauss ........................................... 2
localgauss.indtest ................................... 3

Index 5
localgauss

**local Gaussian parameters**

**Description**

Routine for estimating local Gaussian parameters based on a sample from the bivariate distribution under consideration. The routine can either estimate local parameters on a grid covering the data controlled by the `gsize` and `hthresh` parameters. Otherwise, local Gaussian parameters can be estimated at coordinates specified by the user in `xy.mat`.

**Usage**

```r
localgauss(x,y,b1=1,b2=1,gsize=15,hthresh=0.001,xy.mat=NULL)
```

**Arguments**

- `x`, `y`: The two data vectors
- `b1`, `b2`: The bandwidth in the x-direction and y-direction, respectively
- `gsize`: The gridsize (only used if `xy.mat` is not specified).
- `hthresh`: Gridpoints where a non-parametric density estimate is lower than `hthresh` are omitted (only used if `xy.mat` is not specified).
- `xy.mat`: A M times 2 matrix of points where the local parameters are to be estimated.

**Details**

The objective function is maximized using a modified Newton method. The user should check whether the field `eflag` in the returned object is zero for all estimates. If not, the optimizer has not converged and the estimates should not be trusted. For more details, see [Reference to article].

**Value**

S3 object of type `localgauss` containing the fields:

- `par.est`: M times 5 matrix of parameter estimates, with columns mu1,mu2,sigma1,sigma2,rho.
- `eflag`: M-vector of exitflags from the optimizer. Estimations with exit flags other than 0 should not be trusted.
- `hessian`: The negative Hessian of the objective function.

**References**

See Also

`localgauss.indtest`.

Examples

```r
x = rnorm(n = 1000)
y = x^2 + rnorm(n = 1000)
lgobj = localgauss(x, y)
```

`localgauss.indtest`  
*Pointwise Independence test based on local Gaussian correlation*

Description

Routine for testing for local independence based on local Gaussian parameters. It accepts an S3 object produced by `localgauss()`, and performs a bootstrap-based test with null-hypothesis being that `x` and `y` are independent.

Usage

```r
localgauss.indtest(locobj, R = 10, alpha = 0.1, seed = 1)
```

Arguments

- `locobj` localgauss-object
- `R` Number of bootstrap replica
- `alpha` significance level (note: two sided test)
- `seed` Random seed in used for bootstrap

Details

The test is based on producing a null-distribution of local Gaussian correlations were the original data are resampled from their empirical marginal distributions. The bootstrap-based null-distribution is produced for each point specified in `xyMat` in `locobj`. An estimated local correlation for the original data significantly larger than the null-distribution is indicated with +1 (returned in the vector `testResults`). An estimated local correlation for the original data insignificantly smaller than the null-distribution is indicated with 0. An estimated local correlation for the original data significantly smaller than the null-distribution is indicated with -1.

Value

S3 object of type `localgauss.indtest` containing the fields:

- `localgauss` simply returns `locobj`.
- `upper` Vector containing the 1-alpha/2 quantiles of the null-distributions.
- `lower` Vector containing the alpha/2 quantiles of the null-distributions.
- `testResults` Vector containing the test results.
References


See Also

localgauss.

Examples

```r
x=rnorm(n=100)
y=x^2 + rnorm(n=100)
lgobj = localgauss(x,y,gs=8)
lgind = localgauss.indtest(lgobj)
```
Index

*Topic localgauss
  localgauss, 2
  localgauss.indtest, 3

localgauss, 2, 4
localgauss.indtest, 3, 3