

# Package ‘localgauss’

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**Type** Package

**Title** Estimating Local Gaussian Parameters

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**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

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localgauss                      *local Gaussian parameters*

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### 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

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

### Arguments

<code>x,y</code>	The two data vectors
<code>b1,b2</code>	The bandwidth in the x-direction and y-direction, respectively
<code>gsize</code>	The gridsize (only used if <code>xy.mat</code> is not specified).
<code>hthresh</code>	Gridpoints where a non-parametric density estimate is lower than <code>hthresh</code> are omitted (only used if <code>xy.mat</code> is not specified).
<code>xy.mat</code>	A <code>M</code> 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:

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

### References

Geir Drage Berentsen, Tore Selland Kleppe, Dag Tjøstheim, Introducing `localgauss`, an R Package for Estimating and Visualizing Local Gaussian Correlation, *Journal of Statistical Software*, 56(12), 1-18, 2014, (<http://www.jstatsoft.org/v56/i12/>). Note that for compability reasons, the graphics routines described in the paper have been taken out from release 0.40. See also Tjøstheim, D. and Hufthammer K. O., Local Gaussian correlation: A new measure of dependence, *Journal of Econometrics*, 172(1),pages 33-48,2013, for a detailed description of local Gaussian correlation.

**See Also**

[localgauss.indtest](#).

**Examples**

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

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

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**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**

```
localgauss.indtest(locobj,R=10,alpha=0.10,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 `xy.mat` in `locobj`. An estimated local correlation for the original data significantly larger than the null-distribution is indicated with +1 (returned in the vector `test.results`). An estimated local correlation for the original data insignificant with respect to 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 <code>locobj</code> .
upper	Vector containing the $1-\alpha/2$ quantiles of the null-distributions.
lower	Vector containing the $\alpha/2$ quantiles of the null-distributions.
test.results	Vector containing the test results.

## References

Geir Drage Berentsen, Tore Selland Kleppe, Dag Tjostheim, Introducing localgauss, an R Package for Estimating and Visualizing Local Gaussian Correlation, Journal of Statistical Software, 56(12), 1-18, 2014, (<http://www.jstatsoft.org/v56/i12/>). Note that for compability reasons, the graphics routines described in the paper have been taken out from release 0.40. See also Tjoestheim, D. and Hufthammer K. O., Local Gaussian correlation: A new measure of dependence, Journal of Econometrics, 172(1),pages 33-48,2013, for a detailed description of local Gaussian correlation and Berentsen, G.D. and Tjoestheim D., Recognizing and visualizing departures from independence in bivariate data using local Gaussian correlation, <http://people.uib.no/gbe062/local-gaussian-correlation/> for a description of the local independence test.

## See Also

[localgauss.](#)

## Examples

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

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