

# Package: CLIC (via r-universe)

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**Type** Package

**Title** The LIC for Distributed Cosine Regression Analysis

**Version** 0.1

**Date** 2025-08-18

**Description** This comprehensive framework for periodic time series modeling is designated as ``CLIC'' (The LIC for Distributed Cosine Regression Analysis) analysis. It is predicated on the assumption that the underlying data exhibits complex periodic structures beyond simple harmonic components. The philosophy of the method is articulated in Guo G. (2020) <[doi:10.1080/02664763.2022.2053949](https://doi.org/10.1080/02664763.2022.2053949)>.

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**Encoding** UTF-8

**RoxygenNote** 7.3.2

**Depends** R (>= 3.5.0)

**Imports** stats, LaplacesDemon, fBasics

**Suggests** testthat (>= 3.0.0)

**NeedsCompilation** no

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beta_AD	<i>Calculate the estimators of beta on the A-opt and D-opt</i>
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### Description

Calculate the estimators of beta on the A-opt and D-opt

### Usage

beta\_AD(K = K, nk = nk, alpha = alpha, X = X, y = y)

### Arguments

K	is the number of subsets
nk	is the length of subsets
alpha	is the significance level
X	is the observation matrix
y	is the response vector

### Value

A list containing:

betaA	The estimator of beta on the A-opt.
betaD	The estimator of beta on the D-opt.

### References

- Guo, G., Song, H. & Zhu, L. The COR criterion for optimal subset selection in distributed estimation. *Statistics and Computing*, 34, 163 (2024). [doi:10.1007/s1122202410471z](https://doi.org/10.1007/s1122202410471z)
- Guo, G., Sun, Y., Qian, G., & Wang, Q. (2022). LIC criterion for optimal subset selection in distributed interval estimation. *Journal of Applied Statistics*, 50(9), 1900-1920. [doi:10.1080/02664763.2022.2053949](https://doi.org/10.1080/02664763.2022.2053949).
- Chang, D., Guo, G. (2024). LIC: An R package for optimal subset selection for distributed data. *SoftwareX*, 28, 101909.
- Jing, G., & Guo, G. (2025). TLIC: An R package for the LIC for T distribution regression analysis. *SoftwareX*, 30, 102132.

Chang, D., & Guo, G. (2025). Research on Distributed Redundant Data Estimation Based on LIC. *IAENG International Journal of Applied Mathematics*, 55(1), 1-6.

Gao, H., & Guo, G. (2025). LIC for Distributed Skewed Regression. *IAENG International Journal of Applied Mathematics*, 55(9), 2925-2930.

Zhang, C., & Guo, G. (2025). The optimal subset estimation of distributed redundant data. *IAENG International Journal of Applied Mathematics*, 55(2), 270–277.

Jing, G., & Guo, G. (2025). Student LIC for distributed estimation. *IAENG International Journal of Applied Mathematics*, 55(3), 575–581.

Liu, Q., & Guo, G. (2025). Distributed estimation of redundant data. *IAENG International Journal of Applied Mathematics*, 55(2), 332–337.

### Examples

```
p=6;n=1000;K=2;nk=200;alpha=0.05;sigma=1
e=rnorm(n,0,sigma); beta=c(sort(c(runif(p,0,1))));
data=c(rnorm(n*p,5,10));X=matrix(data, ncol=p);
y=X%*%beta+e;
beta_AD(K=K,nk=nk,alpha=alpha,X=X,y=y)
```

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beta\_cor

*Calculate the estimator of beta on the COR*

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### Description

Calculate the estimator of beta on the COR

### Usage

```
beta_cor(K = K, nk = nk, alpha = alpha, X = X, y = y)
```

### Arguments

K	is the number of subsets
nk	is the length of subsets
alpha	is the significance level
X	is the observation matrix
y	is the response vector

### Value

A list containing:

betaC	The estimator of beta on the COR.
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## References

- Guo, G., Song, H. & Zhu, L. The COR criterion for optimal subset selection in distributed estimation. *Statistics and Computing*, 34, 163 (2024). doi:10.1007/s1122202410471z
- Guo, G., Sun, Y., Qian, G., & Wang, Q. (2022). LIC criterion for optimal subset selection in distributed interval estimation. *Journal of Applied Statistics*, 50(9), 1900-1920. doi:10.1080/02664763.2022.2053949.
- Chang, D., Guo, G. (2024). LIC: An R package for optimal subset selection for distributed data. *SoftwareX*, 28, 101909.
- Jing, G., & Guo, G. (2025). TLIC: An R package for the LIC for T distribution regression analysis. *SoftwareX*, 30, 102132.
- Chang, D., & Guo, G. (2025). Research on Distributed Redundant Data Estimation Based on LIC. *IAENG International Journal of Applied Mathematics*, 55(1), 1-6.
- Gao, H., & Guo, G. (2025). LIC for Distributed Skewed Regression. *IAENG International Journal of Applied Mathematics*, 55(9), 2925-2930.
- Zhang, C., & Guo, G. (2025). The optimal subset estimation of distributed redundant data. *IAENG International Journal of Applied Mathematics*, 55(2), 270-277.
- Jing, G., & Guo, G. (2025). Student LIC for distributed estimation. *IAENG International Journal of Applied Mathematics*, 55(3), 575-581.
- Liu, Q., & Guo, G. (2025). Distributed estimation of redundant data. *IAENG International Journal of Applied Mathematics*, 55(2), 332-337.

## Examples

```
p=6;n=1000;K=2;nk=200;alpha=0.05;sigma=1
e=rnorm(n,0,sigma); beta=c(sort(c(runif(p,0,1)))));
data=c(rnorm(n*p,5,10));X=matrix(data, ncol=p);
y=X%%beta+e;
beta_cor(K=K,nk=nk,alpha=alpha,X=X,y=y)
```

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cerr

*cerr function is used to generate a dataset where the error term follows cosine-based distributions*

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## Description

This cerr function generates a dataset with a specified number of observations and predictors, along with a response vector that has an error term sampled from cosine-based distributions on  $[-\pi/2, \pi/2]$ .

## Usage

```
cerr(n, nr, p, dist_type, ...)
```

**Arguments**

n	is the number of observations
nr	is the number of observations with a different error distribution segment (the second block)
p	is the dimension of the observation
dist_type	is the cosine-based sampler to use: "cosine_random", "cosine_rejection_sampling", or "cosine_metropolis_hastings"
...	is additional arguments (reserved for compatibility; not used)

**Value**

X, Y, e

**References**

- Guo, G., Song, H. & Zhu, L. The COR criterion for optimal subset selection in distributed estimation. *Statistics and Computing*, 34, 163 (2024). doi:10.1007/s1122202410471z
- Guo, G., Sun, Y., Qian, G., & Wang, Q. (2022). LIC criterion for optimal subset selection in distributed interval estimation. *Journal of Applied Statistics*, 50(9), 1900-1920. doi:10.1080/02664763.2022.2053949.
- Chang, D., Guo, G. (2024). LIC: An R package for optimal subset selection for distributed data. *SoftwareX*, 28, 101909.
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- Gao, H., & Guo, G. (2025). LIC for Distributed Skewed Regression. *IAENG International Journal of Applied Mathematics*, 55(9), 2925-2930.
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**Examples**

```
set.seed(12)
data <- cerr(n = 1200, nr = 200, p = 5, dist_type = "cosine_random")
str(data)
```

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 CLIC

*CLIC function based on LIC with cosine\_random distributed errors*


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### Description

The CLIC function builds on the LIC function by introducing the assumption that the error term follows a cosine\_random distribution, thereby enhancing the length and information optimisation criterion.

### Usage

```
CLIC(X, Y, alpha = 0.05, K = 10, nk = NULL, dist_type = "cosine_random")
```

### Arguments

X	is a design matrix
Y	is a random response vector of observed values
alpha	is the significance level
K	is the number of subsets
nk	is the sample size of subsets
dist_type	is the type where the error term obeys a cosine_random distribution

### Value

MUopt, Bopt, MAEMUopt, MSEMUopt, opt, Yopt

### References

- Guo, G., Song, H. & Zhu, L. The COR criterion for optimal subset selection in distributed estimation. *Statistics and Computing*, 34, 163 (2024). doi:10.1007/s1122202410471z
- Guo, G., Sun, Y., Qian, G., & Wang, Q. (2022). LIC criterion for optimal subset selection in distributed interval estimation. *Journal of Applied Statistics*, 50(9), 1900-1920. doi:10.1080/02664763.2022.2053949.
- Chang, D., Guo, G. (2024). LIC: An R package for optimal subset selection for distributed data. *SoftwareX*, 28, 101909.
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- Chang, D., & Guo, G. (2025). Research on Distributed Redundant Data Estimation Based on LIC. *IAENG International Journal of Applied Mathematics*, 55(1), 1-6.
- Gao, H., & Guo, G. (2025). LIC for Distributed Skewed Regression. *IAENG International Journal of Applied Mathematics*, 55(9), 2925-2930.
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Jing, G., & Guo, G. (2025). Student LIC for distributed estimation. *IAENG International Journal of Applied Mathematics*, 55(3), 575–581.

Liu, Q., & Guo, G. (2025). Distributed estimation of redundant data. *IAENG International Journal of Applied Mathematics*, 55(2), 332–337.

## Examples

```
set.seed(12)
n <- 1200
nr <- 200
p <- 5
data <- cerr(n, nr, p, dist_type = "cosine_random")
CLIC(data$X, data$Y, alpha = 0.05, K = 10, nk = n / 10, dist_type = "cosine_random")
```

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LICnew	<i>Calculate the LIC estimator based on A-optimal and D-optimal criterion</i>
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## Description

Calculate the LIC estimator based on A-optimal and D-optimal criterion

## Usage

```
LICnew(X, Y, alpha, K, nk)
```

## Arguments

X	A matrix of observations (design matrix) with size $n \times p$
Y	A vector of responses with length $n$
alpha	The significance level for confidence intervals
K	The number of subsets to consider
nk	The size of each subset

## Value

A list containing:

E5	The LIC estimator based on A-optimal and D-optimal criterion.
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## References

- Guo, G., Song, H. & Zhu, L. The COR criterion for optimal subset selection in distributed estimation. *Statistics and Computing*, 34, 163 (2024). doi:10.1007/s1122202410471z
- Guo, G., Sun, Y., Qian, G., & Wang, Q. (2022). LIC criterion for optimal subset selection in distributed interval estimation. *Journal of Applied Statistics*, 50(9), 1900-1920. doi:10.1080/02664763.2022.2053949.
- Chang, D., Guo, G. (2024). LIC: An R package for optimal subset selection for distributed data. *SoftwareX*, 28, 101909.
- Jing, G., & Guo, G. (2025). TLIC: An R package for the LIC for T distribution regression analysis. *SoftwareX*, 30, 102132.
- Chang, D., & Guo, G. (2025). Research on Distributed Redundant Data Estimation Based on LIC. *IAENG International Journal of Applied Mathematics*, 55(1), 1-6.
- Gao, H., & Guo, G. (2025). LIC for Distributed Skewed Regression. *IAENG International Journal of Applied Mathematics*, 55(9), 2925-2930.
- Zhang, C., & Guo, G. (2025). The optimal subset estimation of distributed redundant data. *IAENG International Journal of Applied Mathematics*, 55(2), 270–277.
- Jing, G., & Guo, G. (2025). Student LIC for distributed estimation. *IAENG International Journal of Applied Mathematics*, 55(3), 575–581.
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## Examples

```
p = 6; n = 1000; K = 2; nk = 200; alpha = 0.05; sigma = 1
e = rnorm(n, 0, sigma); beta = c(sort(c(runif(p, 0, 1)))));
data = c(rnorm(n * p, 5, 10)); X = matrix(data, ncol = p);
Y = X %*% beta + e;
LICnew(X = X, Y = Y, alpha = alpha, K = K, nk = nk)
```

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