# Package 'DLEGFM'

January 20, 2025

**Type** Package

**Version** 0.4.0

**Title** Distributed Loading Estimation for General Factor Model

**Depends** R (>= 3.5.0)

**Suggests** testthat (>= 3.0.0)

**Description** The load estimation method is based on a general factor model to solve the estimates of load and specific variance. The philosophy of the package is described in Guangbao Guo. (2022). <doi:10.1007/s00180-022-01270-z>.

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**Config/testthat/edition** 3

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**Repository** CRAN

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# Contents

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BlPC                          *Loading Estimation for General Factor Model*

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### Description

This function estimates the load and residual terms based on the general factor model and calculates the estimated values.

### Usage

```
BlPC(data,m)
```

### Arguments

| | |
|---|---|
| data | The data is total data set |
| m | The m is the number of first layer principal component |

### Value

| | |
|---|---|
| ABr | estimation of load value |
| ABc | estimation of load value |
| DBr | estimation of error term |
| DBc | estimation of error term |
| SigmaB1hat | estimation of covariance |
| SigmaB2hat | estimation of covariance |

### Author(s)

Guangbao Guo, Yaping Li

### Examples

```
BlPC(data=ISE,m=3)
```

DBlPC                    *Distributed Loading Estimation for General Factor Model*

**Description**

This function estimates the load and residual terms based on the general factor model and calculates the estimated values.

**Usage**

```
DBlPC(data,m,n1,K)
```

**Arguments**

| | |
|---|---|
| data | The data is total data set |
| m | The m is the number of first layer principal component |
| n1 | The n1 is the length of each data subset |
| K | The K is the number of nodes |

**Value**

| | |
|---|---|
| ABr | estimation of load value |
| ABc | estimation of load value |
| DBr | estimation of error term |
| DBc | estimation of error term |
| SigmaB1hat | estimation of covariance |
| SigmaB2hat | estimation of covariance |

**Author(s)**

Guangbao Guo, Yaping Li

**Examples**

```
DBlPC(data=ISE,m=3,n1=107,K=5)
```

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DFanPC                          *Distributed Loading Estimation for General Factor Model*

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### Description

This function estimates the load and residual terms based on the general factor model and calculates the estimated values.

### Usage

```
DFanPC(data,m,n1,K)
```

### Arguments

| | |
|---|---|
| data | The data is total data set |
| m | The m is the number of principal component |
| n1 | The n1 is the length of each data subset |
| K | The K is the number of nodes |

### Value

| | |
|---|---|
| AF | estimation of load value |
| DF | estimation of error term |
| SigmahatF | estimation of covariance |

### Author(s)

Guangbao Guo, Yaping Li

### Examples

```
DFanPC(data=ISE,m=3,n1=107,K=5)
```

---

DGaoPC                          *Distributed Loading Estimation for General Factor Model*

---

### Description

This function estimates the load and residual terms based on the general factor model and calculates the estimated values.

### Usage

```
DGaoPC(data,m,n1,K)
```

### Arguments

| | |
|---|---|
| data | The data is total data set |
| m | The m is the number of first layer principal component |
| n1 | The n1 is the length of each data subset |
| K | The K is the number of nodes |

### Value

| | |
|---|---|
| AG1 | estimation of load value |
| AG2 | estimation of load value |
| DG1 | estimation of error term |
| DG2 | estimation of error term |
| SigmahatG1 | estimation of covariance |
| SigmahatG2 | estimation of covariance |

### Author(s)

Guangbao Guo, Yaping Li

### Examples

```
DGaoPC(data=ISE,m=3,n1=107,K=5)
```

---

| | |
|---|---|
| DGulPC | *Distributed Loading Estimation for General Factor Model* |

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### Description

This function estimates the load and residual terms based on the general factor model and calculates the estimated values.

### Usage

```
DGulPC(data,m,n1,K)
```

### Arguments

| | |
|---|---|
| data | The data is total data set |
| m | The m is the number of first layer principal component |
| n1 | The n1 is the length of each data subset |
| K | The K is the number of nodes |

## Value

| | |
|---|---|
| AU1 | estimation of load value |
| AU2 | estimation of load value |
| DU3 | estimation of error term |
| S1hat | estimation of covariance |

## Author(s)

Guangbao Guo, Yaping Li

## Examples

```
DGulPC(data=ISE,m=3,n1=107,K=5)
```

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DJIA                                      *Dow Jones industrial average*

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## Description

The Dow Jones industrial average (DJIA) data set.

## Usage

```
data("DJIA")
```

## Format

GAS.F  a numeric vector

Nikkei.F  a numeric vector

NZD  a numeric vector

silver.F  a numeric vector

RUSSELL.F  a numeric vector

S.P.F  a numeric vector

CHF  a numeric vector

Dollar.index.F  a numeric vector

Dollar.index  a numeric vector

wheat.F  a numeric vector

XAG  a numeric vector

XAU  a numeric vector

## Details

The data set comes from the Dow Jones industrial average (PSA) data of 96 patients collected by Stanford University Medical Center. These patients all underwent radical prostatectomy.

## Source

The Stanford University Medical Center.

## References

NA

## Examples

```
data(DJIA)
## maybe str(DJIA) ; plot(DJIA) ...
```

---

| DPC | *Distributed Loading Estimation for General Factor Model* |
|---|---|

---

## Description

This function estimates the load and residual terms based on the general factor model and calculates the estimated values.

## Usage

```
DPC(data,m,n1,K)
```

## Arguments

| | |
|---|---|
| data | The data is total data set |
| m | The m is the number of first layer principal component |
| n1 | The n1 is the length of each data subset |
| K | The K is the number of nodes |

## Value

| | |
|---|---|
| Ahat | estimation of load value |
| Dhat | estimation of error term |
| Sigmahat | estimation of covariance |

## Author(s)

Guangbao Guo, Yaping Li

## Examples

```
DPC(data=ISE,m=3,n1=107,K=5)
```

---

DPPC                          *Distributed Loading Estimation for General Factor Model*

---

### Description

This function estimates the load and residual terms based on the general factor model and calculates the estimated values.

### Usage

```
DPPC(data,m,n1,K)
```

### Arguments

| | |
|---|---|
| data | The data is total data set |
| m | The m is the number of first layer principal component |
| n1 | The n1 is the length of each data subset |
| K | The K is the number of nodes |

### Value

| | |
|---|---|
| Apro | estimation of load value |
| Dpro | estimation of error term |
| Sigmahatpro | estimation of covariance |

### Author(s)

Guangbao Guo, Yaping Li

### Examples

```
DPPC(data=ISE,m=3,n1=107,K=5)
```

---

FanPC                          *Loading Estimation for General Factor Model*

---

### Description

This function estimates the load and residual terms based on the general factor model and calculates the estimated values.

### Usage

```
FanPC(data,m)
```

## Arguments

| | |
|---|---|
| data | The data is total data set |
| m | The m is the number of principal component |

## Value

| | |
|---|---|
| AF | estimation of load value |
| DF | estimation of error term |
| SigmahatF | estimation of covariance |

## Author(s)

Guangbao Guo, Yaping Li

## Examples

```
FanPC(data=ISE,m=3)
```

---

GaoPC                           *Loading Estimation for General Factor Model*

---

## Description

This function estimates the load and residual terms based on the general factor model and calculates the estimated values.

## Usage

```
GaoPC(data,m)
```

## Arguments

| | |
|---|---|
| data | The data is total data set |
| m | The m is the number of principal component |

## Value

| | |
|---|---|
| AG1 | estimation of load value |
| AG2 | estimation of load value |
| DG1 | estimation of error term |
| DG2 | estimation of error term |
| SigmahatG1 | estimation of covariance |
| SigmahatG2 | estimation of covariance |

## Author(s)

Guangbao Guo, Yaping Li

## Examples

```
GaoPC(data=ISE,m=3)
```

---

GulPC                          *Loading Estimation for General Factor Model*

---

## Description

This function estimates the load and residual terms based on the general factor model and calculates
the estimated values.

## Usage

```
GulPC(data,m)
```

## Arguments

| | |
|---|---|
| data | The data is total data set |
| m | The m is the number of first layer principal component |

## Value

| | |
|---|---|
| AU1 | estimation of load value |
| AU2 | estimation of load value |
| DU3 | estimation of error term |
| Shat | estimation of covariance |

## Author(s)

Guangbao Guo, Yaping Li

## Examples

```
GulPC(data=ISE,m=3)
```

---

ISE                     *Istanbul Stock Exchange*

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### Description

The Istanbul Stock Exchange (ISE) data set.

### Usage

```
data("ISE")
```

### Format

ISE  a numeric vector

SP  a numeric vector

DAX  a numeric vector

FTSE  a numeric vector

NIKKEI  a numeric vector

BOVESPA  a numeric vector

EU  a numeric vector

EM  a numeric vector

### Details

The data set comes from the Istanbul Stock Exchange (ISE) data of 96 patients collected by Stanford University Medical Center. These patients all underwent radical prostatectomy.

### Source

The Stanford University Medical Center.

### References

NA

### Examples

```
data(ISE)
## maybe str(ISE) ; plot(ISE) ...
```

---

PC                            *Loading Estimation for General Factor Model*

---

**Description**

This function estimates the load and residual terms based on the general factor model and calculates the estimated values.

**Usage**

```
PC(data,m)
```

**Arguments**

| | |
|---|---|
| data | The data is a highly correlated data set |
| m | The m is the number of principal component |

**Value**

| | |
|---|---|
| Ahat | estimation of load value |
| Dhat | estimation of error term |
| Sigmahat | estimation of covariance |

**Author(s)**

Guangbao Guo, Yaping Li

**Examples**

```
PC(data=ISE,m=3)
```

---

PPC                           *Loading Estimation for General Factor Model*

---

**Description**

This function estimates the load and residual terms based on the general factor model and calculates the estimated values.

**Usage**

```
PPC(data,m)
```

## Arguments

| | |
|---|---|
| data | The data is total data set |
| m | The m is the number of principal component |

## Value

| | |
|---|---|
| Apro | estimation of load value |
| Dpro | estimation of error term |
| Sigmahatpro | estimation of covariance |

## Author(s)

Guangbao Guo, Yaping Li

## Examples

```
PPC(data=ISE,m=3)
```

---

| SECI | *New York Stock Exchange Composite Index* |
|---|---|

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## Description

The New York Stock Exchange Composite Index SECI(SECI) data set.

## Usage

```
data("SECI")
```

## Format

GBP a numeric vector

JPY a numeric vector

CAD a numeric vector

AAPL a numeric vector

AMZN a numeric vector

GE a numeric vector

JPM a numeric vector

MSFT a numeric vector

WFC a numeric vector

XOM a numeric vector

FCHI a numeric vector

FTSE a numeric vector

GDAXI a numeric vector

**Details**

The data set comes from the prostate specific antigen (PSA) data of 96 patients collected by Stanford University Medical Center. These patients all underwent radical prostatectomy.

**Source**

The Stanford University Medical Center.

**References**

NA

**Examples**

```
data(SECI)
## maybe str(SECI) ; plot(SECI) ...
```

---

SPP                                   *Stock Portfolio Performance*

---

**Description**

The Stock Portfolio Performance (SPP) data set.

**Usage**

```
data("SPP")
```

**Format**

X1  a numeric vector

X2  a numeric vector

X3  a numeric vector

X4  a numeric vector

X5  a numeric vector

X6  a numeric vector

X7  a numeric vector

X8  a numeric vector

X9  a numeric vector

X10  a numeric vector

**Details**

The data set comes from the Stock Portfolio Performance (SPP) data of 96 patients collected by Stanford University Medical Center. These patients all underwent radical prostatectomy.

## Source

The Stanford University Medical Center.

## References

NA

## Examples

```
data(SPP)
## maybe str(SPP) ; plot(SPP) ...
```

# Index