

# Package ‘DLEGFM’

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**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](https://doi.org/10.1007/s00180-022-01270-z)>.

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BIPC	<i>Loading Estimation for General Factor Model</i>
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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

```
BIPC(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

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

---

DBIPC

*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

```
DBIPC(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

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

---

 DFanPC

*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

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*

---

**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**

```
DGu1PC(data=ISE, m=3, n1=107, K=5)
```

---

DJIA

*Dow Jones industrial average*

---

**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*

---

### **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)
```

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SECI	<i>New York Stock Exchange Composite Index</i>
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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) ...
```

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