Package ‘PDMIF’

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data1X .................................................. A synthesized input variable dataset to fit a linear model on a panel dataset.

Description

A synthesized input variable dataset to fit a linear model on a panel dataset.

Usage

data1X
**data1Y**

**Format**

A data frame with 5,000 rows and 2 columns:

- **columns** the two independent variables
- **rows** each 100 rows represent the timeseries of each of the 50 individuals ...

---

**Description**

A synthesized output variable dataset to fit a linear model on a panel dataset.

**Usage**

`data1Y`

**Format**

A data frame with 100 rows and 50 columns:

- **columns** the individuals
- **rows** the time points in the timeseries of each individual ...

---

**data2X**

**A synthesized input variable dataset to fit a binomial model on a panel dataset.**

**Description**

A synthesized input variable dataset to fit a binomial model on a panel dataset.

**Usage**

`data2X`

**Format**

A data frame with 5,000 rows and 2 columns:

- **columns** the two independent variables
- **rows** each 50 rows represent the timeseries of each of the 100 individuals ...
data2Y

_A synthesized output variable dataset to fit a binomial model on a panel dataset._

**Description**

A synthesized output variable dataset to fit a binomial model on a panel dataset.

**Usage**

data2Y

**Format**

A data frame with 50 rows and 100 columns:

- **columns** the individuals
- **rows** the time points in the timeseries of each individual ...

---

data3X

_A synthesized input variable dataset to fit a poisson model on a panel dataset._

**Description**

A synthesized input variable dataset to fit a poisson model on a panel dataset.

**Usage**

data3X

**Format**

A data frame with 5,000 rows and 3 columns:

- **columns** the three independent variables
- **rows** each 50 rows represent the timeseries of each of the 100 individuals ...
**data3Y**

A synthesized output variable dataset to fit a poisson model on a panel dataset.

**Description**

A synthesized output variable dataset to fit a poisson model on a panel dataset.

**Usage**

data3Y

**Format**

A data frame with 50 rows and 100 columns:

- **columns**: the individuals
- **rows**: the time points in the timeseries of each individual ...

---

**data4LAB**

A synthesized vector of memberships needed to fit a linear model on a panel dataset under known group memberships.

**Description**

A synthesized vector of memberships needed to fit a linear model on a panel dataset under known group memberships.

**Usage**

data4LAB

**Format**

A vector with 300 entries indicating the group membership of each individual.
data4X

_A synthesized input variable dataset to fit a linear model on a panel dataset under known group memberships._

**Description**

A synthesized input variable dataset to fit a linear model on a panel dataset under known group memberships.

**Usage**

data4X

**Format**

A data frame with 30,000 rows and 2 columns:

- **columns** the two independent variables
- **rows** each 100 rows represent the timeseries of each of the 300 individuals ...

---

data4Y

_A synthesized output variable dataset to fit a linear model on a panel dataset under known group memberships._

**Description**

A synthesized output variable dataset to fit a linear model on a panel dataset under known group memberships.

**Usage**

data4Y

**Format**

A data frame with 100 rows and 300 columns:

- **columns** the individuals
- **rows** the time points in the timeseries of each individual ...
**data5X**

A synthesized input variable dataset to cluster individuals by heterogeneous panel data models with interactive effects.

**Description**

A synthesized input variable dataset to cluster individuals by heterogeneous panel data models with interactive effects.

**Usage**

data5X

**Format**

A data frame with 30,000 rows and 2 columns:

- **columns** the two independent variables
- **rows** each 100 rows represent the timeseries of each of the 300 individuals ...

---

**data5Y**

A synthesized output variable dataset to cluster individuals by heterogeneous panel data models with interactive effects.

**Description**

A synthesized output variable dataset to cluster individuals by heterogeneous panel data models with interactive effects.

**Usage**

data5Y

**Format**

A data frame with 100 rows and 300 columns:

- **columns** the individuals
- **rows** the time points in the timeseries of each individual ...
**data6X**  
*Description*
A synthesized input variable dataset to cluster individual units by nonlinear heterogeneous panel data models with interactive effects when the group membership is unknown.

**Usage**
data6X

**Format**
A data frame with 4,500 rows and 2 columns:
- **columns** the two independent variables
- **rows** each 50 rows represent the timeseries of each of the 90 individuals ...

---

**data6Y**  
*Description*
A synthesized output variable dataset to cluster individual units by nonlinear heterogeneous panel data models with interactive effects when the group membership is unknown.

**Usage**
data6Y

**Format**
A data frame with 50 rows and 90 columns:
- **columns** the individuals
- **rows** the time points in the timeseries of each individual ...
**data7X**

A synthesized input variable dataset to fit a quantile panel data model on a panel dataset.

**Description**

A synthesized input variable dataset to fit a quantile panel data model on a panel dataset.

**Usage**

data7X

**Format**

A data frame with 20,000 rows and 3 columns:

- **columns** the three independent variables
- **rows** each 100 rows represent the timeseries of each of the 200 individuals ...

**data7Y**

A synthesized output variable dataset to fit a quantile panel data model on a panel dataset.

**Description**

A synthesized output variable dataset to fit a quantile panel data model on a panel dataset.

**Usage**

data7Y

**Format**

A data frame with 100 rows and 200 columns:

- **columns** the individuals
- **rows** the time points in the timeseries of each individual ...
**data8Y**

A synthesized output variable dataset to fit a quantile VAR model with interactive effects and lag=2.

**Description**

A synthesized output variable dataset to fit a quantile VAR model with interactive effects and lag=2.

**Usage**

data8Y

**Format**

A data frame with 102 rows and 15 columns:

- **columns** the individuals
- **rows** the time points in the timeseries of each individual ...

**HOMTEST**

**HOMTEST**

**Description**

This function tests homogeneity of the regression coefficients in heterogeneous panel data models with interactive effects.

**Usage**

HOMTEST(X, Y, Nfactors, Maxit = 100, tol = 0.001)

**Arguments**

- **X** The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
- **Y** The T times N panel of response where N=number of individuals, T=length of time series.
- **Nfactors** A pre-specified number of common factors.
- **Maxit** A maximum number of iterations in optimization. Default is 100.
- **tol** Tolerance level of convergence. Default is 0.001.
Value

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated factor loadings for the common factors.
- pvalue: The p-value of the homogeneity test.

References


Examples

```r
fit <- HOMTEST(data1X, data1Y, 2, 20, 0.5)
```

Description

This function tests homogeneity of the regression coefficients in heterogeneous generalized linear models with interactive effects.

Usage

```
HOMTESTGLM(X, Y, FAMILY, Nfactors, Maxit = 100, tol = 0.001)
```

Arguments

- **X**: The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
- **Y**: The T times N panel of response where N=number of individuals, T=length of time series.
- **FAMILY**: A description of the error distribution and link function to be used in the model just like in glm functions.
- **Nfactors**: A pre-specified number of common factors.
- **Maxit**: A maximum number of iterations in optimization. Default is 100.
- **tol**: Tolerance level of convergence. Default is 0.001.
Value

A list with the following components:

• Coefficients: The estimated heterogeneous coefficients.
• Factors: The estimated common factors across groups.
• Loadings: The estimated factor loadings for the common factors.
• pvalue: The p-value of the homogeneity test.

References


Examples

fit <- HOMTESTGLM(data2X, data2Y, binomial(link=logit), 2, 10, 0.5)

Description

This function undergoes hypothesis testing for regression coefficients obtained from the various functions in the package.

Usage

HYPTEST(
  B,
  B0,
  Se,
  test = "two",
  variables = seq(1, nrow(B)),
  individuals = seq(1, ncol(B))
)

Arguments

B  A dataframe of Coefficients as obtained in the output of any function in the package.
B0  A dataframe of hypothetical coefficients to be evaluated in the test. (nrows should match number of variables and ncols should match number of individuals)
Se  A dataframe of Standard Errors as obtained in the output of any function in the package.
test  A string to determine what kind of test to run ("two" for two-tailed, "right" for right-tailed and "left" for left-tailed).

variables  A list of variables whose coefficients are to be tested. Default is all variables in the B dataframe.

individuals  A list of individuals whose coefficients are to be tested. Default is all individuals in the B dataframe.

Value  A dataframe of p-values resulting from each individual test.

Examples

```r
fit <- PDMIFLOGIT(data2X,data2Y,2,20,0.5)
HYPTEST(fit$Coefficients,data.frame(c(0,1),c(-1,2)),fit$Se,"two",c(1,3),c(1,2))
```

Description

Under a pre-specified number of groups and the number of common factors, this function implements clustering for N individuals in the panels. Each of individuals in the group are subject to the group-specific unobserved common factors.

Usage

```
PDMIFCLUST(X, Y, NGfactors, NLfactors, Maxit = 100, tol = 0.001)
```

Arguments

- **X**: The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
- **Y**: The T times N panel of response where N=number of individuals, T=length of time series.
- **NGfactors**: A pre-specified number of common factors across groups (see example).
- **NLfactors**: A pre-specified number of factors in each groups (see example).
- **Maxit**: A maximum number of iterations in optimization. Default is 100.
- **tol**: Tolerance level of convergence. Default is 0.001.
Value

A list with the following components:

- Label: The estimated group membership for each of the individuals.
- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- GlobalFactors: The estimated common factors across groups.
- GlobalLoadings: The estimated factor loadings for the common factors.
- GroupFactors: The estimated group-specific factors.
- GroupLoadings: The estimated factor loadings for each group.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

References


Examples

```r
fit <- PDMIFCLUST(data5X, data5Y, 2, c(2, 2, 2), 20, 0.5)
```

Description

Under a pre-specified number of groups and the number of common factors, this function implements clustering for N individual units by nonlinear heterogeneous panel data models with interactive effects. Exponential family of distributions are used Each of individuals in the group are subject to the group-specific unobserved common factors.

Usage

```r
PDMIFCLUSTGLM(X, Y, FAMILY, NFactors, Maxit = 100, tol = 0.001)
```
Arguments

X  The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.

Y  The T times N panel of response where N=number of individuals, T=length of time series.

FAMILY  A description of the error distribution and link function to be used in the model just like in glm functions.

NLfactors  A pre-specified number of factors in each groups (see example).

Maxit  A maximum number of iterations in optimization. Default is 100.

tol  Tolerance level of convergence. Default is 0.001.

Value

A list with the following components:

• Label: The estimated group membership for each of the individuals.
• Coefficients: The estimated heterogeneous coefficients.
• Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
• Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
• GroupFactors: The estimated group-specific factors.
• GroupLoadings: The estimated factor loadings for each group.
• pval: p-value for testing hypothesis on heterogeneous coefficients.
• Se: Standard error of the estimated regression coefficients.

References


Examples

fit <- PDMIFCLUSTGLM(data6X, data6Y, binomial(link=logit), c(1,1,1), 3, 0.5)
Description

Under a known group membership, this function estimates heterogeneous poisson panel data models with interactive effects.

Usage

PDMIFCOUNT(X, Y, Nfactors, Maxit = 100, tol = 0.001)

Arguments

X
The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.

Y
The T times N panel of response where N=number of individuals, T=length of time series.

Nfactors
A pre-specified number of common factors.

Maxit
A maximum number of iterations in optimization. Default is 100.

tol
Tolerance level of convergence. Default is 0.001.

Value

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated factor loadings for the common factors.
- Predict: The conditional expectation of response variable.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

References


Examples

fit <- PDMIFCOUNT(data3X, data3Y, 3, 30, 0.5)
Description

This function estimates heterogeneous panel data models with interactive effects through generalised linear models.

Usage

PDMIFGLM(X, Y, FAMILY, Nfactors, Maxit = 100, tol = 0.001)

Arguments

- **X** The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
- **Y** The T times N panel of response where N=number of individuals, T=length of time series.
- **FAMILY** A description of the error distribution and link function to be used in the model just like in glm functions.
- **Nfactors** A pre-specified number of common factors.
- **Maxit** A maximum number of iterations in optimization. Default is 100.
- **tol** Tolerance level of convergence. Default is 0.001.

Value

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated factor loadings for the common factors.
- Predict: The conditional expectation of response variable.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

References


Examples

fit <- PDMIFGLM(data2X,data2Y,binomial(link=logit),2,20,0.5)
Description

This function estimates heterogeneous panel data models with interactive effects. This function is similar version of PDMIFLING which accommodates a group structure.

Usage

PDMIFLIN(X, Y, Nfactors, Maxit = 100, tol = 0.001)

Arguments

X
The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.

Y
The T times N panel of response where N=number of individuals, T=length of time series.

Nfactors
A pre-specified number of common factors.

Maxit
A maximum number of iterations in optimization. Default is 100.

tol
Tolerance level of convergence. Default is 0.001.

Value

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated factor loadings for the common factors.
- Predict: The conditional expectation of response variable.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

References


Examples

fit <- PDMIFLIN(data1X, data1Y, 2)
Description

Under a known group membership, this function estimates heterogeneous panel data models with interactive effects. Together with the regression coefficients, this function estimates the unobserved common factor structures both for across/within groups.

Usage

PDMIFLING(X, Y, Membership, NGfactors, NLfactors, Maxit = 100, tol = 0.001)

Arguments

X
The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.

Y
The T times N panel of response where N=number of individuals, T=length of time series.

Membership
A pre-specified group membership.

NGfactors
A pre-specified number of common factors across groups (see example).

NLfactors
A pre-specified number of factors in each groups (see example).

Maxit
A maximum number of iterations in optimization. Default is 100.

tol
Tolerance level of convergence. Default is 0.001.

Value

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- GlobalFactors: The estimated common factors across groups.
- GlobalLoadings: The estimated factor loadings for the common factors.
- GroupFactors: The estimated group-specific factors.
- GroupLoadings: The estimated factor loadings for each group.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

References

Examples

```r
fit <- PDMIFLOGIT(data4X, data4Y, data4LAB, 2, c(2, 2, 2), 30, 0.1)
```

---

**PDMIFLOGIT**

**Description**

This function estimates heterogeneous logistic panel data models with interactive effects.

**Usage**

```r
PDMIFLOGIT(X, Y, Nfactors, Maxit = 100, tol = 0.001)
```

**Arguments**

- `X` The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.
- `Y` The T times N panel of response where N=number of individuals, T=length of time series.
- `Nfactors` A pre-specified number of common factors.
- `Maxit` A maximum number of iterations in optimization. Default is 100.
- `tol` Tolerance level of convergence. Default is 0.001.

**Value**

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated factor loadings for the common factors.
- Predict: The conditional expectation of response variable.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

**References**


**Examples**

```r
fit <- PDMIFLOGIT(data2X, data2Y, 2, 20, 0.5)
```
Description

This function estimates heterogeneous probit panel data models with interactive effects.

Usage

PDMIFPROBIT(X, Y, Nfactors, Maxit = 100, tol = 0.001)

Arguments

X
The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.

Y
The T times N panel of response where N=number of individuals, T=length of time series.

Nfactors
A pre-specified number of common factors.

Maxit
A maximum number of iterations in optimization. Default is 100.

tol
Tolerance level of convergence. Default is 0.001.

Value

A list with the following components:

• Coefficients: The estimated heterogeneous coefficients.
• Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
• Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
• Factors: The estimated common factors across groups.
• Loadings: The estimated factor loadings for the common factors.
• Predict: The conditional expectation of response variable.
• pval: p-value for testing hypothesis on heterogeneous coefficients.
• Se: Standard error of the estimated regression coefficients.

References


Examples

fit <- PDMIFPROBIT(data2X, data2Y, 2, 20, 0.5)
Description

This function estimates heterogeneous quantile panel data models with interactive effects.

Usage

PDMIFQUANTILE(X, Y, TAU, Nfactors, Maxit = 100, tol = 0.001)

Arguments

X
The (NT) times p design matrix, without an intercept where N=number of individuals, T=length of time series, p=number of explanatory variables.

Y
The T times N panel of response where N=number of individuals, T=length of time series.

TAU
A pre-specified quantile point.

Nfactors
A pre-specified number of common factors.

Maxit
A maximum number of iterations in optimization. Default is 100.

tol
Tolerance level of convergence. Default is 0.001.

Value

A list with the following components:

- Coefficients: The estimated heterogeneous coefficients.
- Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
- Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
- Factors: The estimated common factors across groups.
- Loadings: The estimated quantile point under a given tau.
- Predict: The conditional expectation of response variable.
- pval: p-value for testing hypothesis on heterogeneous coefficients.
- Se: Standard error of the estimated regression coefficients.

References


Examples

fit <- PDMIFQUANTILE(data7X, data7Y, 0.95, 2, 10, 0.8)
Description

This function estimates heterogeneous quantile panel data VAR models with interactive effects.

Usage

PDMIFQVAR(Y, LAG, TAU, Nfactors, Maxit = 100, tol = 0.001)

Arguments

Y                  The T times N panel of response where N=number of individuals, T=length of time series.
LAG                The number of lags from y_t-1 to y_t-LAG used in the VAR.
TAU                A pre-specified quantile point.
Nfactors           A pre-specified number of common factors.
Maxit              A maximum number of iterations in optimization. Default is 100.
tol                Tolerance level of convergence. Default is 0.001.

Value

A list with the following components:

• Coefficients: The estimated heterogeneous coefficients.
• Lower05: Lower end (5%) of the 90% confidence interval of the regression coefficients.
• Upper95: Upper end (95%) of the 90% confidence interval of the regression coefficients.
• Factors: The estimated common factors across groups.
• Loadings: The estimated quantile point under a given tau.
• Predict: The conditional expectation of response variable.
• pval: p-value for testing hypothesis on heterogeneous coefficients.
• Se: Standard error of the estimated regression coefficients.

References


Examples

fit <- PDMIFQVAR(data8Y, 2, 0.1, 2, 5, 0.8)
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