

Package ‘MaximinInfer’

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Type Package

Title Inference for Maximin Effects in High-dimensional Settings

Version 2.0.0

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Description

Implementation of the sampling and aggregation method for the covariate shift maximin effect, which was proposed in
dimensional maximin effect.

License GPL-3

Encoding UTF-8

RoxygenNote 7.2.3

Suggests knitr,
rmarkdown

Imports MASS,
stats,
CVXR,
glmnet,
intervals,
SIHR

Depends R (>= 2.10)

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decide_delta	<i>Decide ridge penalty data-dependently</i>
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Description

To tell if the estimator is stable or not without ridge penalty at first. If instable, it picks a ridge penalty data-dependently.

Usage

```
decide_delta(
  obj,
  gen.size = 500,
  step_delta = 0.1,
  MAX_iter = 100,
  verbose = FALSE
)
```

Arguments

obj	The returned list of Maximin
gen.size	The generating sample size (Default = 500)
step_delta	The step size of searching delta (Default = 0.1)
MAX_iter	Maximum of iterations for searching (Default = 100)
verbose	Print information about delta and reward (Default = FALSE)

Value

delta	The data-dependent ridge penalty
reward.ratio	The ratio of penalized reward over non-penalized reward

Infer	<i>Inference method</i>
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Description

Given the returned list of Maximin, compute the Point estimator and Confidence interval.

Usage

```
Infer(
  obj,
  delta = 0,
  gen.size = 500,
  threshold = 0,
  alpha = 0.05,
  alpha.thres = 0.01
)
```

Arguments

obj	returned list of Maximin
delta	The ridge penalty (Default = 0)
gen.size	The generating sample size (Default = 500)
threshold	Should generated samples be filtered or not? if 0, use normal threshold to filter; if 1, use chi-square threshold to filter; if 2, do not filter (Default = 0)
alpha	confidence value to construct confidence interval (Default = 0.05)
alpha.thres	confidence value to select generated samples (Default = 0.01)

Value

weight	The weight vector for groups, of length L
mm.effect	The aggregated maximin effect (coefficients), of length p or $p + 1$
mminfer	The list of length $n.loading$, each contains the point estimator and confidence interval

Maximin

*Returns a list that provides materials for later inference method.***Description**

Given list of observations, compute the bias-corrected initial estimators and do bias-correction to the regressopm covariance matrix.

Usage

```
Maximin(
  Xlist,
  Ylist,
  loading.mat,
  X0 = NULL,
  cov.shift = TRUE,
  cov0 = NULL,
  intercept = TRUE,
  intercept.loading = FALSE,
  lambda = NULL,
  verbose = FALSE
)
```

Arguments

Xlist	list of design matrix for source data, of length L
Ylist	list of outcome vector for source data, of length L
loading.mat	Loading matrix, of dimension $n.loading \times p$, each column corresponds to a loading of interest
X0	design matrix for target data, of dimension $n0 \times p$ (default = NULL)
cov.shift	Covariate shifts or not between source and target data (default = TRUE)

cov0	Covariance matrix for target data, of dimension $p \times p$ (default = NULL)
intercept	Should intercept be fitted for the initial estimator (default = TRUE)
intercept.loading	Should intercept term be included for the loading (default = FALSE)
lambda	The tuning parameter in fitting initial model. If NULL, it will be picked by cross-validation. (default = NULL)
verbose	Should intermediate message(s) be printed. (default = FALSE)

Details

The algorithm implemented scenarios with or without covariate shift. If cov0 is specified, the X_0 will be ignored; if not, while X_0 is specified, cov0 will be estimated by X_0 . If both are not specified, the algorithm will automatically set cov.shift as FALSE.

Value

The returned list contains the following components:

Gamma.plugin	The plugin regression covariance matrix
Gamma.debias	The proposed debiased regression covariance matrix
Var.Gamma	The variance matrix for sampling the regression covariance matrix
fits.info	The list of length L , that contains the initial coefficient estimators and variance of fitted residuals.
Points.info	The list of length L , that contains the initial debiased estimator for linear combinations and its corresponding standard error.

Examples

```

L = 2
n1 = n2 = 100; p = 4
X1 = MASS::mvrnorm(n1, rep(0,p), Sigma=diag(p))
X2 = MASS::mvrnorm(n2, rep(0,p), Sigma=0.5*diag(p))
b1 = seq(1,4)/10; b2 = rep(0.2, p)
y1 = as.vector(X1*%b1+rnorm(n1)); y2 = as.vector(X2*%b2+rnorm(n2))
loading1 = rep(0.4, p)
loading2 = c(-0.5, -0.5, rep(0,p-2))
loading.mat = cbind(loading1, loading2)
cov0 = diag(p)
mm = Maximin(list(X1,X2),list(y1,y2),loading.mat,cov0=cov0)

# inference
out = Infer(mm, gen.size=10)

```

measure_instability *measurement of instability*

Description

compute the instability measurement given a specific ridge penalty

Usage

```
measure_instability(  
  obj,  
  delta = 0,  
  gen.size = 500,  
  threshold = 0,  
  alpha.thres = 0.01  
)
```

Arguments

obj	The returned list of Maximin
delta	The ridge penalty (Default = 0)
gen.size	The generating sample size (Default = 500)
threshold	Should generated samples be filtered or not? if 0, use normal threshold to filter; if 1, use chi-square threshold to filter; if 2, do not filter. (Default = 0)
alpha.thres	The confidence value to select generated samples (Default = 0.01)

Value

The measurement of instability

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