Package: mixedLSR (via r-universe)

November 1, 2024

Title Mixed, Low-Rank, and Sparse Multivariate Regression on High-Dimensional Data

Version 0.1.0

Description Mixed, low-rank, and sparse multivariate regression ('mixedLSR') provides tools for performing mixture regression when the coefficient matrix is low-rank and sparse. 'mixedLSR' allows subgroup identification by alternating optimization with simulated annealing to encourage global optimum convergence. This method is data-adaptive, automatically performing parameter selection to identify low-rank substructures in the coefficient matrix.

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Encoding UTF-8

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Depends R (>= 4.0.0)

Imports grpreg, purrr, MASS, stats, ggplot2

Suggests knitr, rmarkdown, mclust

VignetteBuilder knitr

BugReports https://github.com/alexanderjwhite/mixedLSR

URL https://alexanderjwhite.github.io/mixedLSR/

Repository https://alexanderjwhite.r-universe.dev

RemoteUrl https://github.com/alexanderjwhite/mixedlsr

RemoteRef HEAD

RemoteSha 53427da44824f3bffdf81d0c61ccd74954fb295f

Contents

`bic_lsr` *Compute Bayesian information criterion for a mixedLSR model*

Description

Compute Bayesian information criterion for a mixedLSR model

Usage

```
bic_lsr(a, n, llik)
```

Arguments

`a`	A list of coefficient matrices.
`n`	The sample size.
`llik`	The log-likelihood of the model.

Value

The BIC.

Examples

```
n <- 50
simulate <- simulate_lsr(n)
model <- mixed_lsr(simulate$x, simulate$y, k = 2, init_lambda = c(1,1), alt_iter = 0)
bic_lsr(model$A, n = n, model$llik)
```

`mixed_lsr` *Mixed Low-Rank and Sparse Multivariate Regression for High-Dimensional Data*

Description

Mixed Low-Rank and Sparse Multivariate Regression for High-Dimensional Data

Usage

```
mixed_lsr(
  x,
  y,
  k,
  nstart = 1,
  init_assign = NULL,
  init_lambda = NULL,
  alt_iter = 5,
  anneal_iter = 1000,
  em_iter = 1000,
  temp = 1000,
  mu = 0.95,
  eps = 1e-06,
  accept_prob = 0.95,
  sim_N = 200,
  verbose = TRUE
)
```

Arguments

x	A matrix of predictors.
y	A matrix of responses.
k	The number of groups.
nstart	The number of random initializations, the result with the maximum likelihood is returned.
init_assign	A vector of initial assignments, NULL by default.
init_lambda	A vector with the values to initialize the penalization parameter for each group, e.g., c(1,1,1). Set to NULL by default.
alt_iter	The maximum number of times to alternate between the classification expectation maximization algorithm and the simulated annealing algorithm.
anneal_iter	The maximum number of simulated annealing iterations.
em_iter	The maximum number of EM iterations.
temp	The initial simulated annealing temperature, temp > 0.
mu	The simulated annealing decrease temperature fraction. Once the best configuration cannot be improved, reduce the temperature to (mu)T, 0 < mu < 1.
eps	The final simulated annealing temperature, eps > 0.
accept_prob	The simulated annealing probability of accepting a new assignment 0 < accept_prob < 1. When closer to 1, trial assignments will only be small perturbation of the current assignment. When closer to 0, trial assignments are closer to random.
sim_N	The simulated annealing number of iterations for reaching equilibrium.
verbose	A boolean indicating whether to print to screen.

Value

A list containing the likelihood, the partition, the coefficient matrices, and the BIC.

Examples

```
simulate <- simulate_lsr(50)
mixed_lsr(simulate$x, simulate$y, k = 2, init_lambda = c(1,1), alt_iter = 0)
```

---

plot_lsr *Heatmap Plot of the mixedLSR Coefficient Matrices*

Description

Heatmap Plot of the mixedLSR Coefficient Matrices

Usage

```
plot_lsr(a, abs = TRUE)
```

Arguments

a	A coefficient matrix from mixed_lsr model.
abs	A boolean for taking the absolute value of the coefficient matrix.

Value

A ggplot2 heatmap of the coefficient matrix, separated by subgroup.

Examples

```
simulate <- simulate_lsr()
plot_lsr(simulate$a)
```

---

simulate_lsr *Simulate Heterogeneous, Low-Rank, and Sparse Data*

Description

Simulate Heterogeneous, Low-Rank, and Sparse Data

Usage

```
simulate_lsr(
  N = 100,
  k = 2,
  p = 30,
  m = 35,
  b = 1,
  d = 20,
  h = 0.2,
  case = "independent"
)
```

Arguments

N	The sample size, default = 100.
k	The number of groups, default = 2.
p	The number of predictor features, default = 30.
m	The number of response features, default = 35.
b	The signal-to-noise ratio, default = 1.
d	The singular value, default = 20.
h	The lower bound for the singular matrix simulation, default = 0.2.
case	The covariance case, "independent" or "dependent", default = "independent".

Value

A list of simulation values, including x matrix, y matrix, coefficients and true clustering assignments.

Examples

```
simulate_lsr()
```

---

simulate_response *Simulate Heterogeneous, Low-Rank, and Sparse Data with Autoregressive Response*

Description

Simulate Heterogeneous, Low-Rank, and Sparse Data with Autoregressive Response

Usage

```
simulate_response(
  N = 100,
  k = 2,
  p = 30,
  m = 35,
  b = 1,
  d = 20,
  h = 0.2,
  case = "independent",
  response = "independent"
)
```

Arguments

N	The sample size, default = 100.
k	The number of groups, default = 2.
p	The number of predictor features, default = 30.
m	The number of response features, default = 35.
b	The signal-to-noise ratio, default = 1.
d	The singular value, default = 20.
h	The lower bound for the singular matrix simulation, default = 0.2.
case	The covariance case, "independent" or "dependent", default = "independent".

Value

A list of simulation values, including x matrix, y matrix, coefficients and true clustering assignments.

Examples

```
simulate_response()
```

---

simulate_sparse *Simulate Heterogeneous, Low-Rank Data with Varying Sparsity*

Description

Simulate Heterogeneous, Low-Rank Data with Varying Sparsity

Usage

```
simulate_sparse(k = 2, dense = 0.1)
```

Arguments

k	The number of groups, default = 2.
dense	The density ratio (must be greater than 0).

Value

A list of simulation values, including x matrix, y matrix, coefficients and true clustering assignments.

Examples

```
simulate_lsr()
```

Index