

Package ‘mixedLSR’

July 23, 2025

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.

License MIT + file LICENSE

Encoding UTF-8

RoxygenNote 7.2.1

Depends R (>= 4.1.0)

Imports grpreg, purrr, MASS, stats, ggplot2

Suggests knitr, rmarkdown, mclust

VignetteBuilder knitr

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

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

NeedsCompilation no

Author Alexander White [aut, cre] (ORCID:
<<https://orcid.org/0000-0002-9117-1475>>),
Sha Cao [aut] (ORCID: <<https://orcid.org/0000-0002-8645-848X>>),
Yi Zhao [ctb] (ORCID: <<https://orcid.org/0000-0003-4766-5934>>),
Chi Zhang [ctb] (ORCID: <<https://orcid.org/0000-0001-9553-0925>>)

Maintainer Alexander White <whitealj@iu.edu>

Repository CRAN

Date/Publication 2022-11-04 20:00:02 UTC

Contents

bic_lsr	2
mixed_lsr	3
plot_lsr	4
simulate_lsr	5
Index	6

bic_lsr	<i>Compute Bayesian information criterion for a mixedLSR model</i>
---------	--

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	<i>Mixed Low-Rank and Sparse Multivariate Regression for High-Dimensional Data</i>
-----------	--

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, $\text{eps} > 0$.
accept_prob	The simulated annealing probability of accepting a new assignment $0 < \text{accept_prob} < 1$. 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()
```

Index

bic_lsr, [2](#)

mixed_lsr, [3](#)

plot_lsr, [4](#)

simulate_lsr, [5](#)