Package: PLFD (via r-universe)

October 26, 2026

Type Package

Title Portmanteau Local Feature Discrimination for Matrix-Variate Data

Version 0.2.1

Date 2025-05-20

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Description The portmanteau local feature discriminant approach first identifies the local discriminant features and their differential structures, then constructs the discriminant rule by pooling the identified local features together. This method is applicable to high-dimensional matrix-variate data. See the paper by Xu, Luo and Chen (2023, <doi:10.1007/s13171-021-00255-2>).

Depends R (>= 3.5.0)

Imports Rcpp (>= 1.0.2), mathjaxr

LinkingTo Rcpp (>= 1.0.2), RcppArmadillo (>= 0.9.800)

URL https://github.com/paradoxical-rhapsody/PLFD

BugReports https://github.com/paradoxical-rhapsody/PLFD/issues

License GPL-3

Language en-US

Encoding UTF-8

RoxygenNote 7.3.2

Suggests knitr, rmarkdown, markdown

RdMacros mathjaxr

VignetteBuilder knitr

NeedsCompilation yes

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

Date/Publication 2025-05-20 04:30:02 UTC

RemoteUrl https://github.com/cran/PLFD

RemoteRef HEAD

RemoteSha 2321e42c3be38fce2d754b9b32c8416ca26c9427

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`plfd` *PLFD*

Description

A portmanteau local feature discrimination (PLFD) approach to the classification with high-dimensional matrix-variate data.

Usage

```
plfd(x, y, r0, c0, blockList, blockMode = NULL, permNum = 100, alpha = 0)
```

Arguments

`x`	Array of $r \times c \times n$.
`y`	Vector of length-n with values 1 or 2.
`r0`, `c0`	Row and column size of blocks. See details.
`blockList`	List including the index set of pre-specified blocks. See details.
`blockMode`	How the differential structure of $M_1 - M_2$ are detected. The default (`blockMode=NULL`) does NOT detect the structure of feature blocks. If `blockMode="fd"`(or `"forward"`), a forward stepwise procedure is conducted to detect the nonzero positions of feature blocks, wherein BIC serves as the stopping rule.
`permNum`	Rounds of permutation.
`alpha`	The **upper**-α quantile of the permutation statistic.

Details

There are two ways to specify the blocks under consideration. In the case that the matrix-variate is partition into non-overlapping blocks that share the common row size and column size, these sizes can be specified by `r0` and `c0`. Otherwise, the blocks can be flexibly specified by parameter `blockList`, which should be a list in which each element includes `rIdx` and `cIdx` corresponding to the row and column index set of a block. See examples.

Value

List.

- n1, n2, rDim, cDim, blockMode, permNum, alpha;
- blockNumber: the number of identified feature blocks.
- paras: list(list(rIdx, cIdx, B, M), ...), list of the information of feature blocks.

References

Xu Z., Luo S. and Chen Z. (2021). A Portmanteau Local Feature Discrimination Approach to the Classification with High-dimensional Matrix-variate Data. Sankhya A. doi:10.1007/s13171021-002552

Examples

```
set.seed(2023)
rDim <- 20
cDim <- 20

n <- 100
y <- sample(1:2, n, TRUE, c(0.5, 0.5))
x <- array(rnorm(rDim*cDim*n), dim=c(rDim, cDim, n))
x[, , y==2] <- (x[, , y==2] + 1.0)

ntest <- 200
ytest <- sample(1:2, ntest, TRUE, c(0.5, 0.5))
xtest <- array(rnorm(rDim*cDim*ntest), dim=c(rDim, cDim, ntest))
xtest[, , ytest==2] <- (xtest[, , ytest==2] + 1.0)

## Uniform partition
print( plfd(x, y, r0=5, c0=5) )

## Pre-specify feature blocks
blockList <- list(list(rIdx=1:5, cIdx=1:5),
                  list(rIdx=6:10, cIdx=1:5),
                  list(rIdx=3:9, cIdx=2:8))
print( plfd.model <- plfd(x, y, blockList=blockList) )

## Predict
predict(plfd.model, xtest, ytest)
```

---

predict.plfd *Predict Method for* plfd

Description

Predict Method for plfd

Usage

```
## S3 method for class 'plfd'
predict(object, x, y, ...)
```

Arguments

object	plfd object.
x	Array, matrix-variate data to be predicted.
y	Vector (optional), Labels of x with value 1 or 2.
...	Ignored currently.

Value

list(W, y.hat, mcr) with

- W: discriminant scores;
- y.hat: predicted labels;
- mcr: misclassification rate if parameter y is available.

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print.plfd *Print Method for* plfd

Description

Print Method for plfd

Usage

```
## S3 method for class 'plfd'
print(x, ...)
```

Arguments

x	plfd object.
...	Ignored currently.

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