Package 'TSDFGS'

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Type Package

Title Training Set Determination for Genomic Selection

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Description We propose an optimality criterion to determine the required training set, r-score, which is derived directly from Pearson's correlation between the genomic estimated breeding values and phenotypic values of the test set <doi:10.1007/s00122-019-03387-0>. This package provides two main functions to determine a good training set and its size.

License GPL (>= 3)

Encoding UTF-8

Imports dplyr, ggplot2, latex2exp, lifecycle, parallel, Rcpp (>= 1.0.8.3)

LinkingTo Rcpp, RcppEigen

RoxygenNote 7.2.0

URL https://github.com/oumarkme/TSDFGS

BugReports https://github.com/oumarkme/TSDFGS/issues

Depends R (>= 2.10)

LazyData true

NeedsCompilation yes

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`cd_score` *CD-score*

Description

This function calculate CD-score doi:10.1186/1297-9686-28-4-359 by given training set and test set.

Usage

```
cd_score(X, X0)
```

Arguments

`X`	A numeric matrix. The training set genotypic information matrix can be given as genotype matrix (coded as -1, 0, 1) or principle component matrix (row: sample; column: marker).
`X0`	A numeric mareix. The test set genotypic information matrix can be given as genotype matrix (coded as -1, 0, 1) or principle component matrix (row: sample; column: marker).

Value

A floating-point number, CD score.

Author(s)

Jen-Hsiang Ou

Examples

```
data(geno)
## Not run: cd_score(geno[1:50, ], geno[51:100])
```

FGCM *Fit logistic growth curve model*

Description

A function for fitting logisti growth model

Usage

```
FGCM(geno, nt = NULL, n_iter = NULL, multi.threads = TRUE)
```

Arguments

geno	Genotype information saved as a dataframe. Columns represent variants (SNPs or PCs).
nt	A numerical vector of training set sample size for estimating logistic growth curve parameters
n_iter	Number of simulation of each training set size. Automatically gave a suitable number by default.
multi.threads	Default: TRUE. Set as FALSE if you just want to run it by single thread.

Value

Estimation of parameters.

Examples

```
data(geno)
## Not run: FGCM(geno)
```

geno *Genotype information*

Description

A PCA matrix of rice genotype information. This data was published by Zhao et al. (2011) doi:10.1038/ncomms1467

Usage

```
geno
```

Format

A numeric matrix (PCA) with 404 rows (sample) and 404 columns (PCs).

Source

http://www.ricediversity.org/data/

Examples

```
data(geno)
```

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nt2r *Simulate r-scores of each training set size*

Description

Calculate r-scores (un-target) by in parallel.

Usage

```
nt2r(geno, nt, n_iter = 30, multi.threads = TRUE)
```

Arguments

geno	A numeric dataframe of genotype, column represent sites (genotype coding as 1, 0, -1)
nt	Numeric. Number of training set size
n_iter	Times of iteration. (default = 30)
multi.threads	Default: TRUE

Value

A vector of r-scores of each iteration

Examples

```
data(geno)
## Not run: nt2r(geno, 50)
```

optTrain *Optimal training set determination*

Description

This function is designed for determining optimal training set.

Usage

```
optTrain(
  geno,
  cand,
  n.train,
  subpop = NULL,
  test = NULL,
  method = "rScore",
  min.iter = NULL
)
```

Arguments

geno	A numeric matrix of principal components (rows: individuals; columns: PCs).
cand	An integer vector of which rows of individuals are candidates of the training set in the geno matrix.
n.train	The size of the target training set. This could be determined with the help of the ssdfgp function provided in this package.
subpop	A character vector of sub-population's group name. The algorithm will ignore the population structure if it remains NULL.
test	An integer vector of which rows of individuals are in the test set in the geno matrix. The algorithm will use an un-target method if it remains NULL.
method	Choices are rScore, PEV and CD. rScore will be used by default.
min.iter	Minimum iteration of all methods can be appointed. One should always check if the algorithm is converged or not. A minimum iteration will set by considering the candidate and test set size if it remains NULL.

Value

This function will return 3 information including OPTtrain (a vector of chosen optimal training set), TOPscore (highest scores of before iteration), and ITERscore (criteria scores of each iteration).

Author(s)

Jen-Hsiang Ou

Examples

```
data(geno)
## Not run: optTrain(geno, cand = 1:404, n.train = 100)
```

`pev_score` *PEV score*

Description

This function calculate prediction error variance (PEV) score doi:10.1186/s12711-015-0116-6 by given training set and test set.

Usage

```
pev_score(X, X0)
```

Arguments

`X`	A numeric matrix. The training set genotypic information matrix can be given as genotype matrix (coded as -1, 0, 1) or principle component matrix (row: sample; column: marker).
`X0`	A numeric mareix. The test set genotypic information matrix can be given as genotype matrix (coded as -1, 0, 1) or principle component matrix (row: sample; column: marker).

Value

A floating-point number, PEV score.

Author(s)

Jen-Hsiang Ou

Examples

```
data(geno)
## Not run: pev_score(geno[1:50, ], geno[51:100])
```

r_score *r-score*

Description

This function calculate r-score doi:10.1007/s00122-019-03387-0 by given training set and test set.

Usage

```
r_score(X, X0)
```

Arguments

X	A numeric matrix. The training set genotypic information matrix can be given as genotype matrix (coded as -1, 0, 1) or principle component matrix (row: sample; column: marker).
X0	A numeric mareix. The test set genotypic information matrix can be given as genotype matrix (coded as -1, 0, 1) or principle component matrix (row: sample; column: marker).

Value

A floating-point number, r-score.

Author(s)

Jen-Hsiang Ou

Examples

```
data(geno)
## Not run: r_score(geno[1:50, ], geno[51:100])
```

SSDFGS *Sample size determination for genomic selection*

Description

This function is designed to generate an operating curve for sample size determination

Usage

```
SSDFGS(geno, nt = NULL, n_iter = NULL, multi.threads = TRUE)
```

Arguments

geno	A numeric data frame carried genotype information (column: PCs, row: sample)
nt	A numeric vector carried training set sizes for r-score simulation.
n_iter	Number of iterations for estimating parameters.
multi.threads	Default (multi.threads = TRUE) use 75% of threads if the computer has more than 4 threads.

Value

An operating curve and its information.

Author(s)

Jen-Hsiang Ou & Po-Ya Wu

Examples

```
data(geno)
## Not run: SSDFGS(geno)
```

---

subpop *Sub-population information*

Description

Sub-population information of samples. This data was published by Zhao et al. (2011) doi:10.1038/ncomms1467

Usage

```
subpop
```

Format

A character vector.

Source

http://www.ricediversity.org/data/

Examples

```
data(subpop)
```

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