

Package ‘mrMLM.GUI’

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Type Package

Title Multi-Locus Random-SNP-Effect Mixed Linear Model Tools for
Genome-Wide Association Study with Graphical User Interface

Version 4.0

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Description Conduct multi-locus genome-wide association study under the framework of multi-locus random-SNP-effect mixed linear model (mrMLM). First, each marker on the genome is scanned. Bonferroni correction is replaced by a less stringent selection criterion for significant test. Then, all the markers that are potentially associated with the trait are included in a multi-locus genetic model, their effects are estimated by empirical Bayes and all the nonzero effects were further identified by likelihood ratio test for true QTL. Wen YJ, Zhang H, Ni YL, Huang B, Zhang J, Feng JY, Wang SB, Dunwell JM, Zhang YM, Wu R (2018) <doi:10.1093/bib/bbw145>.

Depends R (>= 3.5.0),shiny,lars,ggplot2

Imports

methods,openxlsx,qqman,foreach,ncvreg,coin,shinyjs,data.table,doParallel,sampling,bigmemory,mrMLM,sbl

License GPL (>= 2)

NeedsCompilation no

Repository CRAN

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R topics documented:

mrMLM.GUI-package	2
FASTmrEMMA	3
FASTmrMLM	4
fmegen	5
fmegenraw	5
ISIS	6
mrngen	7

mrngenraw	7
mrMLMFun	8
mrphe	9
pKWmEB	9
pLARmEB	10

Index	12
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mrMLM.GUI-package	<i>Multi-Locus Random-SNP-Effect Mixed Linear Model Tools for Genome-Wide Association Study with Graphical User Interface</i>
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Description

Description: Conduct multi-locus genome-wide association study under the framework of multi-locus random-SNP-effect mixed linear model (mrMLM). First, each marker on the genome is scanned. Bonferroni correction is replaced by a less stringent selection criterion for significant test. Then, all the markers that are potentially associated with the trait are included in a multi-locus genetic model, their effects are estimated by empirical Bayes and all the nonzero effects were further identified by likelihood ratio test for true QTL.

Details

Package: mrMLM.GUI
 Type: Package
 Version: 4.0
 Date: 2019-10-21
 Depends: shiny,ggplot2,lars
 Imports: methods,qqman,foreach,ncvreg,coin,sampling,data.table,doParallel,shinyjs,bigmemory,mrMLM
 License: GPL version 2 or newer
 LazyLoad: yes

Users can use `library(mrMLM.GUI)` to start the GUI and use `'mrMLM.GUI()'` to restart the program.

Author(s)

Zhang Ya-Wen, Li Pei, Zhang Yuan-Ming
 Maintainer: Yuan-Ming Zhang<soy Zhang@mail.hzau.edu.cn>

References

1. Zhang YM, Mao Y, Xie C, Smith H, Luo L, Xu S*. *Genetics* 2005,169:2267-2275.
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5. Ren WL, Wen YJ, Dunwell JM, Zhang

YM*. Heredity 2018,120(3): 208-218. 6. Wen YJ, Zhang H, Ni YL, Huang B, Zhang J, Feng JY, et al. Brief Bioinform 2018,19(4):700-712. 7. Tamba CL, Zhang YM. bioRxiv,preprint first posted online Jun. 7, 2018, doi:<https://doi.org/10.1101/341784>. 8. Zhang YW, Tamba CL, Wen YJ, Li P, Ren WL, Ni YL, et al. Genomics, Proteomics & Bioinformatics, resubmission.

Examples

```
mrMLM.GUI()
```

FASTmrEMMA

To perform GWAS with FASTmrEMMA method

Description

FAST multi-locus random-SNP-effect EMMA

Usage

```
FASTmrEMMA(gen,phe,outATCG,genRaw,kk,psmatrix,svpal,svmlod,Genformat,Likelihood,CLO)
```

Arguments

gen	genotype matrix.
phe	phenotype matrix.
outATCG	genotype for code 1.
genRaw	raw genotype.
kk	kinship matrix.
psmatrix	population structure matrix.
svpal	Critical P-value for selecting variable.
svmlod	Critical LOD score for significant QTN.
Genformat	Format for genotypic codes.
Likelihood	restricted maximum likelihood (REML) and maximum likelihood (ML).
CLO	number of CPU.

Author(s)

Zhang Ya-Wen, Li Pei, and Zhang Yuan-Ming
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Examples

```
G1=data(fmegen)
P1=data(mrphe)
G2=data(fmegenraw)
result=FASTmrEMMA(fmegen,mrphe,outATCG=NULL,fmegenraw,kk=NULL,
psmatrix=NULL,0.005,3,1,Likelihood="REML",CLO=1)
```

FASTmrMLM

To perform GWAS with FASTmrMLM method

Description

FAST multi-locus random-SNP-effect Mixed Linear Model

Usage

```
FASTmrMLM(gen, phe, outATCG, genRaw, kk, psmatrix, svpal, svrad, svmLod, Genformat, CLO)
```

Arguments

gen	genotype matrix.
phe	phenotype matrix.
outATCG	genotype for code 1.
genRaw	raw genotype.
kk	kinship matrix.
psmatrix	population structure matrix.
svpal	Critical P-value for selecting variable.
svrad	Search Radius in search of potentially associated QTN.
svmLod	Critical LOD score for significant QTN.
Genformat	Format for genotypic codes.
CLO	number of CPU.

Author(s)

Zhang Ya-Wen, Li Pei, and Zhang Yuan-Ming
Maintainer: Yuan-Ming Zhang<soy Zhang@mail.hzau.edu.cn>

Examples

```
G1=data(mrgen)
P1=data(mrphe)
G2=data(mrgenraw)
result=FASTmrMLM(mrgen, mrphe, outATCG=NULL, mrgenraw, kk=NULL, psmatrix=NULL,
0.01, 20, 3, 1, CLO=1)
```

fmegen	<i>Genotype data</i>
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Description

Numeric format of genotype dataset.

Usage

```
data(fmegen)
```

Details

Dataset input of Genotype for FASTmrEMMA function.

Author(s)

Maintainer: Yuan-Ming Zhang<soy Zhang@mail.hzau.edu.cn>

fmegenraw	<i>raw genotype data</i>
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Description

Numeric format of raw genotype dataset.

Usage

```
data(fmegenraw)
```

Details

Dataset input of raw genotype for FASTmrEMMA function.

Author(s)

Maintainer: Yuan-Ming Zhang<soy Zhang@mail.hzau.edu.cn>

ISIS

To perform GWAS with ISIS EM-BLASSO method

Description

Iterative Sure Independence Screening EM-Bayesian LASSO

Usage

```
ISIS(gen,phe,outATCG,genRaw,kk,psmatrix,svpal,svmlod,Genformat,CLO)
```

Arguments

gen	genotype matrix.
phe	phenotype matrix.
outATCG	genotype for code 1.
genRaw	raw genotype.
kk	kinship matrix.
psmatrix	population structure matrix.
svpal	Critical P-value for selecting variable.
svmlod	Critical LOD score for significant QTN.
Genformat	Format for genotypic codes.
CLO	number of CPU.

Author(s)

Zhang Ya-Wen, Li Pei, and Zhang Yuan-Ming
Maintainer: Yuan-Ming Zhang<soy Zhang@mail.hzau.edu.cn>

Examples

```
G1=data(mrgen)
P1=data(mrphe)
G2=data(mrgenraw)
result=ISIS(mrgen,mrphe,outATCG=NULL,mrgenraw,kk=NULL,psmatrix=NULL,
0.01,3,1,CLO=1)
```

<i>mrgen</i>	<i>Genotype data</i>
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Description

Numeric format of genotype dataset.

Usage

`data(mrgen)`

Details

Dataset input of Genotype for mrMLM function.

Author(s)

Maintainer: Yuan-Ming Zhang<soy Zhang@mail.hzau.edu.cn>

<i>mrgenraw</i>	<i>raw genotype data</i>
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Description

Numeric format of raw genotype dataset.

Usage

`data(mrgenraw)`

Details

Dataset input of raw genotype for mrMLM function.

Author(s)

Maintainer: Yuan-Ming Zhang<soy Zhang@mail.hzau.edu.cn>

mrMLMFun

To perform GWAS with mrMLM method

Description

multi-locus random-SNP-effect Mixed Linear Model

Usage

```
mrMLMFun(gen, phe, outATCG, genRaw, kk, psmatrix, svpal, svrad, svmlod, Genformat, CLO)
```

Arguments

gen	genotype matrix.
phe	phenotype matrix.
outATCG	genotype for code 1.
genRaw	raw genotype.
kk	kinship matrix.
psmatrix	population structure matrix.
svpal	Critical P-value for selecting variable
svrad	Search Radius in search of potentially associated QTN.
svmlod	Critical LOD score for significant QTN.
Genformat	Format for genotypic codes.
CLO	number of CPU.

Author(s)

Zhang Ya-Wen, Li Pei, and Zhang Yuan-Ming
Maintainer: Yuan-Ming Zhang<soy Zhang@mail.hzau.edu.cn>

Examples

```
G1=data(mrgen)
P1=data(mrphe)
G2=data(mrgenraw)
result=mrMLMFun(mrgen, mrphe, outATCG=NULL, mrgenraw, kk=NULL, psmatrix=NULL,
0.01, 20, 3, 1, CLO=1)
```

mrphe	<i>phenotype data</i>
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Description

phenotype dataset.

Usage

data(mrphe)

Details

Dataset input of phenotype for mrMLM function.

Author(s)

Maintainer: Yuan-Ming Zhang<soy Zhang@mail.hzau.edu.cn>

pKWmEB	<i>To perform GWAS with pKWmEB method</i>
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Description

Kruskal-Wallis test with empirical Bayes under polygenic background control

Usage

pKWmEB(gen, phe, outATCG, genRaw, kk, psmatrix, svpal, svmlod, Genformat, CLO)

Arguments

gen	genotype matrix.
phe	phenotype matrix.
outATCG	genotype for code 1.
genRaw	raw genotype.
kk	kinship matrix.
psmatrix	population structure matrix.
svpal	Critical P-value for selecting variable.
svmlod	Critical LOD score for significant QTN.
Genformat	Format for genotypic codes.
CLO	number of CPU.

Author(s)

Zhang Ya-Wen, Li Pei, and Zhang Yuan-Ming
 Maintainer: Yuan-Ming Zhang<soyzzhang@mail.hzau.edu.cn>

Examples

```
G1=data(mrgen)
P1=data(mrphe)
G2=data(mrgenraw)
result=pKWmEB(mrgen, mrphe, outATCG=NULL, mrgenraw, kk=NULL, psmatrix=NULL,
0.05, 3, 1, CLO=1)
```

pLARmEB

To perform GWAS with pLARmEB method

Description

polygene-background-control-based least angle regression plus Empirical Bayes

Usage

```
pLARmEB(gen, phe, outATCG, genRaw, kk, psmatrix, CriLOD, lars1, Genformat, Bootstrap, CLO)
```

Arguments

gen	genotype matrix.
phe	phenotype matrix.
outATCG	genotype for code 1.
genRaw	raw genotype.
kk	kinship matrix.
psmatrix	population structure matrix.
CriLOD	Critical LOD score for significant QTN.
lars1	No. of potentially associated variables selected by LARS.
Genformat	Format for genotypic codes.
Bootstrap	Bootstrap=FALSE indicates the analysis of only real dataset, Bootstrap=TRUE indicates the analysis of both real dataset and four resampling datasets.
CLO	number of CPU.

Author(s)

Zhang Ya-Wen, Li Pei, and Zhang Yuan-Ming
 Maintainer: Yuan-Ming Zhang<soyzzhang@mail.hzau.edu.cn>

Examples

```
G1=data(mrgen)
P1=data(mrphe)
G2=data(mrgenraw)
result=pLARmEB(mrgen, mrphe, outATCG=NULL, mrgenraw, kk=NULL, psmatrix=NULL,
3, 20, 1, Bootstrap=FALSE, CLO=1)
```

Index

chr (fmegen), [5](#)
chrom (mrgenraw), [7](#)
chromosome (mrgen), [7](#)

FASTmrEMMA, [3](#)
FASTmrMLM, [4](#)
fmechrom (fmegenraw), [5](#)
fmegen, [5](#)
fmegenraw, [5](#)
fmepos (fmegenraw), [5](#)
fmers# (fmegenraw), [5](#)

gen (fmegen), [5](#)
genotype (mrgen), [7](#)

ISIS, [6](#)

mrgen, [7](#)
mrgenraw, [7](#)
mrMLM.GUI (mrMLM.GUI-package), [2](#)
mrMLM.GUI-package, [2](#)
mrMLMFun, [8](#)
mrphe, [9](#)

phenotype (mrphe), [9](#)
pKWmEB, [9](#)
pLARmEB, [10](#)
pos (mrgenraw), [7](#)
posi (fmegen), [5](#)
position (mrgen), [7](#)

rs# (mrgenraw), [7](#)