Package 'genstab'

October 26, 2021

Type Package

Title Resampling Based Yield Stability Analyses

Version 1.0.0

Author Jixiang Wu

Maintainer Jixiang Wu <jixiang.wu@sdstate.edu>

Description Several yield stability analyses are mentioned in this package: variation and regression based yield stability analyses. Resampling techniques are integrated with these stability analyses. The function stab.mean() provides the genotypic means and ranks including their corresponding confidence intervals. The function stab.var() provides the genotypic variances over environments including their corresponding confidence intervals. The function stab.fw() is an extended method from the Finlay-Wilkinson method (1963). This method can include several other factors that might impact yield stability. Resampling technique is integrated into this method. A few missing data points or unbalanced data are allowed too. The function stab.fw.check() is an extended method from the Finlay-Wilkinson method (1963). The yield stability is evaluated via common check line(s). Resampling technique is integrated.

License GPL-2

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

Depends R(>= 4.0.0)

NeedsCompilation no

Repository CRAN

Date/Publication 2021-10-26 14:30:02 UTC

R topics documented:

maize 2
stab.fw 2
stab.fw.check 3
stab.mean 4
stab.var 5

Index 7

`maize` *Maize yield trial data*

Description

Maize yield trial data

Usage

```
maize
```

Format

An object of class `data.frame` with 260 rows and 4 columns.

References

Fan X.M., Kang M.S., Chen H.M., Zhang Y.D., Tan J., Xu C.X. (2007) Yield stability of maize hybrids evaluated in multi-environment trials in Yunnan, China. Agronomy Journal.99:220-228

Examples

```
str(maize)
```

`stab.fw` *F-W Regression Based Yield Stability Analysis*

Description

F-W Regression Based Yield Stability Analysis

Usage

```
stab.fw(y, Gen, Env, times, Rep, X = NULL, alpha = NULL)
```

Arguments

`y`	A vector of yield data
`Gen`	A vector of Genotypes
`Env`	A vector of Environments
`times`	Replication number for resampling
`Rep`	Replication included or not included
`X`	Independent variables matrix or vector
`alpha`	Preset alpha value

Value

A list of yield stability results

References

Finlay, K.W., G.N. Wilkinson 1963. The analysis of adaptation in a plant breeding programme. Australian Journal of Agricultural Research 14: 742-754.

Wu, J., K. Glover, W. Berzonsky, 2012. Statistical tests for stability analysis with resampling techniques. 25th Conference of Applied Statistics in Agriculture. p88-108. April 29-May 01, 2012. Manhattan, KS

Wu, J., K. Glover, and N. Mueller 2014. Check based stability analysis method and its application to winter wheat variety trials," Conference on Applied Statistics in Agriculture. https://doi.org/10.4148/2475-7772.1006

Examples

```
require(genstab)
data(maize)
#names(maize)
Geno=as.vector(maize$Cultivar)
Env=paste(maize$Location,maize$Year,sep=":")
y=maize$Yld
res=stab.fw(y,Gen=Geno,Env=Env,times=10,Rep=TRUE)
res
##end
```

`stab.fw.check` *Check-based yield stability analysis*

Description

Check-based yield stability analysis

Usage

```
stab.fw.check(y, Gen, Env, times, check, Rep, X = NULL, alpha = NULL)
```

Arguments

`y`	A response varible vector used for stability analysis
`Gen`	A vector of genotypes.
`Env`	A vector of environments.
`times`	Times of resampling used for stability analysis.
`check`	One or more checks used for stability analysis.
`Rep`	An argument with replication: Rep=TRUE or with replication: Rep=FALSE
`X`	A vector or matrix of other predictable variables. Default is NULL.
`alpha`	A nominal probability values used for statistical tests. Default is NULL, 0.05

Value

A list of yield stability results

References

Finlay, K.W., G.N. Wilkinson 1963. The analysis of adaptation in a plant breeding programme. Australian Journal of Agricultural Research 14: 742-754.

Wu, J., K. Glover, W. Berzonsky, 2012. Statistical tests for stability analysis with resampling techniques. 25th Conference of Applied Statistics in Agriculture. p88-108. April 29-May 01, 2012. Manhattan, KS

Wu, J., K. Glover, and N. Mueller 2014. Check based stability analysis method and its application to winter wheat variety trials," Conference on Applied Statistics in Agriculture. P102-114. https://doi.org/10.4148/2475-7772.1006

Examples

```
data(maize)
#names(maize)
Geno=as.vector(maize$Cultivar)
Env=paste(maize$Location,maize$Year,sep=":")
y=maize$Yld
res=stab.fw.check(y,Gen=Geno,Env=Env,times=10,check=c("Hai He"),Rep=FALSE)
res
```

---

stab.mean *Group means and ranks with resampling*

Description

Group mean and rank calculation with two resampling techniques:permuation and bootstraping

Usage

```
stab.mean(Y, class, cls2 = NULL, resample, times = NULL, alpha = NULL)
```

Arguments

Y	A matrix including One or more traits
class	A vector of the first factor for calculating variance. For example, a vector of genotypes.
cls2	A vector of the second factor used within-group bootstraping for variance. It can be default
resample	Resampling technique option. resample="Boot" is for bootstrapping. resample="Perm" is for permutation.
times	Number of resampling used. The default number is 1000.
alpha	A nomimal probability used for statistical test. The default value is 0.05.

Value

A list of variances and confidence intervals for genotypes or environments

Author(s)

Jixiang Wu <jixiang.wu@sdstate.edu>

References

Finlay, K.W., G.N. Wilkinson 1963. The analysis of adaptation in a plant breeding programme. Australian Journal of Agricultural Research 14: 742-754.

Wu, J., K. Glover, W. Berzonsky, 2012. Statistical tests for stability analysis with resampling techniques. 25th Conference of Applied Statistics in Agriculture. p88-108. April 29- May 01, 2012. Manhattan, KS

Examples

```
data(maize)
#names(maize)
Geno=as.vector(maize$Cultivar)
Env=paste(maize$Location,maize$Year,sep=":")
y=maize$Yld
res=stab.mean(y,class=Geno,cls2=Env,resample="Boot",times=100)
res
res=stab.mean(y,class=Geno,resample="Perm",times=100)
res
```

`stab.var` *Group variances with resampling*

Description

Group variance calculation with two resampling techniques:permuation and bootstraping

Usage

```
stab.var(Y, class, cls2 = NULL, resample, times = NULL, alpha = NULL)
```

Arguments

`Y`	A matrix including One or more traits
`class`	A vector of the first factor for calculating variance. For example, a vector of genotypes.
`cls2`	A vector of the second factor used within-group bootstraping for variance. It can be default
`resample`	Resampling technique option. resample="Boot" is for bootstrapping. resample="Perm" is for permutation.

times	Number of resampling used. The default number is 1000.
alpha	A nomimal probability used for statistical test. The default value is 0.05.

Value

A list of variances and confidence intervals for genotypes or environments

Author(s)

Jixiang Wu <jixiang.wu@sdstate.edu>

References

Finlay, K.W., G.N. Wilkinson 1963. The analysis of adaptation in a plant breeding programme. Australian Journal of Agricultural Research 14: 742-754.

Wu, J., K. Glover, W. Berzonsky, 2012. Statistical tests for stability analysis with resampling techniques. 25th Conference of Applied Statistics in Agriculture. p88-108. April 29- May 01, 2012. Manhattan, KS

Examples

```
data(maize)
#names(maize)
Geno=as.vector(maize$Cultivar)
Env=paste(maize$Location,maize$Year,sep=":")
y=maize$Yld
res=stab.var(y,class=Geno,cls2=Env,resample="Boot",times=100)
res
res=stab.var(y,class=Geno,resample="Perm",times=100)
res
```

Index

∗ **datasets**
maize, 2

maize, 2

stab.fw, 2
stab.fw.check, 3
stab.mean, 4
stab.var, 5