Package 'IIProductionUnknown'

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Type Package

Title Analyzing Data Through of Percentage of Importance Indice (Production Unknown) and Its Derivations

Version 0.0.2

Description The Importance Index (I.I.) can determine the loss and solution sources for a system in certain knowledge areas (e.g., agronomy), when production (e.g., fruits) is known (Demolin-Leite, 2021). Events (e.g., agricultural pest) can have different magnitudes (numerical measurements), frequencies, and distributions (aggregate, random, or regular) of event occurrence, and I.I. bases in this triplet (Demolin-Leite, 2021) <https://cjascience.com/index.php/CJAS/article/view/1009/1319>. Usually, the higher the magnitude and frequency of aggregated distribution, the greater the problem or the solution (e.g., natural enemies versus pests) for the system (Demolin-Leite, 2021). However, the final production of the system is not always known or is difficult to determine (e.g., degraded area recovery). A derivation of the I.I. is the percentage of Importance Index-Production Unknown (% I.I.-PU) that can detect the loss or solution sources, when production is unknown for the system (Demolin-Leite, 2024) <DOI:10.1590/1519-6984.253218>.

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R topics documented:

`ChisqTest_Distribution` *Loss and solution sources distribution informations*

Description

Indicates the distribution of loss and solution sources: aggregate, random or regular.

Usage

```
ChisqTest_Distribution(Data)
```

Arguments

`Data`	It is an matrix object containing data from loss and solution sources.

Value

Return distribution of loss and solution sources: aggregate, random or regular.

Author(s)

Germano Leao Demolin-Leite (Instituto de Ciencias Agrarias da UFMG)
Alcinei Mistico Azevedo (Instituto de Ciencias Agrarias da UFMG)

See Also

`EffectivenessOfSolution` , `LossSource` , `ReductionDamage`

Examples

```
data("DataLossSource")
ChisqTest_Distribution(DataLossSource)

data("DataSolutionSource")
ChisqTest_Distribution(DataSolutionSource)
```

`DataDamage` *Data damage*

Description

Example with data from data damage .

Usage

```
data(DataDamage)
```

Format

A data frame with sources of solution, one in each column.

Author(s)

Germano Leao Demolin Leite : <germano.demolin@gmail.com>
Alcinei Mistico Azevedo : <alcineimistico@hotmail.com>

`DataDefoliation` *Data defoliation*

Description

Example with data from data defoliation .

Usage

```
data(DataDefoliation)
```

Format

A data frame with data defoliation.

Author(s)

Germano Leao Demolin Leite : <germano.demolin@gmail.com>
Alcinei Mistico Azevedo : <alcineimistico@hotmail.com>

DataLossSource *Loss sources data*

Description

Example with data from loss sources .

Usage

```
data(DataLossSource)
```

Format

A data frame with sources of loss, one in each column.

Author(s)

Germano Leao Demolin Leite : <germano.demolin@gmail.com>

Alcinei Mistico Azevedo : <alcineimistico@hotmail.com>

DataSolutionSource *Solution sources data*

Description

Example with data from solution sources .

Usage

```
data(DataSolutionSource)
```

Format

A data frame with sources of solution, one in each column.

Author(s)

Germano Leao Demolin Leite : <germano.demolin@gmail.com>

Alcinei Mistico Azevedo : <alcineimistico@hotmail.com>

`EffectivenessOfSolution` *Function to estimate the effectiveness of solution sources (S.S.) by loss source (Percentage_I.I. > 0.00) in the production system.*

Description

This function allows to calculate E.S. of each S.S. by L.S. (significant in the reduction of defoliation or damage) in the system. Equation: E.S. = R2 x (1 - P) when it is of the first degree, or E.S. = ((R2 x (1 - P))x(B2/B1) when it is of the second degree. Where, R2 = determination coefficient and P = significance of ANOVA, B1 = regression coefficient, and B2 = regression coefficient (variable2), of the simple regression equation of the S.S..

Usage

```
EffectivenessOfSolution (DataLossSource,DataSolutionSource,ResultLossSource, verbose=TRUE)
```

Arguments

`DataLossSource`	It is an matrix object containing data from loss sources.
`DataSolutionSource`	It is an matrix object containing data from solution sources.
`ResultLossSource`	Output of LossSource function.
`verbose`	Logical value (TRUE/FALSE). TRUE displays the results of the effectiveness of solution

Value

The function returns several indices associated with the loss source.

Author(s)

Germano Leao Demolin-Leite (Instituto de Ciencias Agrarias da UFMG)
Alcinei Mistico Azevedo (Instituto de Ciencias Agrarias da UFMG)

See Also

`ReductionDamage` , `SolutionSource`

Examples

```
data("DataLossSource")
ChisqTest_Distribution(DataLossSource)

data("DataSolutionSource")
ChisqTest_Distribution(DataSolutionSource)
```

```
data("DataDefoliation")
data("DataDamage")

DataResult=cbind(DataDefoliation,DataDamage$D.L.S.2,DataDefoliation,
DataDamage$D.L.S.4,DataDefoliation)
ResultLossSource=LossSource(DataLoss = DataLossSource,DataResult =DataResult,
Cols<-c(1,3,5),verbose=TRUE)

EOS<-EffectivenessOfSolution(DataLossSource =DataLossSource,
                             DataSolutionSource =DataSolutionSource,
                             ResultLossSource = ResultLossSource)
```

IIProductionUnknown package

Analyzing data through of percentage of importance indice-production unknow and its derivations.

Description

The Percentage of Importance Indice-production unknow (Percentage_I.I.P.U.) bases in magnitudes, frequencies, and distributions of occurrence of an event. This index can detect the key loss sources (L.S) and solution sources (S.S.), classifying them according to their importance in terms of damage or damage reduction in the system. The Percentage_I.I.P.U. = ((ks1 x c1 x ds1)/SUM(ks1 x c1 x ds1) + (ks2 x c2 x ds2) + (ksn x cn x dsn)) x 100. key source (ks) is obtained using simple regression analysis and magnitude (abundance). Constancy (c) is SUM of occurrence of L.S. or S.S. on the samples (absence = 0 or presence = 1), and distribution source (ds) is obtained using chi-square test. This index has derivations: i.e., i) Reduction of the total n. of the L.S. (R.L.S.)/Total n. of the solution source and ii) Percentage of the R.L.S. per S.S..

Author(s)

Germano Leao Demolin-Leite (Instituto de Ciencias Agrarias da UFMG)
Alcinei Mistico Azevedo (Instituto de Ciencias Agrarias da UFMG)

References

Demolin-Leite, G. L. (2024), Percentage of importance indice-production unknown: loss and solution sources identification on system. Brazilian Journal of Biology 84, e253218. <https://doi.org/10.1590/1519-6984.253218>.

Examples

```
data("DataLossSource")
ChisqTest_Distribution(DataLossSource)

data("DataSolutionSource")
ChisqTest_Distribution(DataSolutionSource)
```

```
data("DataDefoliation")
data("DataDamage")

DataResult=cbind(DataDefoliation,DataDamage$D.L.S.2,DataDefoliation,
DataDamage$D.L.S.4,DataDefoliation)
ResultLossSource=LossSource(DataLoss = DataLossSource,DataResult =DataResult,
Cols=c(1,3,5),verbose=TRUE)

EOS=EffectivenessOfSolution(DataLossSource =DataLossSource,
                            DataSolutionSource =DataSolutionSource,
                            ResultLossSource = ResultLossSource)

EOS
#Put: y and y
# ID=SelectEffectivenessOfSolution(EOS)
ID=c(FALSE,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,
FALSE,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE)
ResultSolutionSource=SolutionSource(SolutionData =DataSolutionSource,Production =DataResult,
                                    EffectivenessOfSolution =EOS ,Id = ID,Verbose = TRUE  )
ResultSolutionSource

# Put: y,n,y,n,y,n and y
# ReductionAbundance(ResultSolutionSource,ResultLossSource,
#                  EffectivenessOfSolution=EOS)

##################################################
EOSDamage=EffectivenessOfSolution(DataLossSource =DataDamage,
                                  DataSolutionSource =DataSolutionSource,
                                  ResultLossSource = NULL)


EOSDamage

# Put: y, n and y
#ReductionDamage(ResultSolutionSource,LossSource=DataDamage,
#                EffectivenessOfSolution=EOSDamage)
```

`LossSource` *Obtaining indices associated with sources of loss*

Description

These functions allow to calculate the total n of the L.S. (n), R.P., ks, c, ds, n.I.I., Sum.n.I.I., and percentage of I.I. (P.I.I.) by each L.S..
Equations: R.P. = Damage or defoliation
n=total n per sample
k.s.= R.P./n
c = SUM of occurrence of L.S. on the samples, where, absence = 0 or presence = 1.
ds = 1 - P of the chi-square test of L.S. on the samples.

n.I.I.=ks x c x ds
Sum.n.I.I. = sum of all n.I.I.
Percentage of I.I. (P.I.I.)=(n.I.I. of each L.S./sum of all n.I.I.)*100

Usage

```
LossSource(DataLoss,DataResult,Cols=c(1,3,5),verbose)
```

Arguments

DataLoss	It is an matrix object containing data from loss sources.
DataResult	Matrix with loss sources.
Cols	Most important data loss columns.
verbose	Logical value (TRUE/FALSE). TRUE displays the results of the analysis.

Value

The function returns several indices associated with the loss source.

Author(s)

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Alcinei Mistico Azevedo (Instituto de Ciencias Agrarias da UFMG)

See Also

EffectivenessOfSolution , SolutionSource

Examples

```
data("DataLossSource")
ChisqTest_Distribution(DataLossSource)

data("DataSolutionSource")
ChisqTest_Distribution(DataSolutionSource)

data("DataDefoliation")
data("DataDamage")

DataResult<-cbind(DataDefoliation,DataDamage$D.L.S.2,DataDefoliation,
DataDamage$D.L.S.4,DataDefoliation)
ResultLossSource<-LossSource(DataLoss = DataLossSource,DataResult =DataResult,
Cols=c(1,3,5),verbose=TRUE)

EOS<-EffectivenessOfSolution(DataLossSource =DataLossSource,
                             DataSolutionSource =DataSolutionSource,
                             ResultLossSource = ResultLossSource)

EOS
#Put: y and y
# ID=SelectEffectivenessOfSolution(EOS)
```

```
ID<-c(FALSE,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,
FALSE,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE)
ResultSolutionSource<-SolutionSource(SolutionData =DataSolutionSource,Production =DataResult,
                                     EffectivenessOfSolution =EOS ,Id = ID,Verbose = TRUE  )
ResultSolutionSource

# Put: y,n,y,n,y,n and y
# ReductionAbundance(ResultSolutionSource,ResultLossSource,
#                  EffectivenessOfSolution=EOS)

##################################################
EOSDamage<-EffectivenessOfSolution(DataLossSource =DataDamage,
                                   DataSolutionSource =DataSolutionSource,
                                   ResultLossSource = NULL)


EOSDamage

# Put: y, n and y
#ReductionDamage(ResultSolutionSource,LossSource=DataDamage,
#                EffectivenessOfSolution=EOSDamage)
```

ReductionAbundance *Estimate of the abundance reduction*

Description

Function to estimate of the abundance reduction

Usage

```
ReductionAbundance(ResultSolutionSource,ResultLossSource,EffectivenessOfSolution)
```

Arguments

ResultSolutionSource	Output of the SolutionSource function.
ResultLossSource	Output of the LossSource function.
EffectivenessOfSolution	Output of the EffectivenessOfSolution function.

Value

The function returns the estimate of the reduction in abundance.

Author(s)

Germano Leao Demolin-Leite (Instituto de Ciencias Agrarias da UFMG)
Alcinei Mistico Azevedo (Instituto de Ciencias Agrarias da UFMG)

See Also

EffectivenessOfSolution , SolutionSource

Examples

```
data("DataLossSource")
ChisqTest_Distribution(DataLossSource)

data("DataSolutionSource")
ChisqTest_Distribution(DataSolutionSource)

data("DataDefoliation")
data("DataDamage")

DataResult<-cbind(DataDefoliation,DataDamage$D.L.S.2,DataDefoliation,
DataDamage$D.L.S.4,DataDefoliation)
ResultLossSource<-LossSource(DataLoss = DataLossSource,DataResult =DataResult,
Cols=c(1,3,5),verbose=TRUE)

EOS<-EffectivenessOfSolution(DataLossSource =DataLossSource,
                             DataSolutionSource =DataSolutionSource,
                             ResultLossSource = ResultLossSource)

EOS
#Put: y and y
# ID=SelectEffectivenessOfSolution(EOS)
ID<-c(FALSE,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,
FALSE,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE)
ResultSolutionSource<-SolutionSource(SolutionData =DataSolutionSource,Production =DataResult,
                                     EffectivenessOfSolution =EOS ,Id = ID,Verbose = TRUE  )
ResultSolutionSource

# Put: y,n,y,n,y,n and y
# ReductionAbundance(ResultSolutionSource,ResultLossSource,
#                  EffectivenessOfSolution=EOS)

##################################################
EOSDamage<-EffectivenessOfSolution(DataLossSource =DataDamage,
                                   DataSolutionSource =DataSolutionSource,
                                   ResultLossSource = NULL)


EOSDamage

# Put: y, n and y
#ReductionDamage(ResultSolutionSource,LossSource=DataDamage,
#                EffectivenessOfSolution=EOSDamage)
```

ReductionDamage *Estimate of the damage reduction*

Description

Function to estimate of the damage reduction

Usage

```
ReductionDamage(ResultSolutionSource,LossSource,EffectivenessOfSolution)
```

Arguments

ResultSolutionSource	Output of the SolutionSource function.
LossSource	Loss Source data.
EffectivenessOfSolution	Output of the EffectivenessOfSolution function.

Value

The function returns the estimate of the reduction in damage.

Author(s)

Germano Leao Demolin-Leite (Instituto de Ciencias Agrarias da UFMG)
Alcinei Mistico Azevedo (Instituto de Ciencias Agrarias da UFMG)

See Also

EffectivenessOfSolution , SolutionSource

Examples

```
data("DataLossSource")
ChisqTest_Distribution(DataLossSource)

data("DataSolutionSource")
ChisqTest_Distribution(DataSolutionSource)

data("DataDefoliation")
data("DataDamage")

DataResult<-cbind(DataDefoliation,DataDamage$D.L.S.2,DataDefoliation,
DataDamage$D.L.S.4,DataDefoliation)
ResultLossSource<-LossSource(DataLoss = DataLossSource,DataResult =DataResult,
Cols=c(1,3,5),verbose=TRUE)
```

```
EOS<-EffectivenessOfSolution(DataLossSource =DataLossSource,
                             DataSolutionSource =DataSolutionSource,
                             ResultLossSource = ResultLossSource)

EOS
#Put: y and y
# ID<-SelectEffectivenessOfSolution(EOS)
ID<-c(FALSE,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,
FALSE,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE)
ResultSolutionSource<-SolutionSource(SolutionData =DataSolutionSource,Production =DataResult,
                                     EffectivenessOfSolution =EOS ,Id = ID,Verbose = TRUE  )
ResultSolutionSource

# Put: y,n,y,n,y,n and y
# ReductionAbundance(ResultSolutionSource,ResultLossSource,
#                   EffectivenessOfSolution=EOS)

##################################################
EOSDamage<-EffectivenessOfSolution(DataLossSource =DataDamage,
                                   DataSolutionSource =DataSolutionSource,
                                   ResultLossSource = NULL)


EOSDamage

# Put: y, n and y
#ReductionDamage(ResultSolutionSource,LossSource=DataDamage,
#                EffectivenessOfSolution=EOSDamage)
```

`SelectEffectivenessOfSolution` *Determine the pair by pair effects that are important for the analysis.*

Description

Selects, pair by pair, the effect of S.S. on L.S.

Usage

```
SelectEffectivenessOfSolution(EffectivenessOfSolution)
```

Arguments

`EffectivenessOfSolution`
: Output generated by the function 'EffectivenessOfSolution'

Value

Returns a vector with logical values demonstrating the interactions considered important for the analysis.

Author(s)

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Alcinei Mistico Azevedo (Instituto de Ciencias Agrarias da UFMG)

See Also

EffectivenessOfSolution , SolutionSource , LossSource

Examples

```
data("DataLossSource")
ChisqTest_Distribution(DataLossSource)

data("DataSolutionSource")
ChisqTest_Distribution(DataSolutionSource)

data("DataDefoliation")
data("DataDamage")

DataResult<-cbind(DataDefoliation,DataDamage$D.L.S.2,DataDefoliation,
DataDamage$D.L.S.4,DataDefoliation)
ResultLossSource<-LossSource(DataLoss = DataLossSource,DataResult =DataResult,
Cols=c(1,3,5),verbose=TRUE)

EOS<-EffectivenessOfSolution(DataLossSource =DataLossSource,
                             DataSolutionSource =DataSolutionSource,
                             ResultLossSource = ResultLossSource)

EOS
#Put: y and y
# ID<-SelectEffectivenessOfSolution(EOS)
ID<-c(FALSE,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,
FALSE,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE)
ResultSolutionSource<-SolutionSource(SolutionData =DataSolutionSource,Production =DataResult,
                                     EffectivenessOfSolution =EOS ,Id = ID,Verbose = TRUE  )
ResultSolutionSource

# Put: y,n,y,n,y,n and y
# ReductionAbundance(ResultSolutionSource,ResultLossSource,
#                  EffectivenessOfSolution=EOS)

##################################################
EOSDamage<-EffectivenessOfSolution(DataLossSource =DataDamage,
                                   DataSolutionSource =DataSolutionSource,
                                   ResultLossSource = NULL)
```

```
EOSDamage

# Put: y, n and y
#ReductionDamage(ResultSolutionSource,LossSource=DataDamage,
#                EffectivenessOfSolution=EOSDamage)
```

SolutionSource *Obtaining indexes associated with the solution sources.*

Description

Function to estimate the total n of the S.S. (n), E.S., ks, c, ds, n.I.I., Sum.n.I.I., and percentage of I.I. (P.I.I.) by each S.S..

Usage

```
SolutionSource(SolutionData,Production,EffectivenessOfSolution,Id,Verbose=TRUE)
```

Arguments

SolutionData	It is an matrix object containing data from Solution sources.
Production	Matrix with a column containing the damage or defoliation data.
EffectivenessOfSolution	Output generated by the function 'EffectivenessOfSolution'
Id	Logical vector indicating the lines of the 'EffectivenessOfSolution' that are relevant. Output generated by the function SelectEffectivenessOfSolution
Verbose	Logical value (TRUE/FALSE). TRUE displays the results of the analysis.

Value

The function returns indices associated with the source of loss.

Author(s)

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Alcinei Mistico Azevedo (Instituto de Ciencias Agrarias da UFMG)

Examples

```
data("DataLossSource")
ChisqTest_Distribution(DataLossSource)

data("DataSolutionSource")
ChisqTest_Distribution(DataSolutionSource)

data("DataDefoliation")
data("DataDamage")
```

```
DataResult<-cbind(DataDefoliation,DataDamage$D.L.S.2,DataDefoliation,
DataDamage$D.L.S.4,DataDefoliation)
ResultLossSource<-LossSource(DataLoss = DataLossSource,DataResult =DataResult,
Cols=c(1,3,5),verbose=TRUE)

EOS<-EffectivenessOfSolution(DataLossSource =DataLossSource,
                             DataSolutionSource =DataSolutionSource,
                             ResultLossSource = ResultLossSource)

EOS
#Put: y and y
# ID<-SelectEffectivenessOfSolution(EOS)
ID<-c(FALSE,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,
FALSE,FALSE,FALSE,TRUE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE,FALSE)
ResultSolutionSource<-SolutionSource(SolutionData =DataSolutionSource,Production =DataResult,
                                     EffectivenessOfSolution =EOS ,Id = ID,Verbose = TRUE  )
ResultSolutionSource

# Put: y,n,y,n,y,n and y
# ReductionAbundance(ResultSolutionSource,ResultLossSource,
#                  EffectivenessOfSolution=EOS)

##################################################
EOSDamage<-EffectivenessOfSolution(DataLossSource =DataDamage,
                                   DataSolutionSource =DataSolutionSource,
                                   ResultLossSource = NULL)


EOSDamage

# Put: y, n and y
#ReductionDamage(ResultSolutionSource,LossSource=DataDamage,
#                EffectivenessOfSolution=EOSDamage)
```

Index