Package 'ImportanceIndice'

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Type Package

Title Analyzing Data Through of Percentage of Importance Indice and Its Derivations

Version 0.0.2

Description The Percentage of Importance Indice (Percentage_I.I.) bases in magnitudes, frequencies, and distributions of occurrence of an event (DEMOLIN-LEITE, 2021) <http://cjascience.com/index.php/CJAS/article/view/1009/1350>. This index can detect the key loss sources (L.S) and solution sources (S.S.), classifying them according to their importance in terms of loss or income gain, on the productive system. The Percentage_I.I. = [(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) Loss estimates and solutions effectiveness and ii) Attention and non-attention levels (DEMOLIN-LEITE,2024) <DOI:10.1590/1519-6984.253215>.

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Author Germano Leao Demolin Leite [aut]
(<https://orcid.org/0000-0002-2928-3193>),
Alcinei Mistico Azevedo [aut, cre]
(<https://orcid.org/0000-0001-5196-0851>)

Maintainer Alcinei Mistico Azevedo <alcineimistico@hotmail.com>

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R topics documented:

`DataLossSource` *Loss sources data*

Description

Example with data from loss sources .

Usage

```
data(DataLossSource)
```

Format

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

Author(s)

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

Alcinei Mistico Azevedo : <alcineimistico@hotmail.com>

References

DEMOLIN-LEITE, G.L., 2021. Importance indice: loss estimates and solution effectiveness on production. Cuban Journal of Agricultural Science, vol. 55, no. 2, pp. 1-7. <http://scielo.sld.cu/pdf/cjas/v55n2/2079-3480-cjas-55-02-e10.pdf>

DEMOLIN-LEITE, G.L., 2024. Do arthropods and diseases affect the production of fruits on Caryocar brasiliense Camb. (Malpighiales: Caryocaraceae)? Brazilian Journal of Biology, vol. 84, pp. e253215. <https://doi.org/10.1590/1519-6984.253215>

DataNumberSamples *Number samples data*

Description

Example with data of number samples.

Usage

```
data(DataNumberSamples)
```

Format

A data frame with the number of evaluations performed on each individual, the number of months evaluated and the number of evaluations performed per month.

Author(s)

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

Alcinei Mistico Azevedo : <alcineimistico@hotmail.com>

References

DEMOLIN-LEITE, G.L., 2021. Importance indice: loss estimates and solution effectiveness on production. Cuban Journal of Agricultural Science, vol. 55, no. 2, pp. 1-7. <http://scielo.sld.cu/pdf/cjas/v55n2/2079-3480-cjas-55-02-e10.pdf>

DEMOLIN-LEITE, G.L., 2024. Do arthropods and diseases affect the production of fruits on Caryocar brasiliense Camb. (Malpighiales: Caryocaraceae)? Brazilian Journal of Biology, vol. 84, pp. e253215. <https://doi.org/10.1590/1519-6984.253215>

DataProduction *Production data*

Description

Example with production data.

Usage

```
data(DataProduction)
```

Format

A data frame with production data.

Author(s)

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

Alcinei Mistico Azevedo : <alcineimistico@hotmail.com>

References

DEMOLIN-LEITE, G.L., 2021. Importance indice: loss estimates and solution effectiveness on production. Cuban Journal of Agricultural Science, vol. 55, no. 2, pp. 1-7. <http://scielo.sld.cu/pdf/cjas/v55n2/2079-3480-cjas-55-02-e10.pdf>

DEMOLIN-LEITE, G.L., 2024. Do arthropods and diseases affect the production of fruits on Caryocar brasiliense Camb. (Malpighiales: Caryocaraceae)? Brazilian Journal of Biology, vol. 84, pp. e253215. <https://doi.org/10.1590/1519-6984.253215>

DataSolutionSource *Solution sources data*

Description

Example with data from solution sources .

Usage

```
data(DataSolutionSource)
```

Format

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

Author(s)

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

Alcinei Mistico Azevedo : <alcineimistico@hotmail.com>

References

DEMOLIN-LEITE, G.L., 2021. Importance indice: loss estimates and solution effectiveness on production. Cuban Journal of Agricultural Science, vol. 55, no. 2, pp. 1-7. <http://scielo.sld.cu/pdf/cjas/v55n2/2079-3480-cjas-55-02-e10.pdf>

DEMOLIN-LEITE, G.L., 2024. Do arthropods and diseases affect the production of fruits on Caryocar brasiliense Camb. (Malpighiales: Caryocaraceae)? Brazilian Journal of Biology, vol. 84, pp. e253215. <https://doi.org/10.1590/1519-6984.253215>

Distribution_LossSource *Loss source distribution information*

Description

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

Usage

```
Distribution_LossSource(DataLoss)
```

Arguments

DataLoss	It is an matrix object containing data from loss sources.

Value

Return distribution of sources of loss: 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 , NonAttentionLevel , LossSource

Examples

```
library(ImportanceIndice)
data("DataLossSource")
data("DataSolutionSource")

Distribution_LossSource(DataLossSource)
Distribution_SolutionSource(DataSolutionSource)
```

`Distribution_SolutionSource` *Solution source distribution information*

Description

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

Usage

```
Distribution_SolutionSource(SolutionData)
```

Arguments

`SolutionData`	It is an matrix object containing data from solution sources.

Value

Return distribution of sources of solution: 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` , `NonAttentionLevel` , `LossSource`

Examples

```
library(ImportanceIndice)
data("DataLossSource")
data("DataSolutionSource")

Distribution_LossSource(DataLossSource)
Distribution_SolutionSource(DataSolutionSource)
```

`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 production) in the productive 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,Production, 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.
`Production`	It is a vector containing the production data.
`verbose`	Logical value (TRUE/FALSE). TRUE displays the results of the effectiveness of solution

Value

The function returns several indices associated with the source of loss.

Author(s)

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

See Also

`LossProduction` , `NonAttentionLevel`

Examples

```
library(ImportanceIndice)
data("DataLossSource")
data("DataSolutionSource")
data("DataProduction")
data("DataNumberSamples")
```

```
Distribution_LossSource(DataLossSource)
Distribution_SolutionSource(DataSolutionSource)

################################################
################################################


LS<-LossSource(DataLoss = DataLossSource,DataProd = DataProduction)
LS

LP<-LossProduction(Data=DataLossSource,Prod = DataProduction,
                   Evaluation=DataNumberSamples,
                   SegurityMargen=0.75,MaximumToleranceOfLossFruits=1)
LP

ES<-EffectivenessOfSolution(DataLossSource=DataLossSource,
                        DataSolutionSource=DataSolutionSource,Production=DataProduction)
ES
```

`ImportanceIndice package`

Analyzing data through of percentage of importance indice and its derivations

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Description

The Percentage of Importance Indice (Percentage_I.I.) 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 loss or income gain, on the productive system. The Percentage_I.I. = ((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) Loss estimates and solutions effectiveness and ii) Attention and non-attention levels.

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., 2021. Importance indice: loss estimates and solution effectiveness on production. Cuban Journal of Agricultural Science, vol. 55, no. 2, pp. 1-7. <http://scielo.sld.cu/pdf/cjas/v55n2/2079-3480-cjas-55-02-e10.pdf>

DEMOLIN-LEITE, G.L., 2024. Do arthropods and diseases affect the production of fruits on Caryocar brasiliense Camb. (Malpighiales: Caryocaraceae)? Brazilian Journal of Biology, vol. 84, pp. e253215. <https://doi.org/10.1590/1519-6984.253215>

`LossProduction` *Obtaining indices associated with loss of production.*

Description

Allows calculating loss of production per loss source (L.P.L.S.) and its total, maximum estimated production (M.E.P.), percentage of loss of production per loss source (Percentage_L.P.L.S.=P.L.P.L.S.) and its total, n_per_sample, and attention level (A.L.).
Equations:
*L.P.L.S. = total n of the L.S. x R.P. of the L.S. Where R.P. is R2 x (1 - P) when it is of the first degree, or R.P. = ((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 L.S.
*M.E.P. = Total production (P.) + SUM L.P.L.S.1 + ...L.P.L.S.n.
*Percentage_L.P.L.S. = (L.P.L.S./M.E.P.) x 100.
* n_per_sample is n per sample
*A.L. = (n of the L.S. per sample x 0.75)/Percentage_L.P.L.S..
Where, n of the L.S. per sample = n/(number of trees/evaluation frequency/years/number of plant parts evaluated). In this case, the number of trees = 20; evaluation frequency = 12 months per year for leaves, trunks, and branches, two months for bunches of flowers per year, and three months for bunches of fruits per year; years = three; and the number of plant parts evaluated = 12 leaves, 12 bunches of flowers and/or fruits, and one trunk per tree/evaluation. And, 0.75 = 1 percent of loss fruits x 0.75 (safety margin).

Usage

```
LossProduction(DataLossSource,Prod,Evaluation,SegurityMargen=0.75,
MaximumToleranceOfLossFruits=1)
```

Arguments

`DataLossSource`	It is an matrix object containing data from loss sources.
`Prod`	Matrix with a column containing the production data.
`Evaluation`	Matrix containing three lines with the number of evaluations performed on each individual, the number of months evaluated and the number of evaluations performed per month. Must have a column for each source of loss.
`SegurityMargen`	Segurity margen (default=0.75)
`MaximumToleranceOfLossFruits`	Maximum tolerance in percentage (default=1)

Value

The function returns several indices associated with the production loss.

Author(s)

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

See Also

EffectivenessOfSolution , NonAttentionLevel , LossSource

Examples

```
library(ImportanceIndice)
data("DataLossSource")
data("DataSolutionSource")
data("DataProduction")
data("DataNumberSamples")

Distribution_LossSource(DataLossSource)
Distribution_SolutionSource(DataSolutionSource)

##################################################
##################################################


LS<-LossSource(DataLoss = DataLossSource,DataProd = DataProduction)
LS

LP<-LossProduction(Data=DataLossSource,Prod = DataProduction,
                   Evaluation=DataNumberSamples,
                   SegurityMargen=0.75,MaximumToleranceOfLossFruits=1)
LP

ES<-EffectivenessOfSolution(DataLossSource=DataLossSource,
                        DataSolutionSource=DataSolutionSource,Production=DataProduction)
ES
```

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: 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,DataProd)
```

Arguments

DataLoss	It is an matrix object containing data from loss sources.
DataProd	Matrix with a column containing the production data.

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

EffectivenessOfSolution , NonAttentionLevel

Examples

```
library(ImportanceIndice)
data("DataLossSource")
data("DataSolutionSource")
data("DataProduction")
data("DataNumberSamples")

Distribution_LossSource(DataLossSource)
Distribution_SolutionSource(DataSolutionSource)

################################################
################################################


LS=LossSource(DataLoss = DataLossSource,DataProd = DataProduction)
LS

LP=LossProduction(Data=DataLossSource,Prod = DataProduction,
                  Evaluation=DataNumberSamples,
                  SegurityMargen=0.75,MaximumToleranceOfLossFruits=1)
LP

ES=EffectivenessOfSolution(DataLossSource=DataLossSource,
                        DataSolutionSource=DataSolutionSource,Production=DataProduction)
ES
```

NonAttentionLevel *Estimates levels of non-attention.*

Description

Functions to estimate E.S., income gain (I.G.), percentage of I.G.=P.I.G., and non-attention level (N.A.L.) of each S.S. per L.S., and their partial sum of I.G. and P.I.G. of S.S. inside each L.S., and the total of I.G. and P.I.G. on the productive system.

Usage

```
NonAttentionLevel(EffectivenessOfSolution,
LossProduction,
Id,
SafetyMargin=1.25,
Verbose=TRUE)
```

Arguments

EffectivenessOfSolution	Output generated by the function 'EffectivenessOfSolution'
LossProduction	Output generated by the function 'LossProduction'
Id	Logical vector indicating the lines of the 'EffectivenessOfSolution' that are relevant. Output generated by the function SelectEffectivenessOfSolution
SafetyMargin	Safety Margin (Default=1.25)
Verbose	Logical value (TRUE/FALSE). TRUE displays the results of the analysis.

Value

The function returns levels of non-attention.

Author(s)

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

See Also

EffectivenessOfSolution , NonAttentionLevel , LossSource

Examples

```
library(ImportanceIndice)
data("DataLossSource")
data("DataSolutionSource")
data("DataProduction")
data("DataNumberSamples")
```

```
Distribution_LossSource(DataLossSource)
Distribution_SolutionSource(DataSolutionSource)

################################################
################################################



LS<-LossSource(DataLoss = DataLossSource,DataProd = DataProduction)
LS

LP<-LossProduction(Data=DataLossSource,Prod = DataProduction,
                 Evaluation=DataNumberSamples,
                 SegurityMargen=0.75,MaximumToleranceOfLossFruits=1)
LP


ES<-EffectivenessOfSolution(DataLossSource=DataLossSource,
                       DataSolutionSource=DataSolutionSource,Production =DataProduction)
ES




id<-SelectEffectivenessOfSolution(ES)
id<-c(TRUE , TRUE,  TRUE , FALSE,  TRUE)


SS<-SolutionSource(SolutionData = DataSolutionSource,
                 EffectivenessOfSolution = ES,Production = DataProduction,Id = id)
SS


NAL<-NonAttentionLevel(EffectivenessOfSolution = ES,LossProduction = LP,Id = id,Verbose=TRUE)
NAL
```

`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)

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

See Also

EffectivenessOfSolution , NonAttentionLevel , LossSource

Examples

```
library(ImportanceIndice)
data("DataLossSource")
data("DataSolutionSource")
data("DataProduction")
data("DataNumberSamples")

Distribution_LossSource(DataLossSource)
Distribution_SolutionSource(DataSolutionSource)

##################################################
##################################################



LS<-LossSource(DataLoss = DataLossSource,DataProd = DataProduction)
LS

LP<-LossProduction(Data=DataLossSource,Prod = DataProduction,
                Evaluation=DataNumberSamples,
                SegurityMargen=0.75,MaximumToleranceOfLossFruits=1)
LP


ES<-EffectivenessOfSolution(DataLossSource=DataLossSource,
                      DataSolutionSource=DataSolutionSource,Production =DataProduction)
ES




id<-SelectEffectivenessOfSolution(ES)
id<-c(TRUE , TRUE,  TRUE , FALSE,  TRUE)
```

```
SS<-SolutionSource(SolutionData = DataSolutionSource,
                   EffectivenessOfSolution = ES,Production = DataProduction,Id = id)
SS


NAL<-NonAttentionLevel(EffectivenessOfSolution = ES,LossProduction = LP,Id = id,Verbose=TRUE)
NAL
```

`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 production 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)

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

Examples

```
library(ImportanceIndice)
data("DataLossSource")
data("DataSolutionSource")
data("DataProduction")
data("DataNumberSamples")

Distribution_LossSource(DataLossSource)
Distribution_SolutionSource(DataSolutionSource)

################################################
################################################



LS<-LossSource(DataLoss = DataLossSource,DataProd = DataProduction)
LS

LP<-LossProduction(Data=DataLossSource,Prod = DataProduction,
                 Evaluation=DataNumberSamples,
                 SegurityMargen=0.75,MaximumToleranceOfLossFruits=1)
LP


ES<-EffectivenessOfSolution(DataLossSource=DataLossSource,
                       DataSolutionSource=DataSolutionSource,Production =DataProduction)
ES




id<-SelectEffectivenessOfSolution(ES)
id<-c(TRUE , TRUE,  TRUE , FALSE,  TRUE)


SS<-SolutionSource(SolutionData = DataSolutionSource,
                 EffectivenessOfSolution = ES,Production = DataProduction,Id = id)
SS


NAL<-NonAttentionLevel(EffectivenessOfSolution = ES,LossProduction = LP,Id = id,Verbose=TRUE)
NAL
```

Index