Package 'IndexNumber'

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Type Package

Title Index Numbers in Social Sciences

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Description We provide an R tool for teaching in Social Sciences. It allows the computation of index numbers. It is a measure of the evolution of a fixed magnitude for only a product of for several products. It is very useful in Social Sciences. Among others, we obtain simple index numbers (in chain or in serie), index numbers for not only a product or weighted index numbers as the Laspeyres index (Laspeyres, 1864), the Paasche index (Paasche, 1874) or the Fisher index (Lapedes, 1978).

License GPL-2

LazyData true

RoxygenNote 7.0.2

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IndexNumber-package *Index Numbers in Social Sciences*

Description

We provide an R tool for teaching in Social Sciences. It allows the computation of index numbers. It is a measure of the evolution of a fixed magnitude for only a product of for several products. It is very useful in Social Sciences. Among others, we obtain simple index numbers (in chain or in serie), index numbers for not only a product or weighted index numbers as the Laspeyres index (Laspeyres, 1864), the Paasche index (Paasche, 1874) or the Fisher index (Lapedes, 1978).

Details

The DESCRIPTION file:

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Version:	1.3.2
Date:	2021-03-15
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Maintainer:	Alejandro Saavedra-Nieves <alejandro.saavedra.nieves@gmail.com>
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License:	GPL-2
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Index of help topics:

```
ActivePeople            Economically active people in Spain from 2002
                        to 2019.
ECResources             Combustibles and energy resources for the main
                        home in Spain from 2006 to 2015.
Food                    Food in Spain from 2006 to 2015.
IndexNumber-package     Index Numbers in Social Sciences
Mortgages               Mortgages constituted on urban properties in
                        Spain from 2003 to 2018.
aggregated.index.number
                        Calculate an aggregate index number
edgeworth.index.number
                        Calculate the Edgeworth index number
fisher.index.number     Calculate the Fisher index number
index.number.chain      Calculate an index number in chain
index.number.serie      Calculate an index number in serie
laspeyres.index.number
```

```
                        Calculate the Laspeyres index number
paasche.index.number    Calculate the Paasche index number
```

Once we have defined a magnitude for a product (of several products), we can analyse how it (they) evolves along the time. Index Numbers model this effect in Social Science. In this sense, several approaches may be considered. We include in this package several options of analysing this problem.

Author(s)

Alejandro Saavedra-Nieves, Paula Saavedra-Nieves

Maintainer: Alejandro Saavedra-Nieves <alejandro.saavedra.nieves@gmail.com>

References

- (2004) Consumer Price Index Manual: Theory and Practice. ILO, IMF. CPI Manual OECD, UN, Eurostat, and The World Bank by ILO, Geneva.

Index Number (2008) In: The Concise Encyclopedia of Statistics. Springer, New York, NY. <doi:https://doi.org/10.1007/978-0-387-32833-1>.

Laspeyres, E. (1871) Die Berechnung einer mittleren Waarenpreissteigerung. Jahrb. Natl. Stat. 16, 296–314.

Paasche, H. (1874) Uber die Preisentwicklung der letzten Jahre nach den Hamburger Borsennotirungen. Jahrb. Natl. Stat. 23, 168–178.

Examples

```
prices<-c(70,75,77,77,85,90,85,75,77,87,85,90,70,75,77,77,85,90)
index.number.serie(prices,name="Prices",opt.plot=TRUE,opt.summary=TRUE)
```

ActivePeople *Economically active people in Spain from 2002 to 2019.*

Description

Number (thousands) of economically active women and men in Spain between 2002 and 2019

Usage

```
data(ActivePeople)
```

Format

A data frame with columns:

Time A trimester (T1, T2, T3 and T4) between 2002 and 2019.

TotalWomen Number (thousands) of economically active women.

TotalMen Number (thousands) of economically active men.

Source

Spanish Statistical Office (INE), http://www.ine.es

Examples

```
## Not run:
 ActivePeople

## End(Not run)
```

`aggregated.index.number`

Calculate an aggregate index number

Description

This function determines index numbers without weights for those cases in which there exist more than an only product (in chain or in serie)

Usage

```
aggregated.index.number(x, base, type, name,opt.plot=FALSE, opt.summary=FALSE)
```

Arguments

`x`	It is a matrix containing that magnitude to be studied. In each column, it contains the magnitud of a different product. Thus, we have `nrow(x)` values of a magnitud for `ncol(x)` products.
`base`	Chain of characters that indicates the nature of the index number. If we introduce `base="serie"`, we compare each value with respect to the initial one. In this case, it is said to be an index number in serie. Otherwise, if we introduce `base="chain"`, we obtain the index number in chain, by comparing each value with the immediately previous value.
`type`	Chain of characters to indicate the type of non-weighted index number to evaluate the evolution of a set of magnitudes (even for different products). By considering `base="serie"`, if we introduce `type="arithmetic"`, we obtain the Sauerbeck index number. If we introduce `type="geometric"`, we obtain the Geometric index. If we choose `type="harmonic"`, we obtain the Harmonic mean index. If we write `type="BDutot"`, we will obtain the Bradstreet-Dutot index. Otherwise, if we take `base="chain"` and `type="Carli"`, we obtain the Carli index number. If we introduce `type="Jevons"`, we obtain the Jevons index and if we choose `type="Dutot"`, we obtain the Dutot index.
`name`	Chain of characters to indicate the name of the variable under study.
`opt.plot`	Logical option to indicate if a graphical description of the index number along the different stages is required. It takes the value `TRUE` or `FALSE`.

`opt.summary` Logical option to indicate if a statistical summary of the index number is required. It takes the value `TRUE` or `FALSE`.

Value

`Summary` Statistical summary (optional) of the index number along the considered period.

`Agg. index number`
Table containing the values of the index number for the considered stages and the aggregate value.

`Graphical` Graphical summary (optional) of the index number along the considered period.

Author(s)

A. Saavedra-Nieves, P. Saavedra-Nieves

References

CPI Manual (2004). Consumer Price Index Manual: Theory and Practice. OECD, UN, Eurostat, and TheWorld Bank by ILO, Geneva.

Index Number (2008). In: The Concise Encyclopedia of Statistics. Springer, New York, NY. <doi:https://doi.org/10.1007/978-0-387-32833-1>

Examples

```
prices<-matrix(c(70,75,77,77,85,90,85,75,77,87,85,90,70,75,77,77,85,90),ncol=3)
aggregated.index.number(prices,"chain","geometric","Price",opt.plot=TRUE,opt.summary=TRUE)
```

ECResources *Combustibles and energy resources for the main home in Spain from 2006 to 2015.*

Description

Unitary value (euros) and consumed amount (thousands of units) of combustibles and other energy resources for the main home in Spain from 2006 to 2015.

Usage

```
data(ECResources)
```

Format

A data frame with columns:

Time Year between 2006 and 2015.

ElectricityPrice Unitary value of electricity (KWh).

NaturalGasPrice Unitary value of natural gas (m3).

LiquifiedGasPrice Unitary value of liquified gas (kilo).

LiquifiedCombustiblesPrice Unitary value of liquified combustibles (l).

SolidCombustiblesPrice Unitary value of Solid combustibles(l).

ElectricityConsumed Consumed (thousands of units) of electricity (KWh).

NaturalGasConsumed Consumed (thousands of units) of natural gas (m3).

LiquifiedGasConsumed Consumed (thousands of units) of liquified gas (kilo).

LiquifiedCombustiblesConsumed Consumed (thousands of units) of liquified combustibles (l).

SolidCombustiblesConsumed Consumed (thousands of units) of solid combustibles (l).

Source

Spanish Statistical Office (INE), http://www.ine.es

Examples

```
## Not run:
 ECResources

## End(Not run)
```

`edgeworth.index.number`

Calculate the Edgeworth index number

Description

This function determines the Marshall-Edgeworth index number for those cases in which there exist more than an only product.

Usage

```
edgeworth.index.number(x, y, name, opt.plot = FALSE, opt.summary = FALSE)
```

Arguments

`x`	Matrix that contains the magnitude(s) under study. In each column, it contains the magnitude of a different product considered. Thus, we have `nrow(x)` values of a magnitude for `ncol(x)` products.
`y`	Matrix that contains that magnitude used as weight. In each column, it contains another magnitude associated to each different product along the time. Thus, we have `nrow(x)` values of magnitudes for the set of `ncol(x)` products.
`name`	Chain of characters to indicate the name of the variable under study.
`opt.plot`	Logical option to indicate if a graphical descriptiony of the index number along the different stages is required. It takes the value `TRUE` or `FALSE`.
`opt.summary`	Logical option to indicate if a statistical summary of the index number is required. It takes the value `TRUE` or `FALSE`.

Value

`Summary`	Statistical summary (optional) of the index number along the considered period.
`Agg. index number`	Table containing the values of the index number for the considered stages and the aggregate value.
`Graphical`	Graphical summary (optional) of the index number along the considered period.

Author(s)

A. Saavedra-Nieves, P. Saavedra-Nieves

References

Edgeworth, F. (1887) Measurement of change in value of money i. First Memorandum presented to the British Association for the Advancement of Science. Reprinted in his Papers Relating to Political Economy, 1, 198–259.

Marshall, A. (1887) Remedies for fluctuations of general prices. The Contemporary review, 1866-1900, 51, 355–375.

Examples

```
prices<-matrix(c(70,75,77,77,85,90,85,75,77,87,85,90,70,75,77,77,85,90),ncol=3)
weights<-matrix(c(1,1.5,0.8,1.1,1,0.9,0.7,0.8,0.6,1,1.1,0.9,1,1,0.9,1.1,0.6,0.8),ncol=3)
edgeworth.index.number(prices,weights,"Price",opt.plot=TRUE,opt.summary=TRUE)
```

`fisher.index.number` *Calculate the Fisher index number*

Description

This function determines the Fisher index number for those cases in which there exist more than an only product.

Usage

```
fisher.index.number(x, y, name, opt.plot = FALSE, opt.summary = FALSE)
```

Arguments

`x`	It is a matrix containing that magnitude to be studied. In each column, it contains the magnitud of a different product. Thus, we have `nrow(x)` values of a magnitud for `ncol(x)` products.
`y`	It is a matrix containing that magnitude used as weight. In each column, it contains another magnitud of the different products along the time. Thus, we have `nrow(x)` values of a magnitud for `ncol(x)` products.
`name`	Chain of characters to indicate the name of the variable under study.

opt.plot	Logical option to indicate if a graphical descriptiony of the index number along the different stages is required. It takes the value TRUE or FALSE.
opt.summary	Logical option to indicate if a statistical summary of the index number is required. It takes the value TRUE or FALSE.

Value

Summary	Statistical summary (optional) of the index number along the considered period.
Agg. index number	Table containing the values of the index number for the considered stages and the aggregate value.
Graphical	Graphical summary (optional) of the index number along the considered period.

Author(s)

A. Saavedra-Nieves, P. Saavedra-Nieves

References

Fisher, I. (1922) The making of index numbers: a study of their varieties, tests, and reliability, volume 1. Houghton Mifflin.

Lapedes, Daniel N. (1978) Dictionary of Physics and Mathematics. McGrow–Hill. p. 367. ISBN 0-07-045480-9.

Examples

```
prices<-matrix(c(70,75,77,77,85,90,85,75,77,87,85,90,70,75,77,77,85,90),ncol=3)
weights<-matrix(c(1,1.5,0.8,1.1,1,0.9,0.7,0.8,0.6,1,1.1,0.9,1,1,0.9,1.1,0.6,0.8),ncol=3)
fisher.index.number(prices,weights,name="Price",opt.plot=TRUE,opt.summary=TRUE)
```

Food *Food in Spain from 2006 to 2015.*

Description

Unitary value (euros) and consumed amount (thousands of units) of food in Spain from 2006 to 2015.

Usage

```
data(Food)
```

Format

A data frame with columns:

Year Year from 2006 and 2015.

RicePrice Unitary value of rice (kilo).

BreadPrice Unitary value of bread (kilo).

PorkPrice Unitary value of pork meat (kilo).

FishPrice Unitary value of fish (kilo).

WholeMilkPrice Unitary value of whole milk (l).

EggsPrice Unitary value of eggs (unit).

OliveOilPrice Unitary value of olive oil (l).

ApplesPrice Unitary value of apples (kilo).

DriedFruitAndNutsPrice Unitary value of dried fruit and nuts (kilo).

GreenVegetablePrice Unitary value value of green vegetables (kilo).

PotatoesPrice Unitary value value of potatoes (kilo)

SugarPrice Unitary value value of sugar (kilo)

ChocolatePrice Unitary value value of chocolate (kilo)

CoffeePrice Unitary value value of coffee (l).

MineralWaterPrice Unitary value value of mineral water (l).

WinePrice Unitary value value of wine (l).

BeerPrice Unitary value value of beer (l).

RiceConsumed Total amount (thousands of units) of consumed rice (kilo).

BreadConsumed Total amount (thousands of units) of consumed bread (kilo).

PorkConsumed Total amount (thousands of units) of consumed pork meat (kilo).

FishConsumed Total amount (thousands of units) of consumed fish (kilo).

WholeMilkConsumed Total amount (thousands of units) of consumed whole milk (l).

EggsConsumed Total amount (thousands of units) of consumed eggs (unit).

OliveOilConsumed Total amount (thousands of units) of consumed olive oil (l).

ApplesConsumed Total amount (thousands of units) of consumed apples (kilo).

DriedFruitAndNutsConsumed Total amount (thousands of units) of consumed dried fruit and nuts (kilo).

GreenVegetableConsumed Total amount (thousands of units) of consumed green vegetables (kilo).

PotatoesConsumed Total amount (thousands of units) of consumed potatoes (kilo)

SugarConsumed Total amount (thousands of units) of consumed sugar (kilo)

ChocolateConsumed Total amount (thousands of units) of consumed chocolate (kilo)

CoffeeConsumed Total amount (thousands of units) of consumed coffee (l).

MineralWaterConsumed Total amount (thousands of units) of consumed mineral water (l).

WineConsumed Total amount (thousands of units) of consumed wine (l).

BeerConsumed Total amount (thousands of units) of consumed beer (l).

Source

Spanish Statistical Office (INE), http://www.ine.es

Examples

```
## Not run:
 Food

## End(Not run)
```

`index.number.chain` *Calculate an index number in chain*

Description

This function determines index numbers "in chain" for those cases with an only product.

Usage

```
index.number.chain(x, name, opt.plot = FALSE, opt.summary = FALSE)
```

Arguments

`x`	It is a vector containing that magnitude to be studied for a product. Thus, we have `length(x)` values of it.
`name`	Chain of characters to indicate the name of the variable under study.
`opt.plot`	Logical option to indicate if a graphical descriptiony of the index number along the different stages is required. It takes the value `TRUE` or `FALSE`.
`opt.summary`	Logical option to indicate if a statistical summary of the index number is required. It takes the value `TRUE` or `FALSE`.

Value

`Summary`	Statistical summary (optional) of the index number along the considered period.
`Index number`	Table containing the values of the index number for the considered stages.
`Graphical`	Graphical summary (optional) of the index number along the considered period.

Author(s)

A. Saavedra-Nieves, P. Saavedra-Nieves

References

Index Number (2008) In: The Concise Encyclopedia of Statistics. Springer, New York, NY. <doi:https://doi.org/10.1007/978-0-387-32833-1>.

Examples

```
prices<-c(70,75,77,77,85,90,85,75,77,87,85,90,70,75,77,77,85,90)
index.number.chain(prices,"Prices",opt.plot=TRUE,opt.summary=TRUE)
```

`index.number.serie` *Calculate an index number in serie*

Description

This function determines index numbers "in serie" for those cases with an only product.

Usage

```
index.number.serie(x, name, opt.plot = FALSE, opt.summary = FALSE)
```

Arguments

`x`	It is a vector containing that magnitude to be studied for a product. Thus, we have `length(x)` values of it.
`name`	Chain of characters to indicate the name of the variable under study.
`opt.plot`	Logical option to indicate if a graphical descriptiony of the index number along the different stages is required. It takes the value `TRUE` or `FALSE`.
`opt.summary`	Logical option to indicate if a statistical summary of the index number is required. It takes the value `TRUE` or `FALSE`.

Value

`Summary`	Statistical summary (optional) of the index number along the considered period.
`Index number`	Table containing the values of the index number for the considered stages.
`Graphical`	Graphical summary (optional) of the index number along the considered period.

Author(s)

A. Saavedra-Nieves, P. Saavedra-Nieves

References

Index Number (2008). In: The Concise Encyclopedia of Statistics. Springer, New York, NY. <doi:https://doi.org/10.1007/978-0-387-32833-1>

Examples

```
prices<-c(70,75,77,77,85,90,85,75,77,87,85,90,70,75,77,77,85,90)
index.number.serie(prices,"Prices",opt.plot=TRUE,opt.summary=TRUE)
```

`laspeyres.index.number` *Calculate the Laspeyres index number*

Description

This function determines the Laspeyres index number for those cases in which there exist more than an only product.

Usage

```
laspeyres.index.number(x, y, name, opt.plot = FALSE, opt.summary = FALSE)
```

Arguments

`x`	Matrix that contains the magnitude(s) under study. In each column, it contains the magnitude of a different product considered. Thus, we have `nrow(x)` values of a magnitude for `ncol(x)` products.
`y`	Matrix that contains that magnitude used as weight. In each column, it contains another magnitude associated to each different product along the time. Thus, we have `nrow(x)` values of magnitudes for the set of `ncol(x)` products.
`name`	Chain of characters to indicate the name of the variable under study.
`opt.plot`	Logical option to indicate if a graphical descriptiony of the index number along the different stages is required. It takes the value `TRUE` or `FALSE`.
`opt.summary`	Logical option to indicate if a statistical summary of the index number is required. It takes the value `TRUE` or `FALSE`.

Value

`Summary`	Statistical summary (optional) of the index number along the considered period.
`Agg. index number`	Table containing the values of the index number for the considered stages and the aggregate value.
`Graphical`	Graphical summary (optional) of the index number along the considered period.

Author(s)

A. Saavedra-Nieves, P. Saavedra-Nieves

References

Laspeyres, E. (1864) Hamburger Warenpreise 1850–1863 und die kalifornisch-australischen Geldentdeckung seit. Jahrb. Natl. Stat. 3, 81–118, 209–236.

Laspeyres, E. (1871) Die Berechnung einer mittleren Waarenpreissteigerung. Jahrb. Natl. Stat. 16, 296–314.

Examples

```
prices<-matrix(c(70,75,77,77,85,90,85,75,77,87,85,90,70,75,77,77,85,90),ncol=3)
weights<-matrix(c(1,1.5,0.8,1.1,1,0.9,0.7,0.8,0.6,1,1.1,0.9,1,1,0.9,1.1,0.6,0.8),ncol=3)
laspeyres.index.number(prices,weights,"Price",opt.plot=TRUE,opt.summary=TRUE)
```

`Mortgages` *Mortgages constituted on urban properties in Spain from 2003 to 2018.*

Description

Number of mortgages constituted on urban properties and mortgages amounts (thousands of euros) from 2003 to 2018.

Usage

```
data(Mortgages)
```

Format

A data frame with columns:

Year Year from 2003 to 2018

Number.of.bank.mortgages Numbers of bank mortages.

Amount.of.bank.mortgages Amount (thousands of euros) of bank mortages.

Number.of.savings.bank.mortgages Numbers of savings bank mortages.

Amount.of.savings.bank.mortgages Amount (thousands of euros) of savings bank mortages.

Number.of.other.entities.mortgages Numbers of other entities mortages.

Amount.of.other.entities.mortgages Amount (thousands of euros) of other entities mortages.

Source

Spanish Statistical Office (INE), http://www.ine.es

Examples

```
## Not run:
 Mortgages

## End(Not run)
```

paasche.index.number *Calculate the Paasche index number*

Description

This function determines the Paasche index number for those cases in which there exist more than an only product.

Usage

```
paasche.index.number(x, y, name, opt.plot = FALSE, opt.summary = FALSE)
```

Arguments

x	Matrix that contains the magnitude(s) under study. In each column, it contains the magnitude of a different product considered. Thus, we have nrow(x) values of a magnitude for ncol(x) products.
y	Matrix that contains that magnitude used as weight. In each column, it contains another magnitude associated to each different product along the time. Thus, we have nrow(x) values of magnitudes for the set of ncol(x) products.
name	Chain of characters to indicate the name of the variable under study.
opt.plot	Logical option to indicate if a graphical descriptiony of the index number along the different stages is required. It takes the value TRUE or FALSE.
opt.summary	Logical option to indicate if a statistical summary of the index number is required. It takes the value TRUE or FALSE.

Value

Summary	Statistical summary (optional) of the index number along the considered period.
Agg. index number	Table containing the values of the index number for the considered stages and the aggregate value.
Graphical	Graphical summary (optional) of the index number along the considered period.

Author(s)

A. Saavedra-Nieves, P. Saavedra-Nieves

References

Paasche, H. (1874) Uber die Preisentwicklung der letzten Jahre nach den Hamburger Borsennotirungen. Jahrb. Natl. Stat. 23, 168–178.

Examples

```
prices<-matrix(c(70,75,77,77,85,90,85,75,77,87,85,90,70,75,77,77,85,90),ncol=3)
weights<-matrix(c(1,1.5,0.8,1.1,1,0.9,0.7,0.8,0.6,1,1.1,0.9,1,1,0.9,1.1,0.6,0.8),ncol=3)
paasche.index.number(prices,weights,"Price",opt.plot=TRUE,opt.summary=TRUE)
```

Index