Package ‘IFMCDM’

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Title Intuitionistic Fuzzy Multi-Criteria Decision Making Methods

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License GPL (>= 2)

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Imports dplyr

Suggests testthat

Depends R (>= 3.5.0)

NeedsCompilation no

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### data_IF

*The sample intuitionistic fuzzy dataset*

**Description**

The sample intuitionistic fuzzy dataset

**Usage**

`data_IF`

**Format**

An object of class `matrix` (inherits from `array`) with 5 rows and 9 columns.

**Examples**

```r
set.seed(61222)
data(data_IF)
m<-IFSM(data_IF)
print(m)
```

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### IFconversion

*Aggregation of primary data into Intuitionistic Representation*

**Description**

The *IFconversion* - Aggregation of primary data into Intuitionistic Representation. Reference describing the method: Jefmański (2020) [doi:10.1007/9783030523480_4](https://doi.org/10.1007/9783030523480_4)

**Usage**

```r
IFconversion(
  primary,
  u = round(mean(c(min(primary[, -1], na.rm = TRUE), max(primary[, -1], na.rm = TRUE)))),
  u_is_neutral = TRUE
)
```

**Arguments**

- `primary`: dataset with object names (not aggregated) in first column
- `u`: cut level
- `u_is_neutral`: if exact value of variable is equal to `u` (cut_level) the variable is treated as neutral (TRUE) or negative (FALSE)
Value

Ifconversion returns the decision matrix ($m \times n\times 3$) with the values of the $mi$ and $pi$ (three columns for each fuzzy representation), for the $n$ criteria.

References


Examples

```r
set.seed(61222)
data<-sample(1:7,26*13*8,replace=TRUE)
dim(data)<-c(26*13,8)
nrColumns<-8
primary<-data.frame(name=rep(LETTERS,each=13),data)
inth<-Ifconversion(primary)
```

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**IFSM**

**Implementation of the Intuitionistic Fuzzy Synthetic Measure Method for Fuzzy Multi-Criteria Decision Making Problems**

**Description**


**Usage**

```
IFSM(
    data,
    d = "e",
    w = rep(3/ncol(data), ncol(data)/3),
    z = rep("b", ncol(data)/3),
    p = "dataBounds"
)
```

**Arguments**

- **data**
  The data matrix ($m \times n\times 3$) with the values of $mi$ and $pi$ (three columns for each intuitionistic fuzzy representation of criteria for each alternative) where $m$ is the number of alternatives and $n$ is the number of criteria.

- **d**
  Distance "euclidean" or "hamming".
A vector of length \( n \), containing the crisp weights for the criteria (one value for intuitionistic fuzzy representation).

A vector of length \( n \), with preferences type for each criterion with "b" (benefit) and "c" (cost).

Ideal point calculation type with one of two values: "dataBounds" – ideal point contains max and min values from the dataset – see details; "idealBounds" – ideal point contains 1 and 0's - see details.

Details

For \( p=\text{"dataBounds"} \) the actual ideal point is calculated for benefits as maximum from all values for \( mi \) and min for \( ni \) (\( pi = 1 - mi - ni \)); in the case of costs, minimal value for \( mi \) and max for \( ni \) (\( pi = 1 - mi - ni \)). For \( p=\text{"idealBounds"} \) for benefits is 1 for \( mi \) and 0 for \( ni \) (\( pi = 1 - mi - ni \)). In the case of costs it is 0 for \( mi \) and 1 for \( ni \) (\( pi = 1 - (mi - ni) \)).

Value

IFSM returns a data frame that contains the scores of the Intuitionistic Fuzzy Synthetic Measure (IFSM) and the ranking of the alternatives.

References


Examples

```r
set.seed(823)
data<-sample(1:7,26*13*8,replace=TRUE)
dim(data)<-c(26*13,8)
nrColumns<-8
primary<-data.frame(name=rep(LETTERS,each=13),data)
f<-IFconversion(primary)
print(f)
m<-IFSM(f)
print(m)
```
IFTOPSIS

Implementation of the Intuitionistic Fuzzy Technique for Order of Preference by Similarity to Ideal Solution for Fuzzy Multi-Criteria Decision Making Problems

Description


Usage

IFTOPSIS(data, 
  d = "e", 
  w = rep(3/ncol(data), ncol(data)/3), 
  z = rep("b", ncol(data)/3), 
  p = "dataBounds", 
  ap = "dataBounds"
)

Arguments

data The data matrix (m x n x 3) with the values of mi ni and pi (three columns for each intuitionistic fuzzy representation of criteria for each alternative), where m is the number of alternatives and n is the number of criteria.
d Distance "euclidean" or "hamming".
w A vector of length n, containing the crisp weights for the criteria (one value for intuitionistic fuzzy representation)
z A vector of length n, with preferences type for each criterion with "b" (benefit) and "c" (cost).
p Ideal point calculation type with one of two values: "dataBounds" – ideal point contains max and min values from the dataset – see details; "idealBounds" – ideal point contains 1 and 0’s - see details.
ap Anti-ideal point calculation type with one of two values: "dataBounds" – anti-ideal point contains min and max from the dataset – see details; "idealBounds" – anti-ideal point contains 0 and 1’s - see details.

Details

For p= "dataBounds" the actual ideal point is calculated for benefits as maximum from all values for mi and min for ni (pi = 1- mi - ni); in the case of costs, minimal value for mi and max for ni (pi = 1- mi - ni). For p= "idealBounds" for benefits is 1 for mi and 0 for ni (pi = 1- mi - ni). In the case of costs it is 0 for mi and 1 for ni (pi = 1- (mi - ni)). For ap="dataBounds" the actual anti-ideal point is calculated for benefit criteria as minimum of all values for mi, maximum of all values for ni and pi.
= 1 - (mi + ni); in the case of cost criteria, maximum of all values for mi, minimum of all values for ni and pi = 1 - (mi + ni). For ap="idealBounds" in the case of benefit criteria it is 0 for mi, 1 for ni, 0 for pi; in the case of cost criteria it is 1 for mi, 0 for ni and 0 for pi.

Value

IFTOPSIS returns a data frame that contains the scores of the Intuitionistic Fuzzy Technique for Order of Preference by Similarity to Ideal Solution (IFTOPSIS) and the ranking of the alternatives.

References


Examples

set.seed(823)
data<-sample(1:7,26*13*8,replace=TRUE)
dim(data)<-c(26*13,8)
ncColumns<-8
primary<-data.frame(name=rep(LETTERS,each=13),data)
f<-IFconversion(primary)
m<-IFTOPSIS(f)
print(m)
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