Package 'CFL'

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Title Compensatory Fuzzy Logic

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Description The main results on this project are: a package to analyze the data based on compensatory fuzzy logic algorithms and a reasoner for the compensatory fuzzy logic.

License Unlimited

LazyLoad yes

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CFL-package *Compensatory Fuzzy Logic*

Description

The main results on this project are: a package to analyze the data based on compensatory fuzzy logic algorithms and a reasoner for the compensatory fuzzy logic.

Details

Package:	CFL
Type:	Package
Version:	1.0
Date:	2010-08-17
License:	Unlimited
LazyLoad:	yes

Author(s)

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References

Espin, R., Fern\'andez, E., Mazcorro, G., Marx-G\'omez J., M.I. Lecich: Compensatory Logic: A fuzzy normative model for decision making. Investigaci\'on Operativa. Universidad de la Habana.Vol. 27, 2, pp. 188-197 (2006).

Espin, R., Mazcorro, G., Fen\'andez, E.: Consideraciones sobre el car\'acter normativo de la l\'ogica difusa compensatoria. Infraestructura de Datos Espaciales en Iberoam\'erica y el Caribe. IDICT. Cuba (2007).

Espin, R., Fern\'andez, E.: La L\'ogica Difusa Compensatoria: Una Plataforma para el Razonamiento y la Representaci\'on del Conocimiento en un Ambiente de Decisi\'on Multicriterio. In: An\'alisis Multicriterio para la Toma de Decisiones: M\'etodos y Aplicaciones. Coedici\'on: editorial Plaza y Valdes/editorial Universidad de Occidente (2009).

Examples

```
ldc.conj(0,1,0,1)
```

ldc.conj *ldc.conj*

Description

It Calculates the conjuction operator based on compensatory fuzzy logic.

Usage

```
ldc.conj(...)
```

Arguments

...	numeric, matrix or vectors, in the range 0 to 1.

Details

The conjunction symbolizes the inclusive use of "*and*" in natural language. The mathematical formula is: $\wedge_{x \in U} p(x) = \sqrt[n]{\sqcap_{x \in U} p(x)}$. $p \wedge q$ is true if and only if both p and q are true.

Value

The ldc.conj operator return a value of trust [0,1]. If values of ... are outside of the range [0,1] an error will be raised. Otherwise it is a length-one numeric or complex vector.

Author(s)

Pablo Michel Marin Ortega, Kornelius Rohmeyer

References

Espin, R., Fern\'andez, E., Mazcorro, G., Marx-G\'omez J., M.I. Lecich: Compensatory Logic: A fuzzy normative model for decision making. Investigaci\'on Operativa. Universidad de la Habana.Vol. 27, 2, pp. 188-197 (2006).

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Examples

```
ldc.conj(0,1,0,1)
```

ldc.disj *ldc.disj*

Description

It Calculates the disjunction operator based on compensatory fuzzy logic.

Usage

```
ldc.disj(...)
```

Arguments

...	numeric, matrix or vectors, in the range 0 to 1.

Details

The conjunction symbolizes the inclusive use of "*or*" in natural language. The mathematical formula is: $\vee_{x \in U} p(x) = 1 - \sqrt[n]{\sqcap_{x \in U} p(x)}$. $p \vee q$ is false if and only if both p and q are false.

Value

The ldc.disj operator return a value of trust [0...1]. If values of '...' are outside of the range [0...1] the result will be message 'Error...the value is not a value trust'. Otherwise it is a length-one numeric or complex vector.

Author(s)

Pablo Michel Marin Ortega, Kornelius Rohmeyer

References

Espin, R., Fern\'andez, E., Mazcorro, G., Marx-G\'omez J., M.I. Lecich: Compensatory Logic: A fuzzy normative model for decision making. Investigaci\'on Operativa. Universidad de la Habana.Vol. 27, 2, pp. 188-197 (2006).

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Examples

```
ldc.disj(0,1,0,1)
```

ldc.exist *ldc.exist*

Description

It Calculates the exist operator based on compensatory fuzzy logic.

Usage

```
ldc.exist(value)
```

Arguments

value	numeric, matrix or vectors, in the range 0 to 1.

Details

In compensatory fuzzy logic the equivalence is defined by $p \leftrightarrow q = (p \rightarrow q) \wedge (q \rightarrow p)$ and the universal and existential quantifiers over X are defined by:

$$\forall x p(x) = \wedge_{x \in X}(p(x))$$

$$\exists x p(x) = \vee_{x \in X}(p(x))$$

These definitions convey the virtues and defects of the conjunction and disjunction connectives.

Value

The ldc.exist operator return a value of trust [0...1]. If values of '...' are outside of the range [0...1] the result will be message 'Error...the value is not a value trust'. Otherwise it is a length-one numeric or vector.

Author(s)

Pablo Michel Marin Ortega, Kornelius Rohmeyer

References

Espin, R., Fern\'andez, E., Mazcorro, G., Marx-G\'omez J., M.I. Lecich: Compensatory Logic: A fuzzy normative model for decision making. Investigaci\'on Operativa. Universidad de la Habana.Vol. 27, 2, pp. 188-197 (2006).

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Examples

```
ldc.exist(c(0,1,0,1))
```

`ldc.forall` *ldc.forall*

Description

It Calculates the all operator based on compensatory fuzzy logic

Usage

```
ldc.forall(value)
```

Arguments

`value`	numeric, matrix or vectors, in the range 0 to 1.

Details

In compensatory fuzzy logic the equivalence is defined by $p \leftrightarrow q = (p \rightarrow q) \wedge (q \rightarrow p)$ and the universal and existential quantifiers over X are defined by:

$$\forall x p(x) = \wedge_{x \in X}(p(x))$$

$$\exists x p(x) = \vee_{x \in X}(p(x))$$

These definitions convey the virtues and defects of the conjunction and disjunction connectives.

Value

The ldc.forall operator return a value of trust [0...1]. If values of '...' are outside of the range [0...1] the result will be message 'Error...the value is not a value trust'. Otherwise it is a length-one numeric or vector.

Author(s)

Pablo Michel Marin Ortega, Kornelius Rohmeyer

References

Espin, R., Fern\'andez, E., Mazcorro, G., Marx-G\'omez J., M.I. Lecich: Compensatory Logic: A fuzzy normative model for decision making. Investigaci\'on Operativa. Universidad de la Habana.Vol. 27, 2, pp. 188-197 (2006).

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Examples

```
ldc.forall(c(0,1,0,1))
```

`sigmoidal` *sigmoidal membership functions*

Description

By theoretical considerations in (Dubois and Prade, 1985), it is recommend the use of sigmoidal membership functions for increasing or decreasing functions. The parameters of these functions are determined by setting three values. The first value is the variable that need fuzzification, The second is the value at which it is considered that the statement in the predicate is true (gamma). The third is the value for which the data makes almost unacceptable the corresponding statement (beta).

Usage

```
sigmoidal(x,ganma, beta)
```

Arguments

`x`	numeric, complex or vectors with values to fuzzificated.
`ganma`	Acceptable Value. Value in the range 0 and 1.
`beta`	Value almost unacceptable. Value in the range 0 and 1.

Details

The sigmoidal membership functions is used to fuzzificated values. The formula is:

$$S(x, \alpha, \gamma) = \frac{1}{1 + e^{-\alpha(x-\gamma)}}$$

where:

$$\alpha = \frac{ln(0.9) - ln(0.1)}{\gamma - \beta}$$

Value

The sigmoidal membership functions return a value in the range [0...1].

Author(s)

Pablo Michel Marin Ortega, Kornelius Rohmeyer

References

Ceruto Cordov\'es, T.R.S., Alejandro \& Esp\'in Andrade, Rafael (2009) Descubrimiento de predicados a trav\'es de la b\'usqueda metaheur\'istica.

Examples

```
sigmoidal(20,0.5,0.1)
```

Index