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Factors that, in theory, could be known but are not known in practice. Reducible by enhancing the model

Epistemic uncertainty

2

A model is a representation of an entity, defined for a particular purpose. A model includes only the relevant aspects of the modeled entity.

Model

1

Uncertainty pertains to epistemic situations that involve imperfect or unknown information. It is relevant to predictions of future events, existing physical measurements, or the unknown.

Uncertainty

6

A membership function defines a set by specifying the degree of membership of an element from the universe of discourse to the set.

Fuzzy membership function

5

Symbolic, sub-symbolic and black-box

Model classification

4

Unknowns that vary each time the same experiment is conducted. In general, it is present when the model lacks comprehensive coverage.

Aleatoric uncertainty

9

The α-cut of a fuzzy set is the crisp set of values of x such that $\mu(x) \geq \alpha$:

$$\alpha_{\mu}(x) = \{x \mid \mu(x) \geq \alpha\}$$

α-cut

8

A frame of cognition for which the sum of the membership values of each value of the base variable is equal to one.

Fuzzy partition

7

Set of fuzzy sets that fully covers the universe of discourse. Properties: coverage and uni modality.

Frame of cognition

12

If and only if $h_f(X) = 1$

Normal set

11

The height h_f of a fuzzy set f on the universe X is the highest membership degree of an element of X in the fuzzy set:

$$h_f(X) = \max_{x \in X} \mu_f(x)$$

Height

10

Crisp set of values x such that $\mu_f(x) > 0$.

Support

15

$$\mu_{f_1 \cup f_2}(x) = \max[\mu_{f_1}(x), \mu_{f_2}(x)]$$

Union

14

$$\mu_{\bar{f}}(x) = 1 - \mu_f(x)$$

Complement

13

A fuzzy set is convex if and only if

$$\mu[\lambda x_1 + (1-\lambda)x_2] \geq \min[\mu(x_1), \mu(x_2)]$$

for any $(x_1, x_2) \in R$ and any $\lambda \in [0, 1]$.

Convex set

18

Variables whose values are words or sentences in a natural or artificial language

Linguistic variable

17

The combination of information and potential relationships constitutes what we refer to as knowledge.

Knowledge

16

$$\mu_{f_1 \cap f_2}(x) = \min[\mu_{f_1}(x), \mu_{f_2}(x)]$$

Intersection

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Minimum or product

AND implementation

20

A fuzzy rule is a rule whose clauses have the form "V is L", where V is a linguistic variable, and L is a label representing a value for V associated with a fuzzy set. Each of these clauses is referred to as a linguistic clause.

Fuzzy rule

19

An inference rule is a model, essentially defining a mapping from input to output. These rules are utilized to represent inferential relationships among various pieces of knowledge.

Inference rule

24

Normal, convex, and bounded support

Fuzzy numbers constraints

23

Converting crisp input values into fuzzy values

Fuzzification

22

Maximum or probabilistic sum

OR implementation

27

$$[a, b] - [d, e] = [a - e, b - d]$$

Subtraction

26

$$[a, b] + [d, e] = [a + d, b + e]$$

Addition

25

uniqueness of α-cuts and closed intervals

Arithmetic's properties

30

A field is considered a Borel field if it possesses the property that when all the A_n sets belong to the field, the union and intersection of these sets also belong to the field.

Borel field

29

$$[a, b] \div [d, e] = \left[\min\left(\frac{a}{d}, \frac{a}{e}, \frac{b}{d}, \frac{b}{e}\right), \max\left(\frac{a}{d}, \frac{a}{e}, \frac{b}{d}, \frac{b}{e}\right)\right]$$

Division

28

$$[a, b] \times [d, e] = [\min(ad, ae, bd, be), \max(ad, ae, bd, be)]$$

Multiplication

33

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Belief

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Basic probability assignment

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Fuzzy measure

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Possibility

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Conflict, consonance, arbitrary and consistent

Information sources

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Plausibility

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Given $A = \{x, \mu_A(x)\}$, the entropy is:

$$d(A) = K \sum_{i=1}^{n} S(\mu_A(x_i))$$

Where $S(x)$ is Shannon's function:

$$S(x) = -x \ln(x) - (1 - x) \ln(1 - x)$$

Fuzziness measure

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Confirmation degree

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Necessity