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DO WE NEED A PRECISE DEFINITION OF MEMBERSHIP FUNCTIONS ?

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Membership functions of fuzzy sets or possibility distributions intend to model vague predicates or soft constraints . Then it would be paradoxical to demand a very precise assessment of the values of the membership degrees or of the possibility degrees . Fortunately , it is not the case . The following remark makes clear why it is so . We have

$$1 - (a \pm \varepsilon) = (1 - a) \mp \varepsilon$$

$$\min(a \pm \varepsilon, b \pm \varepsilon) = \min(a, b) \pm \varepsilon$$

$$\text{and } \max(a \pm \varepsilon, b \pm \varepsilon) = \max(a, b) \pm \varepsilon$$

Thus , if ε represents the maximum of the possible absolute error which may be made on the membership or the possibility degrees , ε is still the maximum of the error on the result when we are performing complementations , intersections (defined with 'min') , unions (defined with 'max') , 'sup-min'-compositions of fuzzy relations , the computation of the possibility or of the necessity of a fuzzy event (defined respectively by $\Pi(A) = \sup_x \min(\mu_A(x) , \mathcal{K}(x))$ and by $N(A) = \inf_x \max(\mu_A(x) , 1 - \mathcal{K}(x))$) . Roughly speaking , the error cannot increase when we are performing computations . For instance , if the precision of the membership or possibility degrees is $\varepsilon = 0.1$, the results we may obtain from these data are significant up to 0.1 .

We have not such a pleasant situation in probability theory because of the additivity requirement .

Littérature récente

(collectée par D. Dubois et H. Prade)

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