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Where do we stand on measures of uncertainty, ambiguity, fuzziness, and the like? (English)

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The paper gives an extensive exposure of two alternative ways of developing fuzzy set theory. They reflect two fundamentally different types of uncertainty involved, namely vagueness and ambiguity. Vagueness refers to concepts which do not possess sharp boundaries. A concept of fuzzy set specified by its membership function introduced by Zadeh lies in this area of interest. Ambiguity is associated with one-to-many relations, viz. situations in which a choice between some alternatives is left unspecified. It refers to fuzzy measure defined in the power set $P(X)$ of all sets in X (the fuzzy measure $g : P(X) \rightarrow [0, 1]$ satisfies properties of (i) $g(\emptyset) = 0$, $g(X) = 1$, (ii) monotonicity $g(A) \leq g(B)$ for $A \subset B$, (iii) $g(\lim_{n \rightarrow \infty} A_n) = \lim_{n \rightarrow \infty} g(A_n)$ for any monotonic sequence of sets $A_1, A_2, \dots, A_n, \dots$).

A list of measures of vagueness (called measures of fuzziness) is studied. Afterwards measures of ambiguity attached to belief and plausibility measures as nonspecificity, dissonance and confusion are investigated. In sequel links existing between uncertainty, information and system complexity are indicated.

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MSC:

94D05 Fuzzy sets and logic (in connection with information, communication, or circuits theory)

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