

Inference models

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In this paper a consistent model of the generalized modus ponens is discussed in the approximate reasoning. Inputs are implication rules (the so-called: IF-THEN structures) and statements. Output is a statement (conclusion). Approximate reasoning allows fuzzy inputs, fuzzy antecedents, fuzzy consequents, or combinations of these. In general in the approximate reasoning the continuous logic is used instead of classical logic.

One of the most successful areas of fuzzy theory is the fuzzy control based on inference, although from a logical point of view only few theoretical papers

deal with it. The problem is, that there are several operator systems in fuzzy logic (conjunction, disjunction, negation) and there are a lot of implications. The so-called modifiers also play an important role and they still do not have any axiomatic bases. The inference is an algorithm to calculate the unknown values. But what kind of inference is good?

Fuzzy theory deals with uncertain information, but in control the input and the result are not uncertain. (So the membership function should have a different meaning, etc.)

As in the control area the only strictly monotonously increasing operator is useful. We are concentrating on only those operators that come from this class. The theoretical basis of the modifiers is also given. The crucial point is choosing the implication, because the residual implication is non-continuous.

Our solution is using the classical extension with approximate properties. We use different models for the inference: solving equations, optimization and surface approximation. We show that all of them is consistent with the classical inference.