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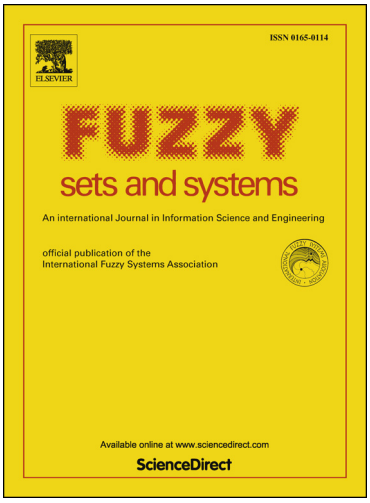

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Evaluating Flexible Criteria on Uncertain Data

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Abstract

Modern information management systems and databases are rapidly becoming better equipped for handling data imperfections. A common imperfection is uncertainty, indicating that a property's exact value is not known. Ideally, such systems can be queried uniformly using flexible criteria regardless of whether the underlying data are uncertain or not. The result thereof should always be informative and intuitive, and should reflect to what degree the data satisfy the criteria and to which degree this is uncertain. In this work, we present a novel way to evaluate flexible criteria on uncertain data. The result thereof is a distribution of uncertainty over degrees of satisfaction. These so-called suitability distributions are first constructed for possibilistic data. It is shown that they can be used in all scenarios going from regular, crisp criteria on certain data to flexible criteria on uncertain data, and that they seamlessly generalize other alternatives. Importantly, their interpretation is always the same, so they can be used without needing to have prior knowledge regarding the quality of the data. Afterwards their properties and supported operations are given. Next it is shown that they can also be applied more broadly, for example for probabilistic data. Examples illustrate their rich semantics, ease-of-use and broad applicability.

Keywords: Information retrieval, Possibility theory, Fuzzy system models

1. Introduction

If there is one thing we can be certain of, it is that data are imperfect in practice. A datum is called uncertain if its exact value is not known. This may be either because it has not been measured, existing measurements are imprecise, the actual real value can not be predicted ahead of time ....

Meanwhile, practical applications such as querying, ranking, decision making and more subject data to criteria in order to solve real-life problems. The

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