

Foreword: Special Issue on Fuzzy Expert Systems

In this special issue on "Fuzzy Expert Systems," six papers cover a wide range of concerns—from theory to applications including: (1) a rule base reorganization, (2) a linear interpolation, (3) a neuro-fuzzy approach to pairwise comparison, (4) properties of reduction in transitive matrices, (5) a consistency checking procedure, and (6) a context dependency model. We present a brief review of these papers next.

In "Rule Base Reorganization and Search with a Fuzzy Cluster Analysis," Türksen and Jiang proposes a fuzzy cluster analysis for the purpose of restructuring a knowledge base where rules are either *S*- or *R*-implication types. The proposed algorithm can be implemented either with a compositional or an analogical tolerance relation. It is shown that analogical tolerance relation is more efficient in a rule base restructuring and a rule firing schema, under the proposed search scheme.

In "Approximate Reasoning by Linear Rule Interpolation and General Approximation," Kóczy and Hirota investigate the problem of sparse fuzzy rule bases. They review various methods of analogical reasoning available in current literature. They discuss concepts of graduality, measurability, distance, and similarity in the fuzzy sense. The fundamental equation of rule interpolation is introduced with α -cuts and resolution principle. The method is extended to multi-dimensional spaces.

In "Neuro-Fuzzy Approach to Data Analysis of Pairwise Comparisons," Ichihashi and Türksen propose an artificial neural network model with an iterative on-line learning scheme. Two quantification methods of pairwise comparisons are presented in order to derive the associated weights. The proposed approach can also be implemented even when we have access to incomplete pairwise comparisons. The proposed approach is compared with Guttman's method and Saaty's AHP.

In "On Reduction of Transitive Fuzzy Matrices and Its Applications," Di Nola, Kolodziejczyk, and Sessa show that the class of *s*-transitive (*w*-transitive) fuzzy matrices properly contain the class of max-min transitive fuzzy matrices. It is also shown that the basic properties of the reduction models remain valid also for *s*-transitive fuzzy matrices.

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In “Consistency Checking for Fuzzy Expert Systems,” Leung and So introduce an affinity measure based on a similarity measure and apply this measure for consistency checking in mixed fuzzy and non-fuzzy expert system environments.

In “The Context Model: An Integrating View of Vagueness and Uncertainty,” Gebhardt and Kruse address two different types of partial ignorance, i.e., vagueness and uncertainty. In this paper they restrict their presentation to Bayes Theory and Dempster–Shafer Theory. “Context Model” applications are illustrated for the spoiled sandwich effect, the three prisoners problem, and the unreliable alarm paradigm.

We hope that our readers will find these topics of some interest to their ongoing theoretical and applied investigations.

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