Ασαφή και Νευροασαφή συστήματα - Ασαφής Βαθεία Μάθηση

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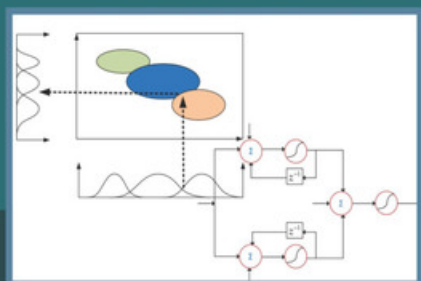
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Abstract

The book aims at familiarizing the reader (post graduate student in computer science or engineering) with significant areas of computational intelligence. Emphasis is put both on the theoretical mathematical background of fuzzy logic and design and training algorithms, as well as on a thorough description of main applications. In the first chapters the fundamentals of fuzzy logic are presented and the structure and operation of fuzzy rules and approximate reasoning are analyzed. The classical fuzzy system and its structure (fuzzifier, defuzzifier, rule base, inference engine) are studied. The design process of PIS, MIS, Takagi-Sugeno-Kang, fuzzy neural networks is given and the most prominent structure and parameter identification algorithms are examined, while genetic FRBCS are also described. Recurrent fuzzy models and recurrent neural networks are introduced, along with dedicated learning techniques. As far as real-world applications are concerned, the problems of sound processing, electric load forecasting, real-time separation of lung sounds and mining of telecommunications data are studied, while emphasis is also put on classification and automatic control. The book concludes with the issue of fuzzy deep learning and a series of deep fuzzy structures is discussed. Numerous models and algorithms have been implemented in MATLAB/Octave, such that the reader becomes familiar with scientific programming.