Optimization of Fuzzy System by Fuzzy Clustering Analysis

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ABSTRACT

Optimization of Fuzzy System by Fuzzy Clustering Analysis ABSTRACT Fuzzy rule base and fuzzy membership functions(MFs) are two major factors in deciding the performance of fuzzy inference system. Therefore, the design plays an important role for the performance stated above. Trial and error was usually the way to solution, which was not only costly and time-consuming but also promised no optimized result. In recent years, many papers were presented about this topic, but none of them has perfect answer. To attack the above problems, we propose the Modified Fuzzy C- Means Method(MFCM) for tuning the parameters of MFs. Then, we fine-tune the MFs with backpropagation learning method. MFCM will be examed for modeling with highly complicated nonlinear functions, such as sinc function and gaussian function, and pattern classification. Finally,there is a simulation test of anti-collision driving system, including first kind of trajectory, second kind of trajectory and evading trajectory of anti-collision driving system, to prove MFCM is suitable for the real world application. The results are quite impressive compared with other approaches such as equalized universe methods(EUM) and subtractive methods(SCM) and show the efficacy of MFCM. Via the MFCM, the bottleneck to be overcomed while designing MFs and the fuzzy system is optimized and has better performance. (Key words: Fuzzy System, Fuzzy Rule Base, FUzzy Membership Function, Fuzzy C-Means, Neural Networks, Backpropagation, Modeling.)

Keywords : Fuzzy System ; Fuzzy Rule Base ; Fuzzy Membership Function ; Fuzzy C-Means ; Neural Networks ; Modeling

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