

FUZZY LOGIC CONTROLLED DIFFERENTIAL EVOLUTION TO IDENTIFICATION OF TAKAGI-SUGENO MODELS

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Abstract

In recent years, soft computing methods have generated a large research interest. The synthesis of the fuzzy logic and the evolutionary algorithms is one of these methods. A particular evolutionary algorithm (EA) is differential evolution (DE). As for any EA, DE algorithm also requires parameters tuning to achieve desirable performance. One of the most important parameter in DE algorithm is amplification factors vector, with size D that D is the dimension of the problem. In this paper a Fuzzy Logic Controller (FLC) tune the amplification factors vector of DE dynamically. We propose fuzzy logic controlled differential evolution (FLC-DE) to identification of the Takagi-Sugeno neuro-fuzzy model (T-S models). The identification of T-S models can be divided into the structure learning and the parameter tuning stages. The both stages of identification are done by FLC-DE completely. The two benchmark problems are used to validate the performance of FLC-DE. Compared to some existing methods, FLC-DE shows better performance in terms of accuracy.

Keywords : Differential Evolution, Evolutionary Algorithm, Fuzzy Logic Controller, Identification, Takagi-Sugeno Model