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A review on the design and optimization of interval type-2 fuzzy controllers

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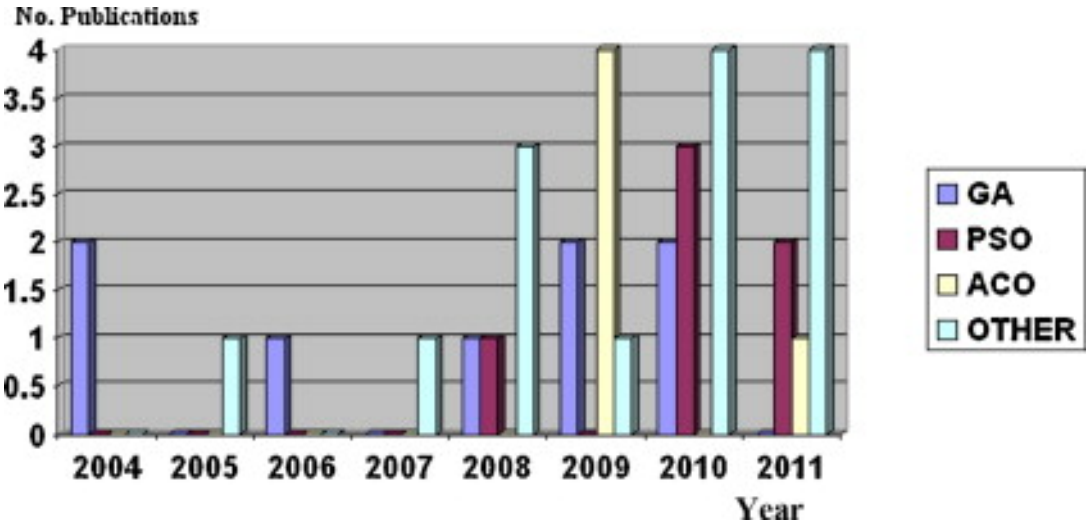
Abstract

A review of the methods used in the design of interval type-2 fuzzy controllers has been considered in this work. The fundamental focus of the work is based on the basic reasons for optimizing type-2 fuzzy controllers for different areas of application. Recently, bio-inspired methods have emerged as powerful optimization algorithms for solving complex problems. In the case of designing type-2 fuzzy controllers for particular applications, the use of bio-inspired optimization methods have helped in the complex task of finding the appropriate parameter values and structure of the fuzzy systems. In this review, we consider the application of genetic algorithms, particle swarm optimization and ant colony optimization as three different paradigms that help in the design of optimal type-2 fuzzy controllers. We also mention alternative approaches to designing type-2 fuzzy controllers without optimization techniques. We also provide a comparison of the different optimization methods for the case of designing type-2

fuzzy controllers.

Graphical abstract



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Highlights

â–° A review of the methods used in the design of interval type-2 fuzzy controllers has been considered in this paper. â–° In this review, we consider the application of genetic algorithms, particle swarm optimization and ant colony optimization as three different paradigms that help in the design of optimal type-2 fuzzy controllers. â–° We mention alternative approaches to designing type-2 fuzzy controllers without optimization techniques. â–° We provide a comparison of the different optimization methods for the case of designing type-2 fuzzy controllers.

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Keywords

Type-2 fuzzy controllers; Bio-inspired methods; Design and optimization

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