

Ant Lion Optimization in a Fuzzy System for Benchmark Control Problem

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Abstract : At today, there are several control problems where the main objective is to obtain the best control in the study to decrease the error in the application. Many techniques can use to control these problems such as Neural Networks, PID control, Fuzzy Logic, Optimization techniques and many more. In this case, fuzzy logic with fuzzy system and an optimization technique are used to control the case of study. In this case, Ant Lion Optimization is used to optimize a fuzzy system to control the velocity of a simple treadmill. The main objective is to achieve the control of the velocity in the control problem using the ALO optimization. First, a simple fuzzy system was used to control the velocity of the treadmill it has two inputs (error and error change) and one output (desired speed), then results were obtained but to decrease the error the ALO optimization was developed to optimize the fuzzy system of the treadmill. Having the optimization, the simulation was performed, and results can prove that using the ALO optimization the control of the velocity was better than a conventional fuzzy system. This paper describes some basic concepts to help to understand the idea in this work, the methodology of the investigation (control problem, fuzzy system design, optimization), the results are presented and the optimization is used for the fuzzy system. A comparison between the simple fuzzy system and the optimized fuzzy systems are presented where it can be proving the optimization improved the control with good results the major findings of the study is that ALO optimization is a good alternative to improve the control because it helped to decrease the error in control applications even using any control technique to optimized, As a final statement is important to mentioned that the selected methodology was good because the control of the treadmill was improve using the optimization technique.

Keywords : ant lion optimization, control problem, fuzzy control, fuzzy system

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