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Title :
Low-Level Hybridization Scripting Language with Dynamic Parameterization in PSO-GA

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Surrounded by an assortment of intelligent and efficient search entities, the Low-Level Hybridization (LLH) for Particle Swarm Optimization (PSO) and Genetic Algorithm (GA), are proven to be a comprehensive tool for solving different kinds of optimization problems due to their contradictive behaviour. In addition, the two algorithms have achieved a remarkable improvement from the adaptation of dynamic parameterization. However, in many cases, implementing the suitable hybrid algorithms for a given optimization problem is a considerably difficult, which in most cases, is time consuming. In addition, research has identified that the existing tools are not adequately designed to enable users to easily develop the algorithms with the dynamic parameterization.

In responding to this problem, this research investigates rapid mechanisms for the LLH design and development with easy, flexible and concise programming. The research has proposed new implementation frameworks and new scripting language with the dynamic parameterization. Based on the implementation reviews from the existing LLHs that combine PSO with GA, the implementation frameworks with a sequential global (SG) scheme, are found to be widely used in practice. The scheme consists of three implementation frameworks: the SG with mutation (SGMutation), the SG with crossover (SGCrossover) and the SG with both crossover and mutation (SGCrossMutation). The scripting language is designed and developed based on the algorithm structure that is defined in the proposed implementation frameworks with the dynamic parameterization. Evaluations of four different sets of applications that used the proposed implementation frameworks with dynamic parameterization have indicated the effectiveness of each tested algorithm in comparison to the single PSO and constant parameterization. In the scripting language evaluation, nine LLHs and three single PSO algorithms have been successfully created. The codes of the scripting language are shown to easily use, concisely describe the algorithm in a directly publishable form and flexible for new problem creations. This work is the first exposition of scripting language for the LLH of PSO-GA embedded with dynamic parameterization, which paves the way for further research possibilities in the future.