

# **Global optimization accuracy and evolutionary dynamics of the generalized generation Gap algorithm with adaptive mutation**

## **Abstract**

The Generalized Generation Gap (G3) algorithm is one of the most efficient and effective state-of-the-art real-coded genetic algorithms (RCGAs) for unconstrained global optimization. However, its performance on multimodal optimization problems is known to be poor compared to unimodal optimization problems. The G3 algorithm currently relies on crossover operations only. The objective of this paper is to augment the G3 algorithm with adaptive mutation operations which are dynamically activated according to some explicit feedback during the evolutionary optimization process in order to improve its performance for solving multimodal optimization problems. The performance of the enhanced algorithm is compared with its original version based on the global optimization accuracy and the evolutionary dynamics of the optimization process. The proposed algorithm is tested using five benchmark test problems with highly deceptive fitness landscapes. It was found that the performance of the G3 algorithm with adaptive mutation improved significantly in two of the five test problems. In one of these test problems, no optimal solutions could be found previously by the G3 algorithm but can now be solved by the proposed G3 algorithm with augmented adaptive mutation operations.