SASEGASA: A New Generic Parallel Evolutionary Algorithm for Achieving Highest Quality Results

Michael Affenzeller and Stefan Wagner
Institute of Systems Science
Systems Theory and Information Technology
Johannes Kepler University
Altenbergerstrasse 69
A-4040 Linz - Austria
({ma,sw}@cast.uni-linz.ac.at*)*

Abstract.

This paper presents a new generic Evolutionary Algorithm (EA) for retarding the unwanted effects of premature convergence. This is accomplished by a combination of interacting generic methods. These generalizations of a Genetic Algorithm (GA) are inspired by population genetics and take advantage of the interactions between genetic drift and migration. In this regard a new selection scheme is introduced, which is designed to directedly control genetic drift within the population by advantageous self-adaptive selection pressure steering. Additionally this new selection model enables a quite intuitive heuristics to detect premature convergence. Based upon this newly postulated basic principle the new selection mechanism is combined with the already proposed Segregative Genetic Algorithm (SEGA), an advanced Genetic Algorithm (GA) that introduces parallelism mainly to improve global solution quality. As a whole, a new generic evolutionary algorithm (SASEGASA) is introduced. The performance of the algorithm is evaluated on a set of characteristic benchmark problems. Computational results show that the new method is capable of producing highest quality solutions without any problem-specific additions.

Keywords: Evolutionary Algorithm(EA), Genetic Algorithm(GA), Selection, Selection Pressure, Premature Convergence, Genetic Drift, Migration