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REPRODUCTION STRATEGY BASED ON SELF-ORGANIZING MAP FOR GENETIC ALGORITHMS

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Abstract. *A novel reproduction strategy by employing a Self-Organizing Map (SOM) for two types of Genetic Algorithms (GAs) is proposed to maintain genetic diversity of population. In the proposed reproduction strategy, a set of new chromosomes in the next generation is decided by a learning of the SOM with modified updating equation based on fitness values. The approximation ability of the SOM facilitates the preservation of the genetic diversity. The proposed reproduction strategy can be applied to "Bit-String GA" and "Real-Coded GA" by employing the SOM with real value weight vectors and binary weight vectors, respectively.*

Keywords: Genetic algorithm, Self-organizing map, Reproduction, Genetic diversity, Fitness

1. **Introduction.** Genetic Algorithms (GAs)[1][2] are search algorithms based on the mechanics of natural selection and natural genetics. They combine survival of the fittest among string structures and randomized information exchange to form a search algorithm with some of the innovative flair of human search. The search in the GAs is achieved by iterating reproduction, crossover and mutation strategies. The reproduction is a process in which chromosomes are copied according to their fitness function values f. This function is a measure of profit, utility, or goodness that we want to maximize. Copying chromosomes according to their fitness values means that chromosomes with higher values have higher probabilities of contributing one or more offspring in the next generation. After reproduction, crossover proceeds in two steps. First, members of the newly reproduced chromosomes in the mating pool are mated at random. Second, two new chromosomes are created by exchanging partial characters between each pair of chromosomes selected in the first step. Mutation plays a secondary role in the operation of the GA because the reproduction and the crossover may occasionally become excessive and lose genetic diversity of a population. The lost of genetic diversity causes a lack of some potentially useful genetic materials. The mutation maintains the genetic diversity of the population