Quantum-bit Coded Genetic Algorithm to Solve Continuous Multiobjective Optimization Problem Using Fast Nondominated Sorting

Optimization is a very important subject to overcome various real-world problems. The real world problems often have several conflicting objectives so-called Multiobjective Optimization Problem (MOP). Evolutionary Multiobjective Optimization Algorithm is then developed to solve MOP with different coding such as binary and real, but there is no study that implements quantum bit coding to solve continuous MOP. Quantum bit superposition nature has been implemented in single objective and discrete MOP evolutionary optimization algorithm and shown capable to outperform the other optimization algorithm. This paper presents a quantum bit coded genetic algorithm to solve continuous MOP using Fast Nondominated Sorting from NSGA-II and implements all genetic algorithm operator i.e Crossover and Mutation with the additional quantum operator the Quantum Gate. The proposed method is shown to be able significantly to outperform the hypervolume and Δ metrics of the MOEA/D method and having comparable hypervolumes to that of NSGA-II while maintaining better mean Δ in all of the test problem results. From this result, we can conclude that using quantum bit coded individual genetic algorithm to perform continuous multiobjective optimization can yield a good hypervolume and Δ metrics in all of the set test problems.

Keywords--genetic algorithm, quantum inspired evolutionary algorithm, Fast Nondominated Sorting

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