

A performance evaluation of genetic algorithm in case of multi-objective bin packing problem

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Abstract

There are many methods that can be used to solve optimization problems. Genetic Algorithm(GA) is different from other methods in mathematical programming. All methods other than GA have only one solution in optimizing Computation. Solutions calculated by GA have a diverseness in solution set. This feature is useful for calculating solutions in multi-objective optimization problems.

We chose a multi-objective bin packing problem. One objective function is to minimize the number of bins used and the other is the deviation of center of gravity which is created by load pattern of items.

Items are different in size and weight. The changing packing order or methods results in an increase in the number of bins and the center of gravity becomes larger. If the number of bins used is increasing, it results in times of driving operations in truckload transportation to increase. Finally, it connects to rising transportation costs. If the center of gravity deviates from correct position, fuel consumption gets heavier. It is a trade-off relationship between two objective functions. In the multi-objective optimization problems, it selects an appropriate solution from the solutions available.

We will show an effectiveness of GA in solving the multi-objective optimization problem in numerical simulation.

Keywords

Optimization, Bin packing problem, Multi-objective, Genetic algorithm

Biography

Tatsuya Komiya is currently a student of the Department of Computer Science and Technology, Salesian Polytechnic, Japan. His research interests include combinatorial optimization problem, large scale numerical computation and operations research.

Yoichi Shimakawa is a Professor and Director of the Department of Computer Science and Technology, Salesian Polytechnic Japan. He received his B.S. and M.Sc. degrees from Chuo University in 1990 and 1996. In 1998, he joined the staff as a research assistant on the research project "Integrated Geographic Information Systems" at ChuoUniversity. He received his D.E. degree from Chuo University. He received paper awards from the Operations Research Society of Japan(ORSJ) in 2002. He is a member of ORSJ and the Geographic Information Systems Association of Japan.