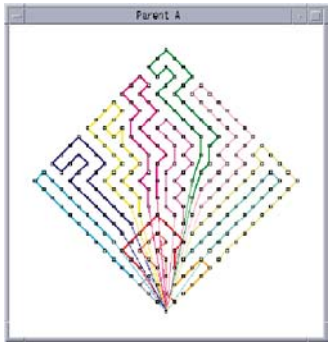
Faculty of Engineering
Tokushima University

Metaheuristics for large combinatorial optimization problems

Associate Professor Yuichi Nagata

A best-known solution of the well-known Mona-Liza TSP benchmark (n=100,000) found by our genetic algorithm.



A best-known solution of one of the well-known benchmarks of the VRP found by our memetic algorithm.

A best-known solution of one of the well-known benchmarks of the JSP found by the proposed algorithm.

Metaheuristics are approximate methods used for solving instances of hard combinatorial optimization problems. The field of metaheuristics for the application to combinatorial optimization problems is a rapidly growing field of research. This is due to the importance of combinatorial optimization problems for the scientific as well as the industrial world. In our research, we develop very powerful approximate methods for many combinatorial optimization problems.

1. The traveling salesman problem (TSP) is one of the most cited NP-hard combinatorial optimization problems. We have developed a very powerful genetic algorithm (GA) for the TSP, finding very high-quality solutions on instances with up to 200,000 cities. A similar approach also shows a very good performance for solving vehicle routing problems.

2. Job shop scheduling problem (JSP) is one of the most studied scheduling problems in the OR community. We have developed a very powerful approximation algorithm for the JSP. The proposed algorithm is base on a new metaheuristic framework, which incorporates constraint propagation techniques into a local search framework.

Keywords: Metaheuristics, combinatorial optimization

E-mail: nagata@is.tokushima-u.ac.jp
Tel. +81-88-656-7505
Fax: +81-88-656-7505