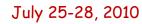# Memetic Algorithms for Evolutionary Multiobjective Combinatorial Optimization

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Abstract

Evolutionary multiobjective optimization (EMO) has been one of the most active research areas in the field of evolutionary computation in the last decade. A number of EMO algorithms have been proposed and successfully applied to various optimization problems with multiple objectives in a wide range of application areas. It is, however, pointed out in the literature that well-known and frequently-used EMO algorithms such as NSGA-II and SPEA2 do not always work well on multiobjective combinatorial optimization problems. As in the case of single-objective optimization, hybridization with local search often significantly improves the search ability of EMO algorithms. Hybrid EMO algorithms with local search are often referred to as memetic EMO algorithms and multiobjective genetic local search (MOGLS). In this presentation, we first briefly explain the basic framework of standard EMO algorithms with Pareto dominance-based fitness evaluation, diversity maintenance and elitism. Next we show some important implementation issues related to the hybridization of EMO algorithms with local search. Among them are the choice of solutions to which local search is applied, the balance in computation load between local search and genetic search, and the timing of local search. It is demonstrated that the hybridization with local search can significantly improve the search ability of EMO algorithms. It is also demonstrated that inappropriate implementation often leads to poor search ability. That is, the performance of memetic EMO algorithms strongly depends on how to combine EMO algorithms with local search. Finally we discuss future research issues in the design of EMO and memetic EMO algorithms.

Biography

Hisao Ishibuchi received the BS and MS degrees from Kyoto University in 1985 and 1987, respectively. He received the Ph. D. degree from Osaka Prefecture University in 1992. Since 1987, he has been with Osaka Prefecture University where he is currently a professor at Department of Computer Science and Intelligent Systems. He is also the head of Computational Intelligence Research Center of Osaka Prefecture University. He was a visiting researcher in University of Toronto (1994-1995 and 1997-1998). He received GECCO 2004 Best Paper Award, HIS-NCEI 2006 Best Paper Award, GECCO 2007 Competition 2 First Prize, 2007 JSPS Prize, and FUZZ-IEEE 2009 Best Paper Award. His research interests include fuzzy rule-based systems, genetic fuzzy systems, evolutionary multiobjective optimization, memetic algorithms, fuzzy data mining, and evolutionary games. Currently he is the IEEE CIS vice-president for technical activities. He is an associate editor of IEEE Computational Intelligence Magazine, IEEE Trans. on Fuzzy Systems, IEEE Trans. on

Evolutionary Computation, and IEEE Trans. on SMC Part B. He is also working for IEEE CEC 2010 as the Program Chair, and FUZZ-IEEE 2011 and FUZZ-IEEE 2012 as a Program Co-Chair.