Combination of Evolutionary Algorithms with Experimental Design, Traditional Optimization and Machine Learning

Abstract: Evolutionary algorithms alone cannot solve optimization problems very efficiently since there are many random (not very rational) decisions in these algorithms. Combination of evolutionary algorithms and other techniques have been proven to be an efficient optimization methodology. In this talk, I will explain the basic ideas of our three algorithms along this line (1): Orthogonal genetic algorithm which treats crossover/mutation as an experimental design problem, (2) Multiobjective evolutionary algorithm based on decomposition (MOEA/D) which uses decomposition techniques from traditional mathematical programming in multiobjective optimization evolutionary algorithm, and (3) Regular model based multiobjective estimation of distribution algorithms (RM-MEDA) which uses the regular property and machine learning methods for improving multiobjective evolutionary algorithms.

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Prof. Zhang is an Associate Editor of the IEEE Transactions on Evolutionary Computation and the IEEE Transactions on Systems, Man, and Cybernetics–Part B. He is also an Editorial Board Member of three other international journals. MOEA/D, a multiobjective optimization algorithm developed in his group, won the Unconstrained Multiobjective Optimization Algorithm Competition at the Congress of Evolutionary Computation 2009, and was awarded the 2010 IEEE Transactions on Evolutionary Computation Outstanding Paper Award.