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A robust heuristic algorithm for Cooperative Particle Swarm Optimizer: A Learning Automata approach

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ABSTRACT

This paper presents a modification of Particle Swarm Optimization (PSO) technique based on cooperative behavior of swarms and learning ability of an automaton. This approach called the Cooperative Particle Swarm Optimization based on Learning Automata (CPSOLA). The CPSOLA algorithm uses three-layer cooperation: intra swarm, inter swarm and inter population. There are two active populations in CPSOLA. In the primary population, the particles are placed in all swarms and each swarm consist of multiple dimensions of search space. Also there is a secondary population in CPSOLA which is used the conventional PSO's updating format. In the upper layer of cooperation, the embedded Learning Automaton (LA) is responsible for deciding whether to cooperate between populations or not. Experiments are organized on five benchmark functions and results show notable performance and robustness of CPSOLA, cooperative behavior of swarms and successful adaptive control of populations.

INDEX TERMS

- **IEEE Terms**
  Acceleration , Algorithm design and analysis , Learning automata , Robustness , Sociology , Statistics , Switches
- **Author Keywords**
  Cooperative learning , Learning Automata (LA) , Particle Swarm Optimization (PSO)

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