Modified Particle Swarm Optimization

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Abstract:

Particle Swarm Optimization (PSO) was introduced by Kennedy and Eberhart (1). PSO is a very popular optimization technique, but it suffers from a major drawback of a possible premature convergence i.e. convergence to a local optimum and not to the global optimum. This paper attempts to improve on the reliability of PSO by addressing the drawback.

The main cause for the premature convergence is the fact that particles get highly influenced during an iteration cycle by the global best and the personal best positions of the previous iteration cycle. Another reason can be a similar kind of information flow between particles during optimization, and this can result in a swarm consisting of similar particles (i.e. a loss in diversity). In literature, there are some attempts to improve the reliability of PSO, for example, Liu et al (2) proposed a multi-start technique.

In the present paper, a modified particle swarm optimization is proposed. During an iteration cycle, while deciding new positions of particles, weightage would be given, not only to the best position, but also to the worst position. This mechanism would free PSO from sub-optimal solutions and would enable it to progress towards the global optimum. Experiments on the benchmark functions are in progress and results would be reported in the paper.

References

1. Kennedy, J. and Eberhart, R. *"Particle swarm optimization",* Proceedings of IEEE International Conference on Neural Networks, USA, IEEE Press, 4, pp. 1942-1948, 1995.

2. Liu, W., Li, M. and Wang, X. *"An Improved Particle Swarm Optimization Algorithm for Optimal Power Flow",* IEEE 6th International Power Electronics and Motion Control Conference, IPEMC'09, pp. 2448- 2450, 2009.