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New measures for comparing optimization algorithms on dynamic optimization problems

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Abstract

Dynamic optimization problems have emerged as an important field of research during the last two decades, since many real-world optimization problems are changing over time. These problems need fast and accurate algorithms, not only to locate the optimum in a limited amount of time but also track its trajectories as close as possible. Although lots of research efforts have been given in developing dynamic benchmark generator/problems and proposing algorithms to solve these problems, the role of numerical performance measurements have been barely considered in the literature. Several performance criteria have been already proposed to evaluate the performance of algorithms. However, because they only take confined aspects of the algorithms into consideration, they do not provide enough information about the effectiveness of each algorithm. In this paper, at first we review the existing performance measures and then we present a set of two measures as a framework for comparing algorithms in dynamic environments, named *fitness adaptation speed* and *alpha–accuracy*. A comparative study is then conducted among different state-of-the-art algorithms on moving peaks benchmark via proposed metrics, along with several other performance measures, to demonstrate the relative advantages of the introduced measures. We hope that the collected knowledge in this paper opens a door toward a more comprehensive comparison among algorithms for dynamic optimization problems.

Keywords

Performance measures Dynamic optimization problems Swarm intelligence
Fitness adaptation speed Alpha-accuracy measure

Notes

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