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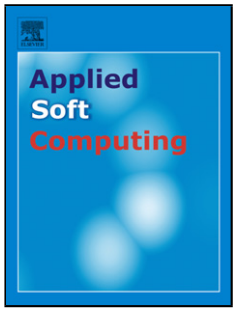

Title: The Evolutionary Cost of Baldwin Effect in the Routing and Spectrum Allocation Problem in Elastic Optical Networks

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The Evolutionary Cost of Baldwin Effect in the Routing and Spectrum Allocation Problem in Elastic Optical Networks

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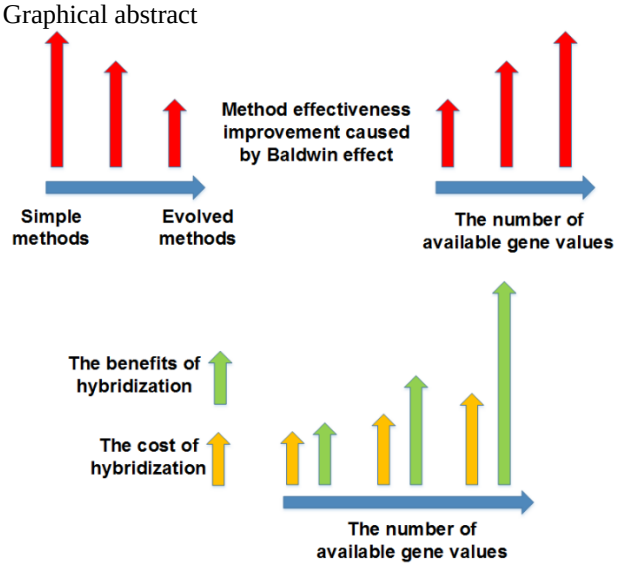
Graphical abstract



Highlights

- The analysis of Baldwin effect influence on evolutionary methods effectiveness
- Evolutionary methods hybridization
- The proposition of a new effective method for solving hard up-to-date practical problem

Abstract—Evolutionary Algorithms (EAs) are frequently used to solve various practical problems. It is common to adjust an EA to the solved problem by adding a different kind of problem-dependent mechanisms. One of the possible improvements is an evolutionary method hybridization with local search algorithms. Such hybridization may lead to phenomena called the *Baldwin effect*. It was shown that the occurrence of Baldwin effect helps to preserve population diversity and therefore may be beneficial for the method effectiveness. However, it also has its drawbacks. The use of local search causes the significant increase of computation load necessary for a single individual's fitness computation. Therefore, the hybridization of an evolutionary method does not have to be beneficial. Moreover, the benefits (or drawbacks) of hybridization may be different depending on the method type and the features of the solved problem. Therefore, the main objective of this paper is to investigate the pros and cons of hybridization on the base of a hard practical and up-to-date problem, namely the Routing and Spectrum Allocation of Multicast Flows (RSA/M) in Elastic Optical Networks (EONs). The second objective of this paper is to propose an effective optimization method for solving the RSA/M problem in EONs.

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