

EVOLUTIONARY COMPUTATION FOR DYNAMIC OPTIMIZATION PROBLEMS

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Many real-world optimization problems are subject to dynamic environments, where changes may occur over time regarding optimization objectives, decision variables, and/or constraint conditions. Such dynamic optimization problems (DOPs) are challenging problems due to their nature of difficulty. Yet, they are important problems that researchers and practitioners in decision-making in many domains need to face and solve. Evolutionary computation (EC) encapsulates a class of stochastic optimization methods that mimic principles from natural evolution to solve optimization and search problems. EC methods are good tools to address DOPs due to their inspiration from natural and biological evolution, which has always been subject to changing environments. EC for DOPs has attracted a lot of research effort during the last two decades with some promising results. However, this research area is still quite young and far away from well-understood. This tutorial provides an introduction to the research area of EC for DOPs and carry out an in-depth description of the state-of-the-art of research in the field. The purpose is to (i) provide detailed description and classification of DOP benchmark problems and performance measures; (ii) review current EC approaches and provide detailed explanations on how they work for DOPs; (iii) present current applications in the area of EC for DOPs; (iv) analyse current gaps and challenges in EC for DOPs; and (v) point out future research directions in EC for DOPs.