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Graph-based solution batch management for Multi-Objective Evolutionary Algorithms

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Abstract

In Alberto and Mateo [2], 2004, a graph-based structure used for manipulating populations of Multi-Objective Evolutionary Algorithms in a more efficient way than the structures existing at that point was defined. In this paper, an improvement of such tool is presented. It consists of the simultaneous insertion of a set of solutions (solution batch), instead of a single one, into the created graph structure. Furthermore, two experiments devoted to comparing the behavior of the new algorithms with the original version from Alberto and Mateo [2] and with a well-known non-dominated sorting algorithm are carried out. The first shows how the new version outperforms the original one in time and number of Pareto comparisons. The second experiment shows a reduction in the time needed in all the cases and an important reduction in the number of Pareto comparisons when inserting chains of dominated solutions. From these experiments it is verified that, in general, the new proposals save computational time and, in the majority of the cases, the number of Pareto comparisons carried out for the insertion. In addition, when the new proposals outperform the others, they increase their gain over them as the size of the population and/or the size of the batch increases. The new tool can also be used, for example, in parallel genetic algorithms such as the ones based on islands, to carry out the migrations of the

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