An incremental Non-Dominated Sorting framework based on Irreducible Domination Graphs

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SUMMARY

Non-Dominated Sorting process, NDS, plays an important role in Pareto based Evolutionary Multi-Objective Optimization Algorithms and it is one of the most time consuming tasks, mainly when steady-state Evolutionary Algorithms are considered. In this work we present a general framework to carry out the NDS process and three implementations based on a modification of the Irreducible Domination Graph structure, IDG, presented in Alberto and Mateo (2004) [1] for accomplishing this task.

Our algorithms are benchmarked against other NDS algorithms focused on incremental updating of Pareto layers ([2], [3], [4]). The experiments accomplished show that the implementation of the proposed algorithms reduce, in general, the number of Pareto comparisons as well as the time needed when compared with the competitors.

Keywords: Non-dominated Sorting, Multi-objective Optimization, Graphs

AMS Classification: 90-08,68W50, 90C29

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