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Solving Multi Objective Problems with Single Objective Solver

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Abstract: The main difference between multi-objective optimization and single-objective optimization is that the first one has more than one target function. The single-objective solver provides a single result value when multi-objective problems have a full set of optimal values, called the Pareto set. One very common approach for solving multi-objective problems is by transforming the multi objectives into a single objective. The simplest transformation is through an additive model, where a weighting factor is given on each objective. This research proposes a calculation procedure by which the LibreOffice Calc NLP Solver is used to generate solutions in the Pareto subset for multi-objective problems.

Keywords:multi-objective optimization, single-objective optimization, LibreOffice Calc NLP Solver

# 1. Introduction

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The rest of this paper is organized as follows: Section 1 introduces the problem with searching for Pareto optimal solutions; Section 2 describes the way in which a single-objective solver can be used for multi-objective problems; Section 3 reveals some practical experiments and related results; and Section 4 concludes with some suggestions for further work.

# 2. LibreOffice Calc NLP Solver

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# 3. Searching Pareto Points for Binh and Korn Function

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# **4**. Conclusion

This research examines the capabilities of a single-objective solver to be applied to multi-objective problems. By giving random weights for the objectives, various solutions are provided close to the Pareto front. The stochastic nature of the solver does not allow the proposed solutions to be on the front itself, and they are positioned close to it. From a mathematical point of view, this is not acceptable, but in real practice, even decent solutions are preferable in the absence of any solutions.

The application of random coefficients does not always give a good distribution of the points around the Pareto front. It would be interesting to apply some strategy for a wider study of the possible values for the coefficients. Although it is possible to change the coefficients manually, some form of automation would significantly speed up the process of finding an acceptable solution.

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