

# Desirability functions in multicriteria optimization

## Observations made while implementing `desiRe`

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Desirability functions and desirability indices are powerful tools for multicriteria optimization und multicriteria quality control purposes. The package `desiRe` not only provides functions for computing desirability functions of Harrington- (Harrington, 1965) and Derringer/Suich-type (Derringer and Suich, 1980) but also allows the specification of functions in an interactive manner. Density and distribution functions of the desirability functions and the desirability index are integrated including the possibility of random number generation (Steuer, 2005), (Trautmann and Weihs, 2006). Optimization procedures for the desirability index and a method for determining the uncertainty of the optimum influence factor levels (Trautmann and Weihs, 2004) as wells as a control chart for the desirability index with analysis of out-of control-signals are implemented (Trautmann, 2004). The Desirability Pareto-Concept allows focussing on relevant parts of the Pareto-front by integrating a-priori-expert-knowledge in the multicriteria optimization process (Mehnen et al., 2007).

We will focus on the implementation of the Desirability Pareto-Concept in R. First we will give a short review of the traditional optimization strategy using desirability indices. Then, after showcasing NSGA-II (Deb et al., 2002), we will briefly talk about how desirability functions can be integrated into optimization procedures that estimate the pareto front. Finally some of the problems faced during the development will be discussed. These include interfacing R and C code and using functions as first class objects.

In addition a short overview of the package will be given.

## References

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