Kai-Simon Goetzmann (Autor)

The Power of Compromise

Reference Point Methods and Approximation in Multicriteria Optimization

Kai-Simon Goetzmann

The Power of Compromise

Reference Point Methods and Approximation in Multicriteria Optimization

Cuvillier Verlag Göttingen
Internationaler wissenschaftlicher Fachverlag

https://cuvillier.de/de/shop/publications/6511

Copyright:
Cuvillier Verlag, Inhaberin Annette Jentzsch-Cuvillier, Nonnenstieg 8, 37075 Göttingen, Germany
Telefon: +49 (0)551 54724-0, E-Mail: info@cuvillier.de, Website: https://cuvillier.de

Contents

1 Introduction **7**

1.1 Motivation 7
1.2 Our contribution 11
1.3 Preliminaries 13
1.4 The state of the art 19
1.5 Related concepts 24

I Theory **33**

2 Equivalence of approximability **35**

2.1 Reference point solutions and the Pareto set 36
2.2 From Pareto sets to reference point solutions 39
2.3 From reference point solutions to Pareto sets 41

3 Algorithms **45**

3.1 Approximation by weighted sum 45
3.2 Convex optimization with linear objectives 46
3.3 Approximation through LP rounding 48
3.4 From pseudopolynomial algorithms to approximation 49
3.5 Enumeration techniques 54
3.6 Weighted disjoint hitting set 57

4 Maximization problems **65**

4.1 Equivalence of approximability 66
4.2 Algorithms 70

5 Arbitrary reference points **75**

5.1 Equivalence of approximability 77

Dieses Werk ist copyrightgeschützt und darf in keiner Form vervielfältigt werden noch an Dritte weitergegeben werden.
Es gilt nur für den persönlichen Gebrauch.

II Practice **83**

6 Synthetic sustainability indicators **85**
6.1 The double reference point method 88
6.2 Special types of objectives 92
6.3 Determination of the parameters 93
6.4 Critique 96

7 Evaluating genetic algorithms **99**
7.1 Algorithms 101
7.2 Performance indicators 105
7.3 Test problems 107
7.4 A comparative study 108
7.5 Critique 122

8 Conclusion **125**

A More proofs on approximability **127**
A.1 From the p-norms to the maximum-norm 127
A.2 Results from Section 2.3 for p-norms 129
A.3 Results from Section 3.1 for p-norms 131
A.4 Results from Section 4.1 for p-norms 132

B Computing the ε-indicator **135**

Bibliography **138**

Nomenclature **151**

Dieses Werk ist copyrightgeschützt und darf in keiner Form vervielfältigt werden noch an Dritte weitergegeben werden.
Es gilt nur für den persönlichen Gebrauch.