



Universiteit
Leiden

The Netherlands

Sampling strategies in automated algorithm configuration

Anastacio, M.I.A.

Citation

Anastacio, M. I. A. (2026, June 23). *Sampling strategies in automated algorithm configuration*. Retrieved from <https://hdl.handle.net/1887/4307419>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/4307419>

Note: To cite this publication please use the final published version (if applicable).

Sampling Strategies in Automated Algorithm Configuration

Proefschrift

ter verkrijging van
de graad van doctor aan de Universiteit Leiden,
op gezag van rector magnificus prof.dr. S. de Rijcke,
volgens besluit van het college voor promoties
te verdedigen op dinsdag 23 juni 2026
klokke 10:00 uur

door

Marie Inès Adélaïde Anastacio
geboren te Frankrijk
in 1989

Promotores: Prof. Dr. H.H. Hoos
 Prof. Dr. T.H.W. Bäck

Promotiecomissie:

Prof. Dr. K.J. Batenburg	
Prof. Dr. M.M. Bonsangue	
Dr. C. Doerr	CNRS, Sorbonne Université (France)
Prof. Dr. M. Lindauer	Leibniz University Hannover (Germany)
Dr. E. Raponi	

Contents

Summary	vii
Samenvatting	ix
List of Figures	xiii
List of Tables	xv
List of Algorithms	xvii
List of Symbols	xix
1 Introduction	1
1.1 Background	2
1.2 Outline and research questions	3
1.3 Publications based on material in this thesis	4
1.4 Other work published by the author	6
2 Automated Algorithm Configuration	9
2.1 Algorithm configuration problem	10
2.1.1 Problem definition	10
2.1.2 Challenges	10
2.2 Configuration approaches	12
2.2.1 Scope	12
2.2.2 Details on prominent AAC procedures	13
2.3 Configuration scenarios	20
2.3.1 Benchmark instance sets	20
2.3.2 Target algorithms	23

2.3.3	Scenarios	24
2.4	Conclusion	27
3	Critical Assessment of the State of the Art in AAC	29
3.1	Background	30
3.2	Evaluating the state of the art	30
3.2.1	Evaluation protocol	31
3.2.2	Configurators specificities	32
3.2.3	Normalised score	34
3.2.4	Implementation details	34
3.3	Evaluation results	35
3.3.1	Overall performance	35
3.3.2	Comparative analysis	37
3.3.3	Overtuning analysis	41
3.3.4	Scenario features analysis	41
3.4	Conclusion	44
4	Default Value	47
4.1	Introduction	48
4.1.1	Background	48
4.1.2	Related work	49
4.1.3	Research questions	49
4.2	Protocol of experiments	50
4.3	Impact of the default	52
4.4	Reduction of the search space	53
4.4.1	Reduction methods	54
4.4.2	Results	56
4.5	Probabilistic sampling	61
4.5.1	Extension with probabilistic sampling	61
4.5.2	Results	63
4.6	Conclusion	66
5	Sampling instances to compare the performance of algorithms	69
5.1	Introduction	71
5.1.1	Background	71
5.1.2	Research question	73
5.2	Model-free instance selection	73

5.3	Methods	74
5.3.1	The discrimination component	76
5.3.2	The instance selection component	78
5.4	Setup of experiments	81
5.4.1	Datasets	81
5.4.2	Implementation details	83
5.4.3	Estimation of the running time distribution	83
5.5	Experiments	85
5.6	Conclusions and future work	90
6	Instance selection within AAC	93
6.1	Introduction	95
6.1.1	Background	96
6.1.2	Research questions	96
6.2	Comparison of two configurations	98
6.2.1	Instance selection	98
6.2.2	Stopping criterion	102
6.3	Setup of experiments	102
6.3.1	Datasets	103
6.3.2	Implementation details	104
6.3.3	Execution environment	106
6.4	Evaluation outside the configuration process	106
6.4.1	Compare configurations on known instances	107
6.4.2	Compare configurations on unknown instances	109
6.4.3	Discussion	111
6.5	Evaluation inside the configuration process	111
6.5.1	Impact of the instance selection methods	112
6.5.2	Impact of the statistical test	112
6.5.3	Discussion	114
6.6	Conclusion	115
7	Conclusions	117
7.1	The work achieved so far	117
7.2	Future work	119
7.3	Final word	121
	Bibliography	123

Contents

Acknowledgements	137
Curriculum Vitae	139