

Optimization in Architecture

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Thesis to obtain the Master of Science Degree in
Information Systems and Computer Engineering

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Publications

The development of this thesis resulted in several scientific contributions exploring different perspectives of optimization problems:

1. Caetano, I., Ilunga, G., **Belém, C.**, Aguiar, R., Feist, S., Bastos, F., and Leitão, A. (2018). Case Studies on the Integration of Algorithmic Design Processes in Traditional Design Workflows. Proceedings of the 23rd International Conference of the Association for CAADRIA, 1(Giedion 1941), 111–120.
2. **Belém, C.**, and Leitão, A. (2018). From Design to Optimized Design An algorithmic-based approach. Proceedings of the 36th eCAADe Conference - Volume 2, Lodz University of Technology, Poland, 549-558

Abstract

Keywords

Algorithmic Design; Black-Box Optimization; Machine Learning; Surrogate-based Modelling.

Resumo

Palavras Chave

Design Algorítmico; Otimização de caixa-preta; Modelos baseados em aproximações; Aprendizagem Máquina.

Contents

1	Introduction	1
1.1	From design to Optimized design	3
1.1.1	Building Performance Simulation	3
1.1.2	Algorithmic Design	3
1.1.3	Algorithmic Analysis	3
1.1.4	Architectural Optimization Workflow	3
1.2	Goals	3
1.3	Organization of the Document	3
2	Background	5
2.1	Single-Objective Optimization	7
2.1.1	Derivative-Free Optimization	7
2.1.2	Galapagos	7
2.1.3	Goat	7
2.2	Multi-Objective Optimization	7
2.2.1	Experimentation-based Approach	8
2.2.2	A priori Preferences Articulation Approach	8
2.2.3	Pareto-Based Approach	8
2.2.4	Performance Assessment of Multi-Objective Optimizers	8
2.2.4.A	Octopus	8
2.2.4.B	Opossum	8
2.2.4.C	Optimo	8
3	Solution	9
3.1	Architecture Overview	11
3.2	Architecture Design Requirements	11
3.2.1	Problem Modelling	11
3.2.2	Simple Solver	11
3.2.3	Meta Solver	11

3.3	Architecture Design Implementation	11
3.3.1	Problem Modelling	11
3.3.2	Simple Solver	11
3.3.3	Meta Solver	11
4	Evaluation	13
4.1	Qualitative Evaluation	15
4.2	Examples of Applications	15
4.2.1	Ericeira House: Solarium	15
4.2.2	Black Pavilion: Arts Exhibit	15
4.3	Development Process	15
4.4	Development Environment	15
4.5	Client Application	15
4.5.1	User Interface	15
5	Conclusion	17
5.1	Conclusions	19
5.2	System Limitations and Future Work	19
5.2.1	Optimization Algorithms	19

List of Figures

List of Tables

List of Algorithms

Listings

Acronyms

1

Introduction

Contents

1.1	From design to Optimized design	3
1.2	Goals	3
1.3	Organization of the Document	3

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1.1 From design to Optimized design

1.1.1 Building Performance Simulation

1.1.2 Algorithmic Design

1.1.3 Algorithmic Analysis

1.1.4 Architectural Optimization Workflow

1.2 Goals

1.3 Organization of the Document

This thesis is organized as follows: Chapter 1 interdum vel, tristique ac, condimentum non, tellus. In chapter 2 curabitur nulla purus, feugiat id, elementum in, lobortis quis, pede. In chapter 3 consequat ligula nec tortor. Integer eget sem. Ut vitae enim eu est vehicula gravida. Chapter 4 morbi egestas, urna non consequat tempus, nunc arcu mollis enim, eu aliquam erat nulla non nibh in ???. Chapter 5 suspendisse dolor nisl, ultrices at, eleifend vel, consequat at, dolor.

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2

Background

Contents

2.1	Single-Objective Optimization	7
2.2	Multi-Objective Optimization	7

Vivamus auctor leo vel dui. Aliquam erat volutpat. Phasellus nibh. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Cras tempor. Morbi egestas, urna non consequat tempus, nunc arcu mollis enim, eu aliquam erat nulla non nibh. Duis consectetur malesuada velit. Nam ante nulla, interdum vel, tristique ac, condimentum non, tellus. Proin ornare feugiat nisl. Suspendisse dolor nisl, ultrices at, eleifend vel, consequat at, dolor.

2.1 Single-Objective Optimization

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2.1.1 Derivative-Free Optimization

2.1.2 Galapagos

2.1.3 Goat

2.2 Multi-Objective Optimization

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2.2.1 Experimentation-based Approach

2.2.2 A priori Preferences Articulation Approach

2.2.3 Pareto-Based Approach

2.2.4 Performance Assessment of Multi-Objective Optimizers

2.2.4.A Octopus

2.2.4.B Opossum

2.2.4.C Optimo

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3

Solution

Contents

3.1	Architecture Overview	11
3.2	Architecture Design Requirements	11
3.3	Architecture Design Implementation	11

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3.1 Architecture Overview

3.2 Architecture Design Requirements

3.2.1 Problem Modelling

3.2.2 Simple Solver

3.2.3 Meta Solver

3.3 Architecture Design Implementation

3.3.1 Problem Modelling

3.3.2 Simple Solver

3.3.3 Meta Solver

4

Evaluation

Contents

4.1	Qualitative Evaluation	15
4.2	Examples of Applications	15
4.3	Development Process	15
4.4	Development Environment	15
4.5	Client Application	15

- Relembrar o objectivo do trabalho e dizer como o vamos avaliar de um modo geral introduzindo os proximos subcapitulos.

4.1 Qualitative Evaluation

- Number and Heterogeneity of Available algorithms - Differences / Benefits / Disadvantages when compared to Grasshopper's frameworks

4.2 Examples of Applications

- Dizer que de um modo geral começámos de forma incremental por considerar problemas single-objective, nomeadamente a casa da ericeira, que remonta a primeira publicação. Depois evoluimos para a avaliação bi-objetivo de dois casos de estudo reais - Pavilhão Preto para exposições e de uma arc-shaped space frame.

4.2.1 Ericeira House: Solarium

4.2.2 Black Pavilion: Arts Exhibit

4.3 Development Process

4.4 Development Environment

4.5 Client Application

4.5.1 User Interface

5

Conclusion

Contents

5.1	Conclusions	19
5.2	System Limitations and Future Work	19

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Rui Cruz
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with an in-
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text

5.1 Conclusions

5.2 System Limitations and Future Work

5.2.1 Optimization Algorithms

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