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

Resumo

Palavras Chave

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

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Introduction

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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

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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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Solution

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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

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- 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

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Conclusion

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Rui Cruz You should always start a Chapter with an introductory text

5.1 Conclusions

5.2 System Limitations and Future Work

5.2.1 Optimization Algorithms

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