

pursuit and evasion

Ph.D. kandidatarbete

by

Felix Blumenberg

870605-0633

Fredrik Bberg

880312-0511

Mats Malmberg

860802-0338

under the guidance of

Doctoral Student Johan Thunberg

and

Professor, Ph. D Xiaoming Hu

Department of mathematic optimization
Royal Institute of Technology KTH, Sweden
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Abstract

Abstract in ENGLISH

Sammanfattning

Abstract på SVENSKA

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Chapter 1

Introduction

Giving a general overview of the report.

1.1 Organization Of the Report

- Chapter 2 explains the simulation environment we built.
- Chapter 3 contains a description of the algorithms we decided to use.
- Chapter 4 contains the results of our simulations.
- Chapter 5 contains a discussion of our results, comparison and conclusions.

1.2 Background

The objective of this section is to give a short theoretical background of optimization.

1.2.1 What is optimization

What is optimization?

What is an optimal solution?

Non-optimal solutions?

Good solutions and computational time?

1.2.2 (the need for) a near optimal solution

Giving a very short background for the following section.

1.2.3 P & NP problems

explain what P and NP-hard problems is, and what consequences it yields.

1.2.4 Heuristic methods

Explanation of what heuristic methods is, and how one sacrifices optimality for gain in computational time.

1.3 Problem formulation

The essentials of our problem formulation today is "To test implementation of greedy approach, tabu search and genetic programming and evaluation." The exact formulation is in progress...

1.3.1 Approach

A description of our approach to the problem. Describing the overview of our approach. Mentioning the creation of an testing enviroment, choice and application of heuristics and target data to evaluate the effectiveness.

Chapter 2

Environment

In order to attain the data needed for a comparison of our different algorithms it was necessary to construct a good testing environment. We decided to create this environment by the use of two separate parts. One part is called the "Map generator". This part creates a map of the environment, tests the feasibility and prints feasible environments into an output file. The other part is called the "Network generator". This part reads in an environment from a file, creates a graph network to the corresponding map and gives each node in the network its relevant information.

assumptions made: we do not lose generality by only constructing convex environments. this is in line with the assumptions made in the paper boolean control (referens till artikel)

2.1 Map generator

-we demand that each map is connected.

we demand that each region is convex

the model can easily be expanded to non square regions for further work.

mention distribution of the function `rand()`, and how it distributes the obstacles.

describe indata/outdata

pseudo kring hur programmet körs The environment generator has length, width and number of obstacles as input. By construction each subarea is convex. The generator also tests for the total area to be connected, which guarantees a feasible environment.

Every environment created can be considered to be built of squares. This results in that diagonal edges will not be created, but since a diagonal can be created by a line of obstacles if the resolution is high enough, that should not be a loss of generality.

2.2 Node network

Our node-network generator takes a matrix as input and generates a graph network, which is to be used by our algorithms.

The array can either be generated, se previous section, or hand-made.

Chapter 3

Methods

A Description of the methods and algorithms we have used.

3.1 Greedy

Greedy

3.1.1 Description

A description of what Greedy is

3.1.2 Algorithm

A description of the algorithm

3.1.3 Implementation

A description of how the algorithm is implemented

3.1.4 Development process

How the development of the algorithm have proceeded.

3.2 Tabu

Tabu

3.2.1 Description

A description of what Tabu is

3.2.2 Algorithm

A description of the algorithm

3.2.3 Implementation

A description of how the algorithm is implemented

3.2.4 Development process

How the development of the algorithm have proceeded.

3.3 Genetic

3.3.1 Description

Genetic algorithms is based on the idea of evolution. Using a combination of reproduction, mutation and survival of the fittest a solution is generated.

3.3.2 Algorithm

A description of the algorithm

3.3.3 Implementation

A description of how the algorithm is implemented

3.3.4 Development process

How the development of the algorithm have proceeded.

Chapter 4

Results

Statistics, tables and a description of the tables. Also why we have chosen these tables etc.

Results for MILP evaluation could also be added here.

Chapter 5

Discussion

This chapter contains analysis of each algorithm, why it did or did not work, how it compares to the other algorithms and a conclusion. The main purpose is to present conclusions from the data presented in the previous chapter.

5.1 Analysis

An analysis of each algorithm, evaluation of why it did or did not work.

5.2 Comparsion and statistics

A comparsion between the algorithms, and perhaps also with MILP.

5.3 Conclusion

A conclusion of our work.

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