pursuit and evasion

Ph.D. kandidatarbete

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Abstract

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Sammanfattning

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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 consequenses 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

The chapter gives a description of the simulation environment we have created. Presenting how we created it, why we needed to create it and motivation of the choices made.

First we give an short overview of the parts that are in the enviroment, and a definition of in/out data. Motivating all our choices made concerning limitations in the enviroment, and also describing positive features of our enviroment.

2.1 Generator

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

Discusion

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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