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Optimizing bus routes using AI-methods

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Abstract

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Chapter 1

Introduction

AtB is responsible for planning, ordering and marketing public transport throughout Sør-Trøndelag county.

1.1 Motivation

- Why do we want to do this?
- What makes this interesting?

AtB goes with deficit. AtB går med underskudd.

A known problem is rush traffic (takes time to get to work, and not good for the environemt - global warming etc). Reducing traffic demands helps reduce traffic jams and gasoline consumptiion, thereby alleviating the air pollution problems (fra Path-Planning Alforithms for Public Transportation Systems) To reduse traffic demands with making more users take public transport, the users must be satisfied.

- Full busses makes users less satisfied. The passengers can allow to stand on the bus for a maximum of 15 minutes (AtB surveys).
- The new initiatives they have tried to get more passengers is cost-ineffective (mobile apps etc.)
- New routes has high costs and it takes time for these busses to fill up.

So how can we satisfy more users and in addition to decreasing the costs without decreasing/increasing the number of busses. ==¿ optimize.

The current solution of AtB consist of an experience based route network. There has never been done any analysis and it has never been optimized. Optimalisering = nyhetsverdi.

According to Trondheim kommune (Miljøpakka?) should the increasning number of citizens only allow more buses to be used, and not more cars. Trondheim kommune wants to invest in public transportation and an optimized routes would help them do so.

1.2 Goals and Research Questions

This is the main message to the readers

- Which AI methods is best suited for optimization?
- Which factors play the greatest role, regarding optimalization?
- Does this solution help optimizing the bus routes? (Is this solution better than the existing solution) ...

1.3 Report Overview

- What does this thesis contain
- Give results in a general way

Chapter 2

Related Work

Social insect colonies, such as ant or bee colonies, have shown that simple organisms can perform complex tasks by interacting with each other. These colonies are highly distributed and self-organized, and they adapts well to changes in the environment. Swarm intelligence (Beni and Wang, 1989) is a branch of artificial intelligence that tries to adapt the characteristics of these social insects in intelligent computer systems. Swarm intelligence-methods have proven to optimize highly complex optimization problems such as the Traveling Salesman Problem (TSP).

Chapter 3

The Model

This is the main structure of what you built. - Not at code level, but you can include pseudocode. Explain the system in a way the reader understands it. Include diagrams and the algorithms used.

Chapter 4

Results

4.1 Statistical Results

4.2 Individual Runs Results

Chapter 5

Analysis

In this section you should explain why you got the results you did.

Chapter 6

Discussion

Low level answers to the results. Discuss what you managed, and why you had sucess / not success. Show that you understand.

6.1 Future Work

Bibliography

Beni and Wang (1989). Swarm intelligence. *Proceedings of the Seventh Annual Meeting of the Robotics Society of Japan*, page 425–428.