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# Optimizing bus routes using AI-methods

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# Abstract

# Acknowledgements

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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?

A known problem is rush traffic (takes time to get to work, and not good for the environment - global warming etc). Reducing traffic demands helps reduce traffic jams and gasoline consumption, thereby alleviating the air pollution problems (from Path-Planning Algorithms for Public Transportation Systems). To reduce 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.  $\Rightarrow$  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 (Miljøpakke?) should the increasing 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.

AtB goes with deficit. AtB går med underskudd. However, deficit in this context is not negative. The price of one customer is more than it costs to transport them. So more deficit equals more customers taking public transport. But the new initiatives AtB have tried to get more customers is cost-ineffective. That's why optimization of the routes could be cost-effective blabla

## 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 optimization?
- 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

## 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 success / not success. Show that you understand.

### 6.1 Future Work

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