

Project Report  
IT3708 Sub-symbolic AI methods  
Project 2

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### **Abstract**

This is the report for the second project in the course IT3708. The purpose of the assignment is to:

*Gain experience with a variety of EA representations and genetic operators for solving the same general problem in different ways.*

We feel that we have learned a lot more about EA algorithms from this assignment by solving the challenges we faced as we worked with improving our code to solve the Travling Salesman Problem.

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# Chapter 1

## Introduction

### 1.1 Assignment

The assignment was to enhance the code from the previous assignment, making it capable of solving the Traveling Salesman Problem. We were to use these three different representations, quoted from the assignment:

1. A direct encoding of the tour as a permutation of integers. Goldberg's Partially-Mapped Crossover (PMX) should be used for recombination, while simple integer swaps suffice for mutation.
2. An indirect encoding wherein a bit-vector genotype is converted into a list of integers  $(i_1, i_2, \dots)$ , where  $i_k = m$  implies that the  $k$ th city in the tour should be the  $m$ th city in the list of remaining cities. Here,
3. Another direct encoding as integers, but in this case, use Whitley et. al's Edge Recombination Operator (ERO) during crossover.

## Chapter 2

# Code Description

### 2.1 Goldberg's PMX

Write about our implementation of Goldberg's Partially-Mapped Crossover genotype-phenotype representation here.

### 2.2 Indirect Encoding

Write about our implementation of the indirect bit-vector genotype representation here.

### 2.3 Edge Recombination Operator

Write about our implementation of Whitley et. al's Edge Recombination Operator representation here.

## 2.4 Flow Chart

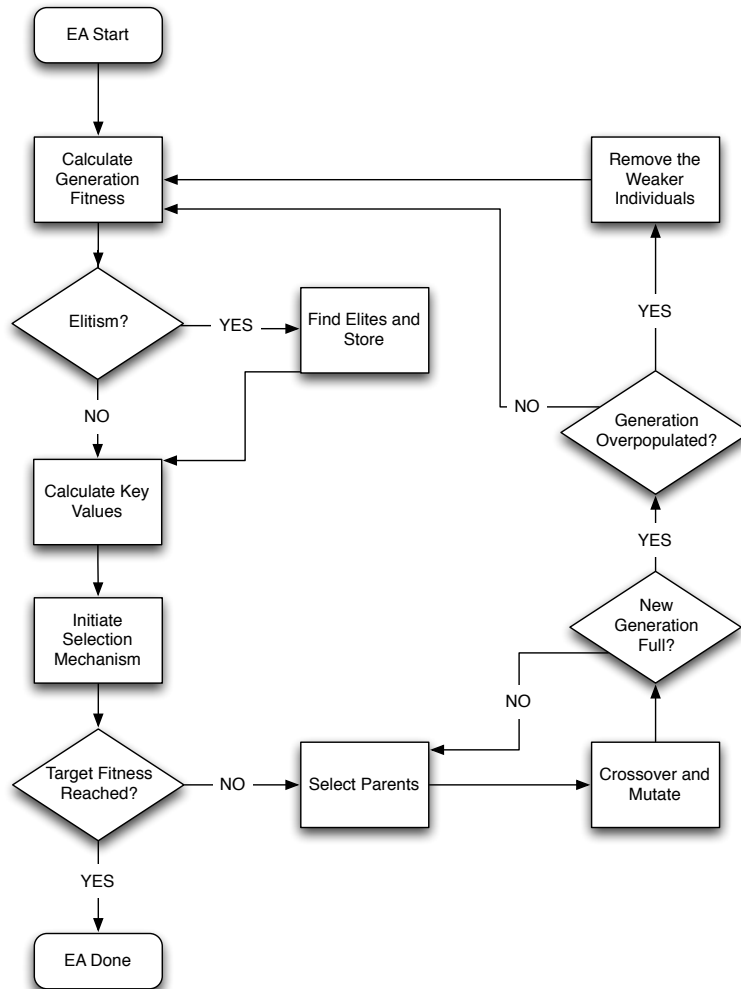


Figure 2.1: Program Flow Chart. Unchanged from Assignment 1.

## Chapter 3

# Fitness Plots

## Chapter 4

## Conclusion