Assignment 1 Report

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1 Introduction

This report covers the technical specification of both Iterated Local Search and Simulated Annealing in solving the Traveling Salesman Problem. It also holds some research results.

2 Technical Specification

2.1 Iterated Local Search

Iterated Local Search starts with an initial solution, which can be generated by a for loop adding the points in order. The algorithm then enters a loop where it perturbs the solution by swapping two random campuses and then applies a local search by swapping two consecutive campuses on a solution. The old and new solution is now compared and the best one is set to the current solution. This loop goes through 1000 iterations.

2.2 Simulated Annealing

Simulated Annealing also starts with the initial solution as Iterated Local Search. The temperature and cool down rate is 0.95 and 0.01 respectively. The algorithm picks a random neighbour solution and decides whether to move to it based on a probability, and a parameter called t that decreases over time by being multiplied by a. If the neighbour solution is better, the move is always accepted. If the neighbour solution is worse, the move is accepted with a certain probability.The process is repeated until t is less than 0.

3 Results

Problem Set	ILS	SA
Best Solution(route)	0-1-2-3-4	0-1-2-3-4
Objective Function Val	81	81
Runtime	0.076s	0.069s
Av Obj Func	81	81

Table 1: Results

4 Graphical Plot

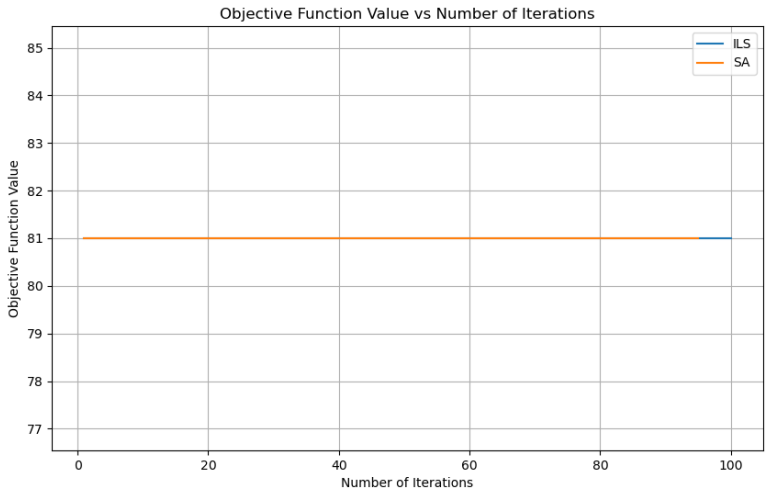

Figure 1: Objective value vs No of iterations

5 Conclusion

In this report, we compared the performance of Iterated Local Search (ILS) and Simulated Annealing (SA) in solving the University of Pretoria campus routing problem. Both algorithms consistently found the optimal solution with a total distance of 81 units. The overall results were very similar, demonstrating the effectiveness of both algorithms in solving this problem.