A COMPARATIVE ANALYSIS OF INTEGER LINEAR PROGRAMMING AND ANT COLONY OPTIMIZATION IN TRAVELLING SALESMAN PROBLEM FOR TOURIST DESTINATIONS IN TERENGGANU

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ABSTRACT

Tourism is a significant industry for regional economies. For travellers to fully experience a destination's attractions, effective route planning is essential. The task of maximizing visitor experiences while minimizing travel lengths is known as the Travelling Salesman Problem (TSP). To address the TSP for tourist attractions in Terengganu, Malaysia, this study compares two optimization methods which are Integer Linear Programming (ILP) and Ant Colony Optimization (ACO). Using ILP, the study creates a precise mathematical model for TSP that minimizes the overall distance travelled to find the best route. Parallel to this, pheromone trails and heuristic information are used to repeatedly build pathways using ACO, inspired by ants' foraging activity. The project assesses the two methods by considering scalability, computing efficiency, and quality of the solutions. To model realistic situations, real-world data on tourist sites in Terengganu is used. The ILP and ACO are put into practice and adjusted to consider the distinct features of the local tourism environment. Thorough analysis is done on performance measures, such as total travelled distance, efficiency nodes covered, optimality ratio, and computational time. The preliminary findings provide insight into how well they might be used to actual TSP cases. This comparative analysis makes a significant contribution to the larger fields of optimization and tourism management.

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