

## ABSTRACT

Traveling has become an essential need for people to fulfill their psychological needs. Generally, tourists want to visit a new destination for several days. To get route guidance (visiting schedule), tourists usually use the services of a travel agent, but this service cannot be tailored to the tourist's wishes. In previous research, many have concluded that one-day tourist route and multi-day tourist routes was analogous to the Traveling Salesman Problem (TSP). However, this study has yet to emphasize daily optimization for multi-day routes because daily routes are only cut based on time constraints. One possible approach to optimize tourist routes per day is the analogy of solving Vehicle Routing Problem (VRP). Therefore, in this research, we propose a new model that combines the Whale Optimization Algorithm (WOA) with a Variable Neighborhood Search (VNS) strategy known as WOA-VNS to recommend multi-day tourist routes, which is analogous to the VRP to overcome deficiencies with the TSP analogy. The number of vehicles corresponds to the number of days tourists visit, thus ensuring optimal daily routes. The system considers user preferences for popularity, ratings, and time using the concept of Multi-Attribute Utility Theory (MAUT). The MAUT value are used as fitness values. Five metrics (fitness value, number of Point of Interest (POI)s, trip duration, cost, and rating attributes) were tested on several test scenarios. The WOA-VNS-VRP shows the best performance with the highest average fitness value (0.6221), the highest average number of POIs included (21,18), the highest average rating (4.5519), the lowest total cost (82430 IDR), and the shortest trip duration (8.5488 days). The Wilcoxon Rank-Sum statistical test supports these results by showing statistically significant differences between the corresponding WOA-VNS-VRP and conventional algorithms.

**Keywords:** recommender system, multi-day tourist routes, vehicle routing problem, whale optimization algorithm, variable neighborhood search strategy