Data Scientist Task: Capacitated Vehicle Routing Problem Optimization

Task Description

As a Data Scientist, your task is to optimize vehicle routes for a logistics company. The goal is to minimize the total distance traveled while ensuring that all customers are served and vehicle capacity constraints are met. You will find two datasets that contain vehicle and customer data here.

Dataset 1: `vehicle_info.csv`

This dataset includes the following columns, representing various attributes related to vehicles:

- **vehicle_type**: Type of vehicle.
- **capacity**: The maximum capacity for each vehicle type.
- **number_of_vehicles**: The total number of available vehicles.

Dataset 2: `customer_info.csv`

This dataset includes the following columns, representing various attributes related to customers with the exception of the first row which corresponds to the depot information:

- **order_id**: Unique identifier for each order.
- **customer_id**: Unique identifier for each customer.
- **latitude** and **longitude**: Latitude and longitude representing each customer's geographic location.
- **demand**: Each customer's demand.

Responsibilities

Your responsibilities will include:

1. **Solution Development**: Design and develop a solution to the CVRP.
2. **Performance Evaluation**: Evaluate the performance of your solution using metrics such as total distance traveled, number of vehicles used, and computational time.
3. **Visualization**: Create a visualization of the best solution with its boundaries to illustrate the results.
4. **Documentation**: Document your approach, results, and any challenges you faced during the implementation.

Deliverables

- A Jupyter notebook or Python script implementing the CVRP solution, covering the data science lifecycle. Instructions on how to install code dependencies.
- Documentation.
- Recommendations for further improvements.

We are excited to see your solutions. Good luck!

*You have received this package as part of the recruitment process for OptimeAI. The contents of this exercise are confidential; please do not distribute.