Time-Dependent Vehicle Routing for Fleets

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Motivation

- Introduction: Vehicle Routing Problem
  - Calculate route based on historical traffic pattern
  - Find the best start time of delivery

Functionalities

- Time-Dependent Vehicle Routing
  + Calculate route based on historical traffic pattern
  + Find the best start time of delivery

- Time-Dependent Window Vehicle Routing
  + Decision making and economical routing
  + Decide the appropriate time-window for delivery
  + Decide the least number of vehicles for delivery

- Algorithms
  + Nearest Neighbor Heuristics
  + Sweep Algorithms

System Architecture

- Integration of Oracle Network Data Model (NDM)
- Populate the LA road network and TD patterns into Oracle database
- Using JAVA API for network analysis (shortest paths, TSP)
- Develop VRP Algorithms upon their NDM Model

Running Examples

- Time-Dependent Vehicle Routing
  + Given specific start time and delivery points, find routes for vehicles
  + Indicate optional better route with different start time

- Time-Dependent Window Vehicle Routing
  + Decide the least number of vehicles needed for delivery
  + Decide whether the time window is enough for delivery

Conclusion and Future Work

- Developed efficient and accurate algorithms for VRP problems by taking historical and real-time traffic information
- Consider more practical constraints such as customer’s priority
- Design better heuristic for real-time update