



PROBLEM STATEMENT

Title: Resource Optimization and Recommendation System for Electrical Utility Service

The hackathon's main objective is to create an optimization model for technician routing and task scheduling for electrical utility service dispatch operations using AI, Machine Learning, and Data Science techniques.

Design the best possible approach for allocating the electrical technicians to the electrical service assignments. Let's say there are 41648 service/job locations and 10412 technicians. The technicians will be allocated to the specific dispatch centres (190 centres) which will determine the starting point for the technicians at the beginning of the day. The technician shall be assigned to the service locations based on the demands of the geographical area surrounding the dispatch centres. The technicians must be optimally assigned to the service location so that the total cost of operation is minimised in terms of travel time and distance, while also taking into account the constraints such as customer's preferred hours, the hourly wage, technician's skills etc (see below the complete list of hard and soft constraints). The objective is to maximize the job assignments at the lowest cost. Extra credit will be awarded for addressing the problem of reassigning the technician to other dispatch centres in order to meet the demand.

Hard constraints

- The technician should arrive and complete the job within the preferred hour of customer
- A technician's daily work schedule is nine hours. Over time Service shall not exceed 3 hours
 - Pay will 50% more on labour cost
- Technician must start from the assigned depot and return back to the same depot by end of the day
- Skill set of Technician must match the job's skill set

Soft constraints

- Technician can be reallocated based on the demand of overdue Jobs
- Technician travel distance shall not exceed 100kms
- Technician travel time for one job assignment shall not exceed 2hrs

Evaluation Criteria

- Maximum job assignment 20%
- Distance based ranking will be based on lowest distance per job (total distance travelled by across all jobs divided by number of jobs assigned) 30%
- Cost based ranking will be based on lowest cost per job (total cost divided by total number of jobs assigned) 30%
 - Calculated by a) hourly wages of the technician multiplied by the sum of travel time + Job assignment duration; and b) distance travel by vehicle multiplied by Rs.10
- Low execution time and less memory and CPU usage 20%
- Solutions assigning lesser than 80% jobs will be disqualified