LEVEL UP || 2FM FLEET MANAGEMENT DASHBOARD

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Introduction

The Fleet and Facility Management Department (2FM) manages and maintains over 14,000 pieces of vehicle equipment. The department is currently collecting vast amounts of data describing the performance level of the equipment in their fleet. In order to operate more efficiently, save money, and improve energy efficiency, the department is seeking a real-time system that can easily and robustly monitor the state of their fleet. Our web-application dashboard solution will make use of repair history, vehicle location, and vehicle status to help 2FM make more informed decisions about fleet management as well as make predictions about future repairs in order to optimize department operations.

Strategy

Monitoring the "health" of the fleet

Based on client interviews, we identified that a simple yet robust summary of the status of the fleet is the tool that will have the most immediate impact on decision making for vehicle maintenance and deployment.

The health monitoring pages of our dashboard:

1. Summarize the state of the entire vehicle fleet and spare parts inventory (can be broken down by vehicle category)
2. Provide a more detailed analysis of each vehicle, including performance history
3. Utilize a map application for geospatial analysis of the entire fleet

Predicting the future state of the fleet

Our dashboard expands upon existing statistical models that have been built to predict vehicle repairs. We use open source data streams from the city to augment these models with real-time information about the state of the city. We envision a system that combines information about each vehicle (e.g. mileage, repair history) with information about the places it's been (e.g., concentration of potholes, concentration of road salt) to use machine learning algorithms that can help predict when the vehicle will need to be serviced before it breaks down. In the future, we will be able to adapt our algorithms to make use of emerging data streams from technologies such as the Array of Things.

Implementation

Through our dashboard, managers and supervisors are able to view performance levels in real-time, thus optimizing efficiency and reducing repair and replace costs. The dashboard will compute each vehicle's total costs (repair and replace costs + gas consumption costs) and CO2 emission levels. With this information, managers are given the option of repairing the vehicle or replacing the vehicle entirely. Machine learning algorithms will be able to make sense of statistics on Reliability and Maintainability in Engineering Systems to determine which of the options will save more money in the long run. 2FM will be able to make choices that save money, improve energy efficiency, and perform efficiently.

The implementation of our dashboard includes the following:

Home page

- Amount of vehicles in service vs. out of service, with the option to break down this amount into vehicle types. For example percentage of snow plows in service vs. out of service

Car page (all cars included in list with filtering capabilities)

- Full inventory and status of the car
- Basic info: mileage, average miles per gallon
- "Best by" date: when the car is expected to need repair
- Suggested actions (e.g., inspect, repair, replace) with the associated financial and CO2 impact of each action

Map page

- Visual geospatial representation of the current location of vehicles, with indication of which are in good standing, which need repair, and which are not in service

Critical Items page

- A list of all outstanding items in relation to vehicles including necessary repairs and other urgent problems

Recommendations page

- "Top 10" list: which vehicles need attention ASAP
- Broader fleet-wide recommendations: when categories of vehicles will need particular attention