Seattle Paramedic Deployment Optimization – Enabling Quicker Decisions

Project Title:
Seattle Paramedic Deployment Optimization – Enabling Quicker Decisions

Problem Definition:
At a public town hall, several citizens of Seattle raised concerns over response times for Emergency Medical Services (EMS) without sharing key data to support their claims. Having heard their specific accounts of severe accidents and their overarching concerns, the Mayor and head of EMS would like to understand the circumstances and patterns surrounding prior severe accidents and identify quick-win changes to training guides to better prepare their 911 operators for timely and appropriate EMS responses. As confident as the EMS team was in their current procedures, they were open to the review, because real life cases have proven to deviate from even the best training guides. In their experiences, long conversions with someone who is hysterical or not capable of doing an on-scene assessment delays the appropriate course of action or leads to misguided decisions. Sending services for every accident is cost prohibitive. And, there's not enough time to wait for the police to arrive, assess and then phone in a request. Thus, identifying the key differentiators, in the context of the description of the accident, can aide in guiding the 911 operators' decisions leading to faster deployment, and saving of many lives, without an undue burden of cost. The findings and changes to procedures can then be communicated back to the public in order to restore their full confidence in the EMS department.

Describe the Data:
In order to identify those key differentiators of severe accidents, a robust dataset of incidents is required. It should at foremost identify if there were injuries involved or somehow identify severity. The data set should be robust in time with many years of data but does not necessarily need to enable time series evaluation. There should be categorical features, such as: time of day, road conditions, weather conditions, street location and types of vehicles involved. Ordinal features should also be considered, such as: number of people, vehicles, pedestrians and bicyclists involved.

There shouldn't be a need for hospital outcomes data or insurance adjuster reports to further assess the severity, unless it is not provided in the core data. There's no need for specific geographic location, since the location is already confined to the city of Seattle and would otherwise lead to a sparse model. The analysis also does not need to deep-dive into the accounts reported at the town hall nor personal information of the people involved.

The data collection and feature engineering should allow for a sufficiently accurate and explainable model such that reasonable confidence can be achieved in its outcomes. The outcome of the model is to provide a yes/no answer on whether to send paramedics. The model will not to predict further levels of severity, number of injured people, estimated medical bills or predicted damage costs. Once the desired model is achieved, those key differentiators can be identified for reasonability checks and inclusion in the updated training guides.

As it turns out, the city of Seattle has all the data, with companion metadata, available electronically. There are many years of data, all the features listed above and additional information that may prove valuable.