

Data Science Practicum II: Connected Intersections

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Data Practicum Challenge

Problem/Situation

Transportation impacts everyone in society. The movement of goods, people and services enables mobility towards a chosen destination. The tracking of devices and the information an object sends enables a digital footprint of data to be collected and stored for use. Using data that track movement patterns promote safety and efficiency on roads. Traffic signal prioritization may lead to a variety of use cases including but not limited to; (1) extending the green light phase to allow transit vehicles to travel freely through intersections, (2) providing an early green light phase to allow transit vehicles to spend less time idling at an intersection and (3) dedicating bypass lanes, also known as high occupancy vehicle (HOV) lanes, or queue jump lanes for buses.

Research Question

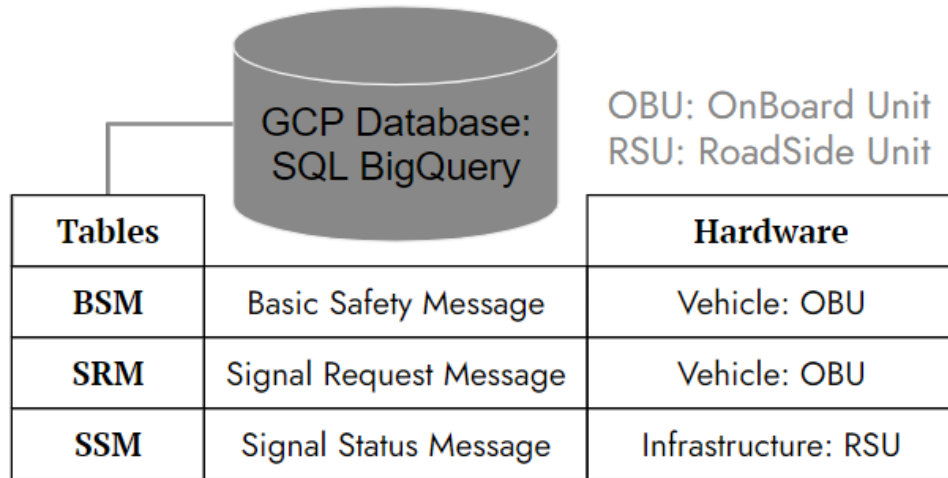
Exploratory research involves determining how different connected vehicle messages interact with a connected intersection to produce an assignment based intersection management system. Ideally produce data visualizations that see a vehicle coming into an intersection, request signal priority, and the corresponding response resulting in a vehicle leaving the intersection.

Data

Data Tables

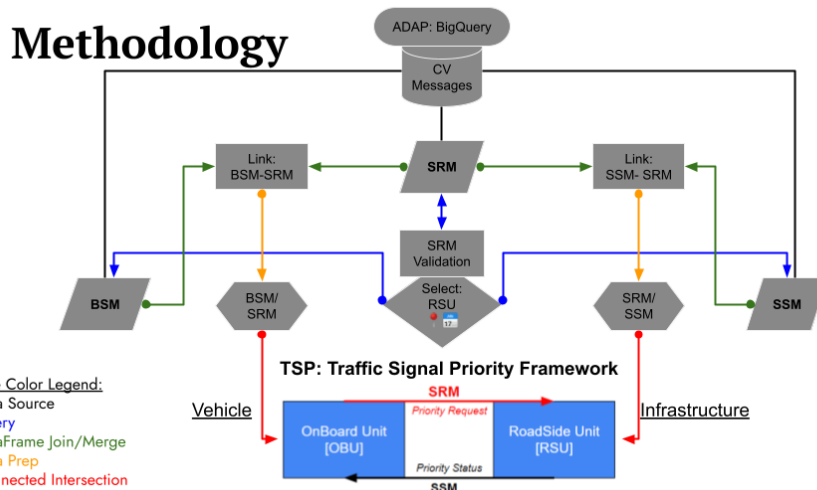
Basic Safety Messages (BSM) are used in various applications to exchange safety data regarding vehicle state. This message is broadcast frequently to surrounding vehicles with data content as required by safety and other applications. Signal Request Messages (SRM) are sent by a V2X-equipped entity (vehicle) to the RSU in a signalized intersection. It is used for either a priority signal request or a preemption signal request depending on the way each request is set.

Signal Status Messages (SSM) sent by an RSU in a signalized intersection. It is used to relate the current status of the signal and the collection of pending or active preemption or priority requests acknowledged by the controller.

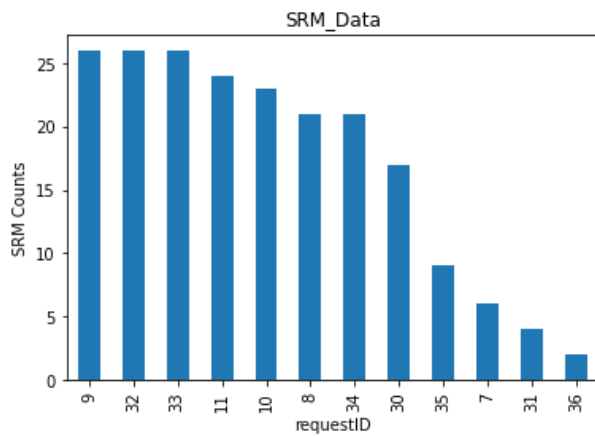
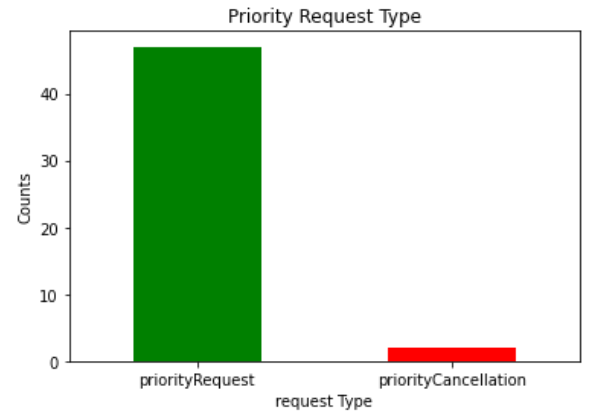
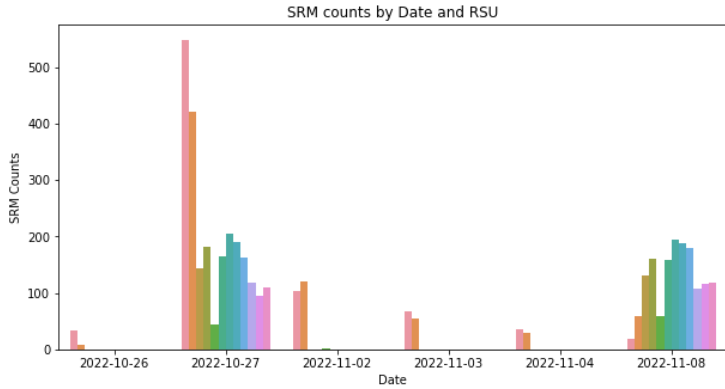


Proposed Methodology

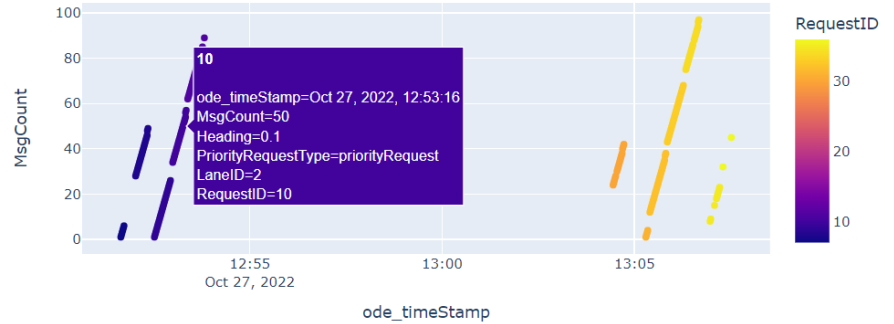
The intention of this exploratory project is to dive deeper into the message sets that contain SRM, BSM and SSM. By locating data features that will assist in the integration between hardware outputs of the vehicle's OnBoard Units (OBU) that transmits data and the roadside infrastructure (RSU) that processes and returns data.



Results



SRM timing



SRM output

