[Capstone Category]

Project Name **VehID**

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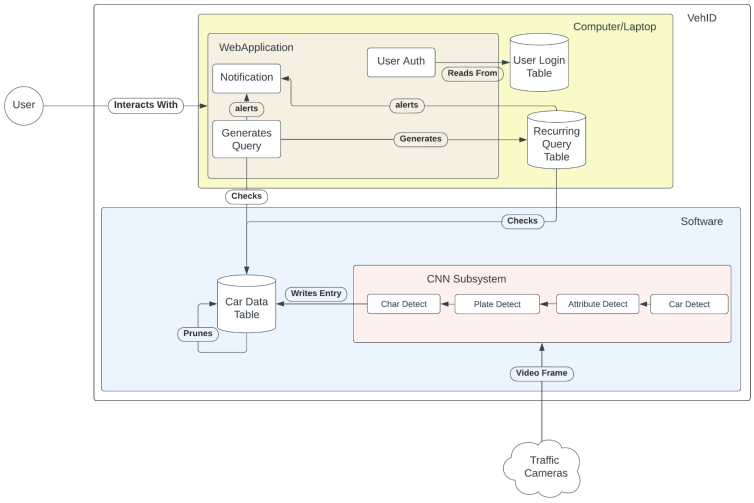
The intention of our project is to improve public safety by utilizing machine learning to recognize vehicles based upon a variety of characteristics such as color, body type, make, and/or license plate. Our inspiration for this project is to enhance the current methods of detecting vehicles involved in AMBER alerts, stolen vehicles, and vehicles involved in criminal offenses. The current methods for locating these vehicles often rely on human interaction or utilize license plate readers which are only beneficial when the plate number of the specified vehicle is known. To approach this problem, we designed the project with three main portions: a neural network subsystem, a backend database, and a web application.

The neural network (NN) subsystem is given a video feed which it then processes each frame outputting key information to a JSON file to be read into our database. To complete this task, the program will read in video footage to be parsed into individual frames, which are then passed into a series of pre-trained NNs to extract each vehicle and its respective information. The NN subsystem consists of 6 parts: vehicle detection, color classification, body type classification, vehicle make detection and classification, license plate detection, and plate character detection.



The exported JSON file from the NN subsystem is read into our database to add new entries of vehicles extracted from our video feed. Our database is used to host a collection of vehicle entries that a user can interact with through the use of our web application.

The objective of our web application is to provide a user friendly experience when interacting with our database. The database will be presented to the user in a tabular format displaying each car entry's vehicle attribute, and an image of the corresponding vehicle to allow for manual verification. Users will be able to perform queries against the database for full or partial matches. Users will also be able to filter the table by attributes, and have the ability to manually edit and delete entries in the car table.

After constructing the neural network subsystem and testing it on collected video footage, we concluded that 95% of the time our system properly detects a vehicle. Out of the properly detected vehicles, 71% had one or more attributes correctly predicted and 28% had two or more attributes correctly predicted. The web application's prior stated functionality has proven to work efficiently. Data is fetched, and displayed to the user in a timely manner, and running queries against said data is accurate in displaying all full or partial matches.

Through the use of our software, after a video has been processed using our NN subsystem, a user has the ability to view vehicle information from the video by utilizing our web application. This has the potential to help in a variety of uses, including those that this project was inspired by.