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dsaiontz / **CS4641_ML_Project**

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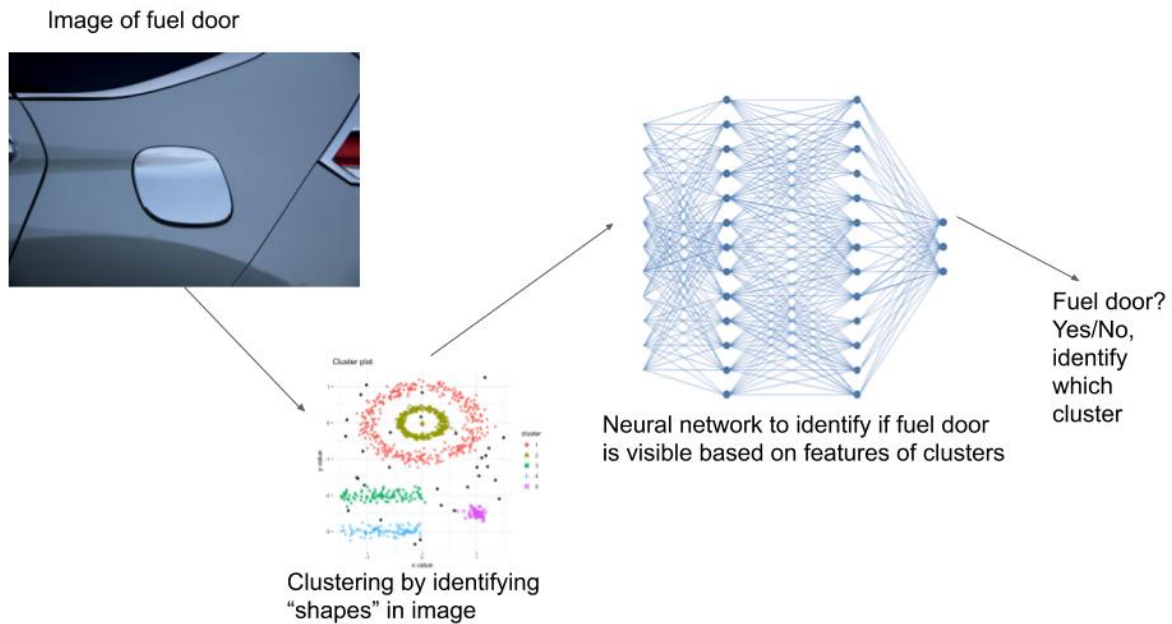
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# CS4641_ML_Project

## Summary Figure

Image of fuel door



Clustering by identifying
"shapes" in image

Neural network to identify if fuel door
is visible based on features of clusters

Fuel door?
Yes/No,
identify
which
cluster

# Introduction

We plan on combining both ML and Computer Vision techniques to identify the fuel cap on a vehicle. As autonomous vehicles become increasingly common, we expect that people will want their cars to be able refuel themselves autonomously. To facilitate this, we seek to develop an algorithm which can identify the fuel caps on vehicles. This algorithm could then be used to pilot a robotic arm which could handle the refueling process.

As far as we can tell, this algorithm has not been implemented.

We hope to develop an algorithm which is successful more than 99% of the time in identifying the fuel port within a picture of a car when the fuel port is fully within the picture. We believe that the development of such an algorithm is important step in achieving the autonomous refueling of vehicles.

# Methods and Dataset

Our dataset will consist of images of fuel caps/fuel doors on vehicles, as well as pictures where the vehicle is far away/a fuel cap is not visible. These images will be scraped from the Internet, and then we will split them between images with a visible fuel cap and ones without a visible fuel cap.

Our unsupervised portion will combine computer vision and clustering algorithms to define "shapes" visible in the imagee, or prominent features of images. These clusters will be created by identifying lines in the image with computer vision and creating clusters using these lines.

Our supervised portion will utilize a trained neural network to then identify, once these clusters are generated, to identify whether or not a fuel cap is visible.

# Results

The end result will be an algorithm that takes in an image of a vehicle and outputs whether or not a fuel cap is present, and if it is, it's location in the image. Optimally, this algorithm will perform correctly with 99% accuracy for any given image.

The location data will consist of information such as the pixel coordinates of the fuel cap and a modified image with this area highlighted.

# Discussion

Hopefully, our project can be used in the future by automatic refueling or recharging stations. For these stations to operate, being able to identify the fuel cap on a vehicle is crucial. The next part after this project is building the robots and machinery that could actually facilitate an automatic refueling station that this project is designed for. This is the next step in automation of transportation, as self-driving cards are already very successful, and transportation will increasingly be fully automated within the near future.

# References