**Deep Learning Project Proposal**

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The problem we selected for this project is classifying vehicles by make and model through computer vision, and more specifically through image classification. Car sale websites, such as Kelly Blue Book, Cars, Autotrader, etc., often require individuals to upload images of the vehicles they wish to either sell or get an estimate for. Confirming that the images uploaded match the description set by the individual is important to ensure listings and estimates are accurately representative of said vehicles. Automating this process saves a great deal of time and money as it would no longer require a human to personally confirm the uploaded images match the description.

The dataset that we will use is sourced via Stanford University and a paper written by Jonathan Krause, Michael Stark, Jia Deng, and Li Fei-Fei titled *3D Object Representation for Fine-Grained Categorization*. It contains 16,185 images of 196 classes of cars and is split into 8,144 training images and 8,041 testing images with each class being split roughly 50-50 between the two subsets. Classes are typically at the level of *Make, Model, Year*, e.g. 2012 Tesla Model S or 2012 BMW M3 coupe. This dataset is large enough to train a deep network.

We plan to use the VGG19 pretrained model while using our dataset to fine tune the model to allow for more precise classification of images of vehicles by *Make, Model, Year.* We will adjust the model if a need arises while testing the model. The framework we will use to implement the network is Tensorflow since the pretrained model is written using Tensorflow.

The reference materials we will use to obtain sufficient background on applying the chosen network to our vehicle image classification are the Deep Learning course materials, the official documentation websites for the packages we will be using, and various websites such as medium.com.

We will judge the performance of our models by checking the accuracy score of our test dataset. The metrics we will calculate are precision, recall, F1, and MSE for loss. We may use accuracy as a metric, dependent on how balanced the dataset is between classes. This will be examined during exploratory data analysis.

The table below outlines the progress and deliverables that we plan to achieve at each date.

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| --- | --- |
| Step | Target Date |
| Decide on dataset | 2021-11-03 |
| Gather data for model and upload it to cloud | 2021-11-09 |
| Train CNN model using VGG 19 | 2021-11-16 |
| Optimize and finalize CNN model | 2021-11-23 |
| Draft of final report | 2021-11-27 |
| Finalize report | 2021-12-04 |
| Create and finalize presentation | 2021-12-05 |