Machine Learning II Final Project Proposal
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What problem did you select and why did you select it?
The problem we have chosen to solve is finding the best models to classify traffic signs and the best methods to explain their results. In a previous project from 2018, researchers used Capsule Networks to classify German Traffic signs to mitigate the shortcomings of Convolution Neural Networks. We aim to implement this same architecture and see how well it performs in classifying American Traffic signs.

We were interested in this problem because the automotive industry is adapting machine learning to enhance vehicles. Creating models that can accurately classify traffic signs will ensure the safety of the passengers and pedestrians and remove the onus from the driver for some driving tasks.

What database/dataset will you use? Is it large enough to train a deep network?
We will use the German Traffic Sign Recognition dataset from Kaggle that contains 12631 images of traffic signs classified into 43 labels.

What deep network will you use?
We will use a Capsule Neural Networks.

Will it be a standard form of the network, or will you have to customize it?
We will use a standard version of the network provided in the paper.

What framework will you use to implement the network? Why?
We will be using Tensorflow.

What reference materials will you use to obtain sufficient background on applying the chosen network to the specific problem that you selected?
We will be referring to the following websites and papers to collect background information and ideas as we progress through the project: paper link

How will you judge the performance of the network? What metrics will you use?
The model in the reference project uses loss and accuracy to evaluate the model. We will check for label class imbalance, given the 43 groups, and utilize the f1 micro score to get class-wise performance metrics.

Provide a rough schedule for completing the project.

11/8/22: Finish proposal, create GitHub
11/9/22-11/16/22: Download the code and make sure that we can duplicate results of the paper
11/17/22-11/26/22: Understand Capsule Neural Networks and repurpose code from paper to use on different traffic sign dataset

11/27/22-11/30/22: Understand SHAP and LIME, work on interpretability of model
12/01/22: Start report
12/12/2022: Submit project