Final Project Proposal

Definitions

Team name: ***Licensed to Plate***

Team members: ***Gokul Ajith, Prithu Dasgupta, Spencer Greene, Daniel Park***
Note: Once one person uploads the report to Gradescope, please add all other team members to the submission within the Gradescope interface (top right on your submission).

What is your project idea?

Because of its applications in criminology, we are interested in creating an application that takes in images of cars with different backgrounds and orientations, detects if the car has a license plate, and highlights where the license plate is and reads its number if exists. Our project consists of three main areas.

1. Given arbitrary images, use edge detection and feature extraction algorithms to highlight where the license if in the image if it exists.
2. Given a cropped images of license plates, design and train a neural network to output the number printed on the license plate.
3. Design a web application, where users can upload batches of images of cars and our two algorithms will highlight the license plate in the uploaded image and output the number. Since this is more software engineering related rather than computer vision related, we will do this part of the project if time persists.

What data will you use?

Our data will come from two areas. First, we will use public labeled datasets. The actual datasets themselves we will experiment with but likely they will come from a site like https://platerecognizer.com/number-plate-datasets/. Some of these datasets only contain the license plates but not the entire car so we will ignore these. We solely want images of different colors, backgrounds, and orientations of the backs of cars with the license plate visible. The name of each image file should be the license plate number itself. The other area is from scraping data from sites online. Pictures of cars are fairly common and with the right permissions, scraping should be fairly doable.

What software will you use?

In terms of software, we believe our whole backend of the project can be completed in Python leveraging Tensorflow for building out the model and Numpy and OpenCV for data storage and preprocessing. The web application will be written in Flask and node.js.

What are the skills of the team members? Who will do what?

- Gokul
  - Skills: Deep Learning, Web Scraping and Data Preprocessing, Web Application Development
  - Assignment: Data Scraping and Prepossessing, Aiding with neural net architecture tuning, Web application lead.
- Prithu
  - Skills: Deep Learning, Linear Algebra
  - Assignment: Will work on neural net architecture and training
- Spencer
  - Skills: Deep Learning, Machine Learning, and AI. Python, Tensorflow, web scraping.
  - Assignment: Data collection (web scraping and manual photos) plus neural net.
- Daniel
  - Skills: Neural Networks, Model Building
  - Assignment: Work on neural net architecture and coding/testing

How will you know whether you have made progress? What will you measure?

We will separate our dataset into training and testing sets and keep track of how we are preprocessing data as well as our model architecture and parameters and connect these with measured training accuracy and loss and testing accuracies over multiple epochs. As with any neural network, by keeping all of this information on record, we can clearly show what changes are being made to our overall implementation as well as the exact effects these changes have on our model performance. The goal is to show iterative improvement as our initial model will gradually be tuned in many areas to maximize testing accuracy and minimize training loss, and these improvements will allow us to derive conclusions as to effective strategies that should be utilized to solve general computer vision classification problems more than just this one.

What problems do you foresee or have?

One problem we might run into is with getting the data in a proper state for our model. We will have to carefully preprocess the data and ensure that there is a good data source to use for the project. Another problem is the potential difficulty in identifying where the

license plate is in an image due to the variance in what license plates look like and the variance in car design and background.

Another problem we might encounter is generalizability of our model to many countries' license plates. For example, a license plate number reading model trained on U.S. only data — or California only data — might not perform as well on license plates in the E.U.

Another issue could be how the model performs with different backgrounds and scales. For instance, the model will have to learn different parameters for a car during the daytime versus a car during the nightime.

Is there anything that we can do to help? E.G., resources, equipment.

Besides a mentor TA, we believe we are fine!

2 pages max; feel free to include any media, references, etc.