

Road Sign Recognition

Group 3

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Project Summary

This project will be focused on developing a system that can use live video feeds to identify road signs on the road and notify the user. It will make use of computer vision tools to identify the presence of road signs, identify which road sign it is, and then highlight that road sign for the user.

Background

There are various computer vision models that already exist that can help us with detecting the common road signs. An example of these models is the comma.ai model: <https://www.comma.ai/> which is trusted by a lot of autonomous car companies. This model includes a very reliable traffic light detection model that can help our project a lot. The team is also planning to use the following dataset: <https://benchmark.ini.rub.de/> which has been developed for similar projects.

The Challenge

The challenge associated with this project is that there are a lot of parts present. For starters, road signs need to be identified. In addition, the comma.ai model might be a bit advanced for our project since it is designed to account for a variety of different things on the road such as traffic signs, obstacles, etc.

Goals and Deliverables

Plan to achieve:

- The goal of the project is to develop a system to reliably detect traffic signs from a live camera feed.
- The system is expected to recognize all the common traffic signs in Ontario as specified here: <https://www.ontario.ca/document/official-mto-drivers-handbook/signs>

Hope to achieve:

- The team hopes that if there is extra time, the project will be able to detect the traffic signs in different conditions such as low brightness, rain, etc.
- The team also hopes that the project can be easily expanded to include more signs.

- The team hopes to expand traffic from just signs in Ontario to all signs in Canada.

Evaluation

- **Speed of Recognition:** The first evaluation metric we intend to use is the amount of time it takes for our system to detect and identify a road sign from an image. This metric is important because users should be notified of road signs as soon as they become evident in the video feed. Ideally, this metric should be as low as possible.
- **Recall and Precision of Recognition:** The second evaluation metric we intend to use is the recall and precision of road sign detection. This metric is important because if an incorrect road sign is identified, then the user of the system may use that information in an unsafe manner. For our system, the recall and precision of our system should be as close to 100% as possible.

Realism

Our group believes that this project is realistic for the allotted time. Road sign recognition is a very important field that has seen a lot of development in recent years, and as a result there are a lot of models and projects that we can use for reference when designing our system. Furthermore, all members in our group are very skilled at learning things in short time frames which means we should be more than capable of completing the project in the given time frame.

Schedule

Week	Bardia	Liam	Siddharth
Feb. 5-11	Research various CV models for sign detection	Research various CV models for sign detection	Research various CV models for sign detection
Feb. 12-18	Research the OpenCV library for analyzing camera feeds	Find proper datasets for the model and investigate the accuracy of the chosen model.	Prepare a simple UI for starting the camera and reading reading signs.
Feb. 19-25	Apply different OpenCV filters to the camera stream to single out the signs.	Apply different OpenCV filters to the camera stream to single out the signs.	Prepare a simple UI for starting the camera and reading reading signs.
Feb. 26 - Mar. 3	Apply different OpenCV filters to the camera stream to single out the signs.	Apply different OpenCV filters to the camera stream to single out the signs.	Train the model with the select dataset.
Mar. 4-10	Integrate all the components together and test the system.	Integrate all the components together and test the system.	Integrate all the components together and test the system.

Mar. 11-17	Prepare a prototype for the project to demonstrate to the TA	Prepare a prototype for the project to demonstrate to the TA	Prepare a prototype for the project to demonstrate to the TA
Mar. 18-24	Prepare a prototype for the project to demonstrate to the TA	Prepare a prototype for the project to demonstrate to the TA	Prepare a prototype for the project to demonstrate to the TA
Mar. 25-31	Investigate adding support for more traffic signs.	Investigate adding support for different lighting and weather conditions.	Investigate adding support for partial recognition of the signs (ie detecting broken signs).
Apr. 1-7	Investigate adding support for more traffic signs.	Investigate adding support for different lighting and weather conditions.	Investigate adding support for partial recognition of the signs (ie detecting broken signs).
Apr. 8-10	Prepare the final report	Prepare the final report	Prepare the final report