

Project Title: State Farm Distracted Driver Detection

List of Team Members:

Name1, Zhiyuan Liu, zhiyual9@uci.edu

Name2, StudentID2, uci_email_address

[Name3, StudentID3, uci_email_address]

1. Project Summary

This project is about detecting distracted drivers and their behaviors from images of drivers, and it will use convolutional neural network to predict 10 different kinds of behaviors from a training dataset of size around 20000 images, with evaluation using classification accuracy and user studies.

2. Problem Definition

There are more than 100,000 images of different drivers in the dataset. The images will be the inputs to the system with the input layer of $640 * 480$, and the goal is to predict the likelihood of what the driver is doing in each picture. There will be 10 classes of behaviors to predict the likelihood of in the output including nine types of distracted driving and one safe driving. Then, the classification will happen base on these likelihoods, and the accuracy can be calculated from that.

3. Proposed Technical Approach.

In this project, I will be using Pytorch approach to perform a convolutional neural network. There will be more than one type of convolutional neural networks to predict, examples of such networks are VGG-16, Inception, and RESNET50. There will be a convolutional layer with filters of small dimensions. There will also be ReLU, Pooling, and Dropout layers.

4. Data Sets

The dataset are images of people either driving safely or doing one of the nine kinds of distracted behaviors. The training set of this project has a size of 22,424 images which consists of 1,900 to 2,500 images per class of the ten classes of drivers' behaviors. Each image in the dataset has $640 * 480$ pixels. The testing dataset is about four times the size of the training dataset and has a size of 79,726 images. The size of the datasets is subject to changes for better results.

5. Experiments and Evaluation

In this project, after calculating the likelihood of each behavior of the driver in each picture, we can classify that the driver in the image is doing the behavior with the highest likelihood calculated. After the classification, we can then calculate the accuracy of the classification in the training and testing dataset. When implementing this project, the training size will be adjusted to get better results.

6. Software

For this project regarding image analysis and machine learning, I will be using Python. Since for this project, neural networks will be utilized, and there's a huge dataset, it is best to run things on the GPU to increase performance and efficiency. Therefore, Google Colab is a good option for all these purposes. I will use either be using Pytorch or TensorFlow to accomplish the neural network part of the project.

7. Individual Student Responsibilities

I will be do everything for this project.