Abstract

DeepEye is a driving copiloting system which uses a combination of computer vision and Artificial Intelligence techniques to:

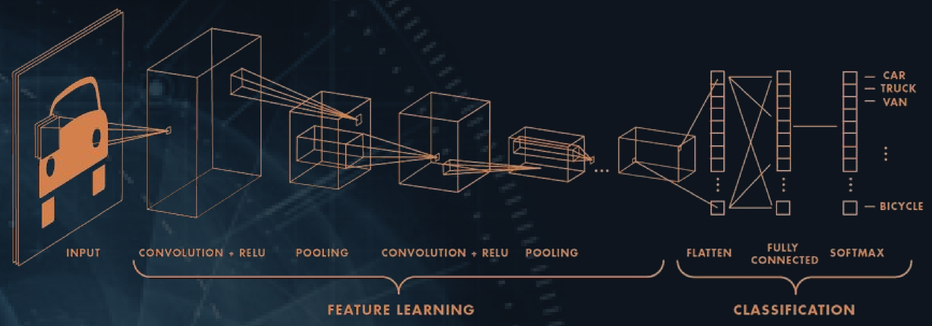
- -Detect and classify the following objects in and around the road: vehicles, bikes, pedestrians, stop signs, and traffic lights
- -Detect lanes and determine if driver is in them
- -Detect possible imminent collisions

All of this information is displayed on an interface that could be on a drivers dashboard in order to notify them

Research

Our research comprised several academic sources, including Google and Cornell University. Important insights we gathered:

- -Neural networks are best at object detection
- -TensorFlow provides pre-trained models and Feature Extractors
- -Photorealistic environments (like GTA) can be effective as well



DeepEye

A Capstone Project
By
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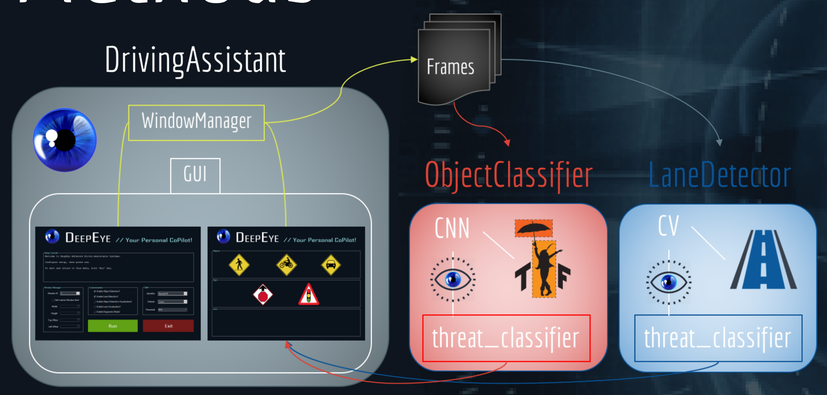
Methods



The DrivingAssistant class controls the program

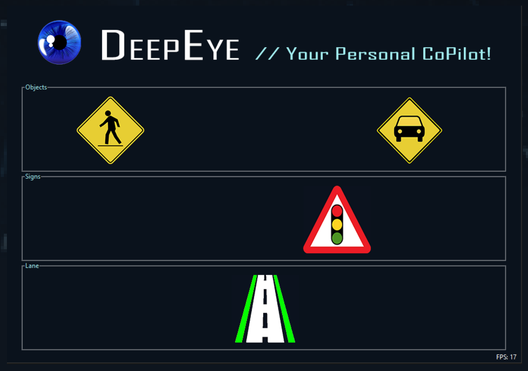
- -Manages frames analyzed by the program
- -Controls GUI which allows user interaction

The ObjectClassifier is a Convolutional Neural Network

- -Analyzes frames for objects, looking for feature Identifiers
- -Icons pop up in the interface when a corresponding object is identified through the threatClassifier
- -If object is within a certain small region at the bottom of the frame, collision warning is given

The LaneDetector uses OpenCv filters to detect road lanes

- -An icon will be displayed in the interface corresponding to the drivers position in the lane



Results

We tested with two environments:

- -Grand Theft Auto V, for a variety of environments, times of day, and weather conditions
- -Stock Dash Camera Footage, for more realistic driving

We compared two data logs; One created by the program listing relevant objects on screen, and one filled out going through each frame

GTA-V

Overall Performance ≅ 30 (minutes)	
count	422 frames
mean	0.874596
std	0.114521
min	0.428571
25%	0.857143
50%	0.857143
75%	1.000000
max	1.000000

Dash-Cam

Overall Performance ≅ 26 (minutes)	
count	274 frames
mean	0.915537
std	0.114775
min	0.428571
25%	0.857143
50%	1.000000
75%	1.000000
max	1.000000