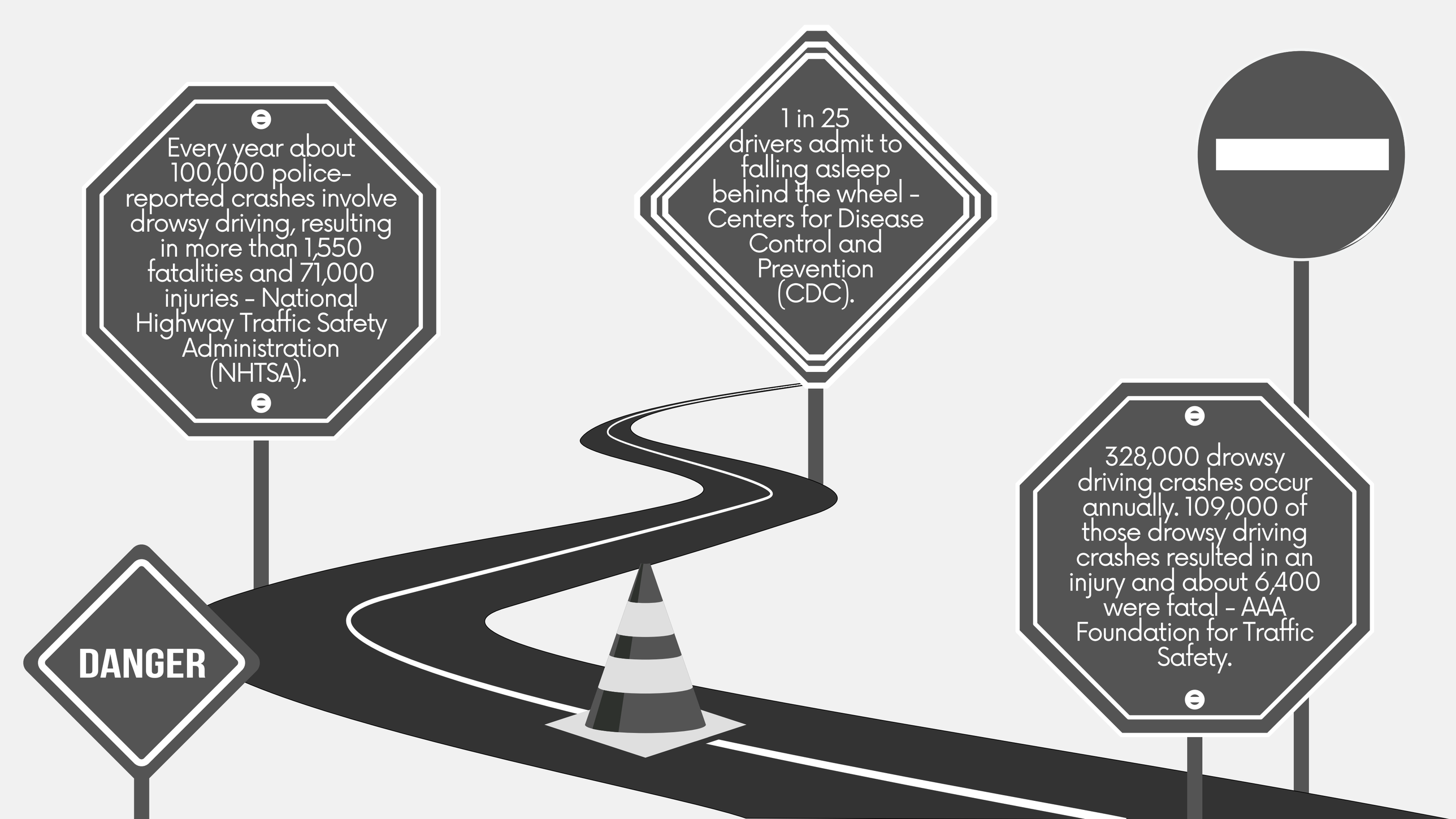
מספר פרויקט: 211206

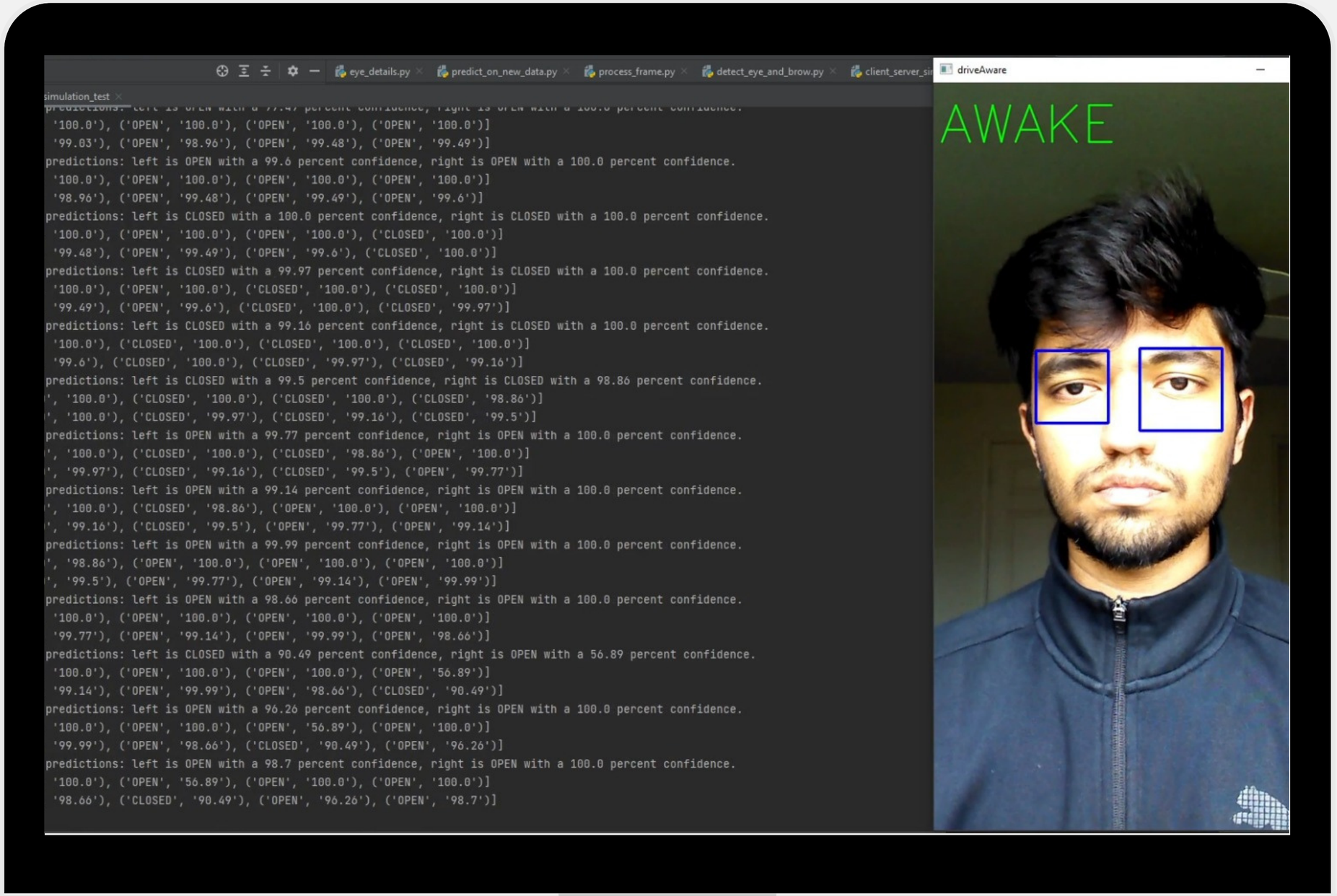
שם הסדנה: ארכיטקטורת ביג דאטה

שם הסטודנטים: יהלי יעקב, יוני מלכי, רבקה טובמן

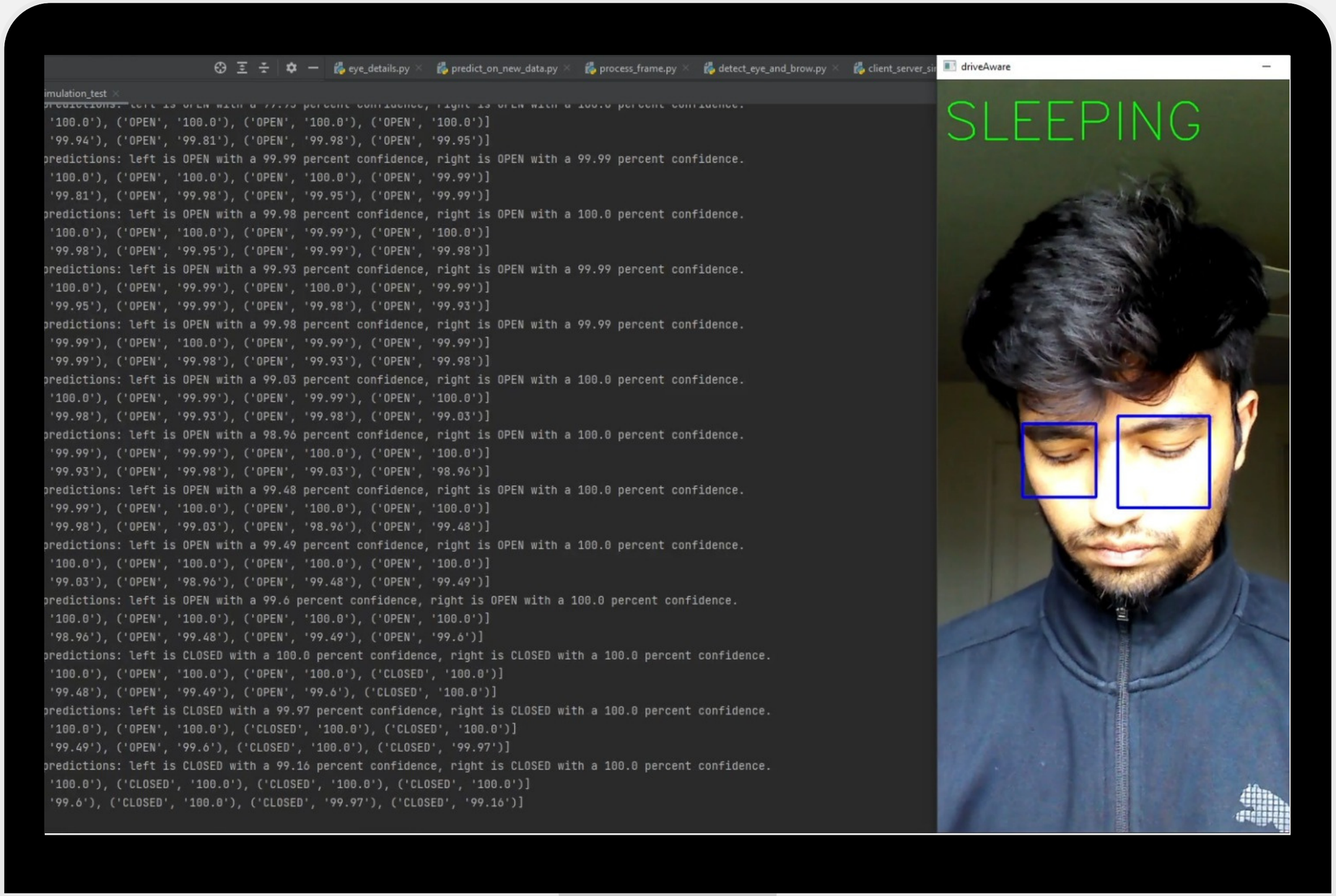
שם המנחה: ד"ר רועי קרקובסקי


Every year about 100,000 police-reported crashes involve drowsy driving, resulting in more than 1,550 fatalities and 71,000 injuries - National Highway Traffic Safety Administration (NHTSA).
1 in 25 drivers admit to falling asleep behind the wheel - Centers for Disease Control and Prevention (CDC).
328,000 drowsy driving crashes occur annually. 109,000 of those drowsy driving crashes resulted in an injury and about 6,400 were fatal - AAA Foundation for Traffic Safety.
DANGER

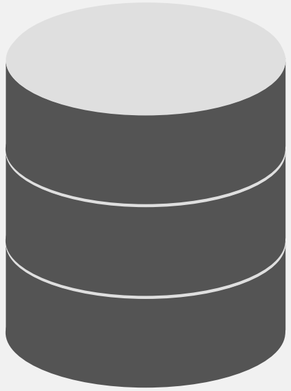
Demonstration



Demonstration



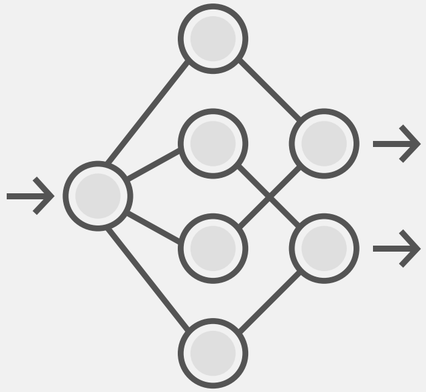
Supervised Learning



Dataset

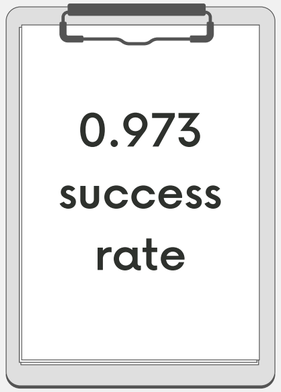
MRL eye dataset with ~84,000 images of eyes divided by eye state.

60% training
20% validation
20% test



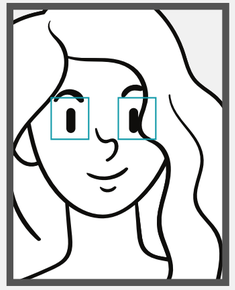
Neural Network

Using **Keras** and **TensorFlow**.
3 hidden layers with a depth of 92 and 2 output layers.



Results

Based on the test dataset.
Out of 16,981, 465 wrong predictions were made.



Classifier

The classifier detects the eyes of the driver. The eyes are then cropped, reshaped, and sent to the neural network.

Neural Network

Our neural network makes a prediction for each eye and returns the results to the driver's device.

Real Time

Webcam

Every second, 2 frames of the driver's face are captured and sent to the face classifier.

Alert

Alerts the driver if the algorithm decides the results from the neural network imply the driver is drowsy.

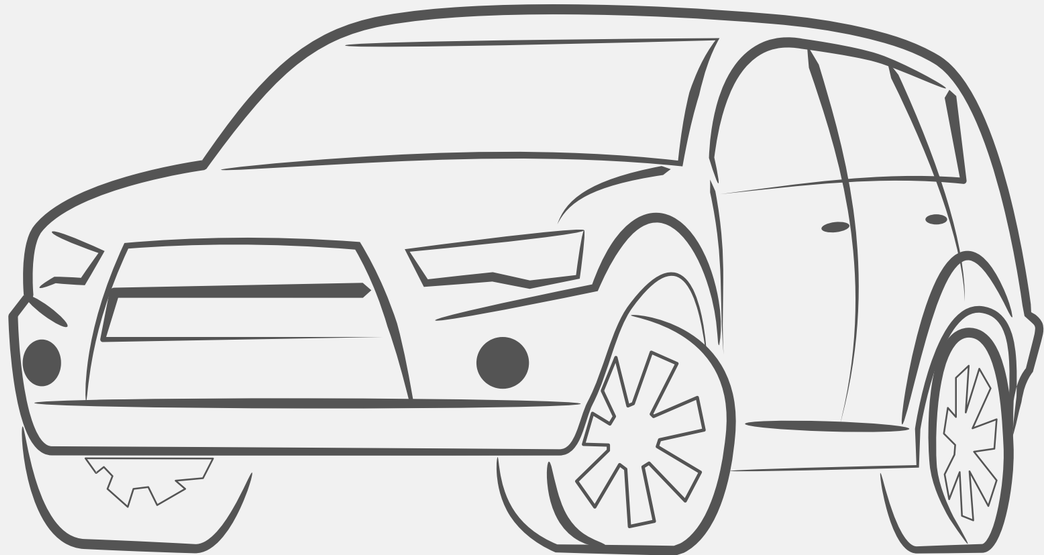
Comparison

Most cars these days have some sort of driver assistance systems that target driver drowsiness.

- **BMW**: Active Driving Assistant with Attention Assistant analyses driving behaviour and, if necessary, advises the driver to rest.
- **Bosch**: "Driver drowsiness detection" takes input from the steering angle sensor, front-mounted lane assist camera, vehicle speed and turn signal stalk.
- **Jaguar Land Rover**: Driver Condition Monitor and Driver Fatigue Alert, both evaluate driving technique for signs of driver fatigue.

The driver drowsiness detection systems that are available today relay on various sensors within the vehicle, while our product makes use of the person behind the wheel.

We consider the driver's eyes to be the most important and reliable source of information regarding the driver's awareness state.



Conclusions

- We have created a system that is capable of successfully recognizing the driver's awareness state using his eyes with high accuracy.
- We enjoyed learning about the Big Data field, diving into Machine Learning, Supervised Learning using Convolutional Neural Networks, and image processing.
- We learned new technologies, frameworks and libraries:

ThankYou!

DRIVE SAFELY!