AUTO COM

"YOUR GUARDIAN ON THE ROAD"

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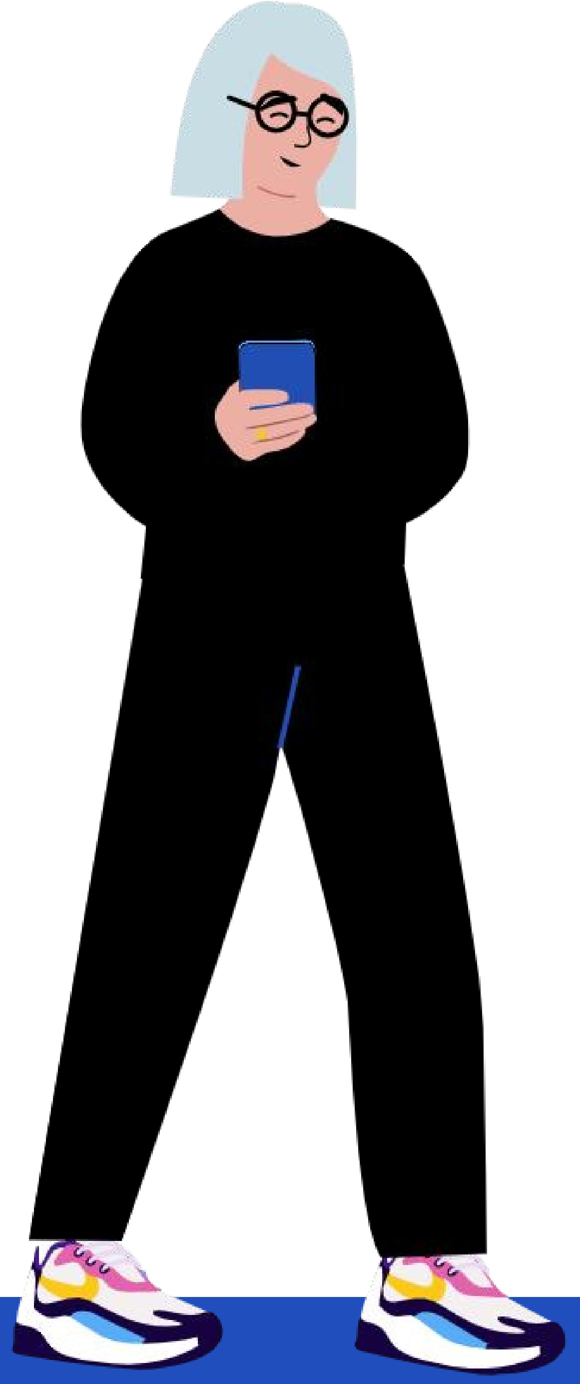
PROBLEM STATEMENT

- Distracted Driving Is A Significant Contributor To Road Accidents, Leading To Injuries And Fatalities Worldwide.

- The Challenge Is To Develop An Accurate And Reliable Machine Learning Model That Can Detect And Classify Various Types Of Driver Distractions From Images.

- The Goal Is To Classify Images Into One Of Ten Categories Representing Different Driver Behaviors, Such As Safe Driving, Texting, Talking On The Phone, Eating, And More.



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MEET OUR TEAM!

Kumaran Hariharan

Frontend And Integration

Roshan Rajendran

Model Design And Training

Tejaswini Swaroop

Model Building

Pradhap Rane

Model Training

Farhad Khan

Data Evaluation And Training

ABSTRACT

- Distracted Driving Poses A Significant Risk To Road Safety, Leading To Numerous Accidents.

- The Aim Of This Project Is To Develop An Advanced Machine Learning Model Capable Of Detecting Various Forms Of Driver Distractions From Images.

- The Project Involves Applying Image Processing Techniques And Deep Learning Algorithms To Identify And Categorize Driver Behaviors Into Distinct Classes Such As Texting, Eating, Talking On The Phone, And Others.

- Providing Real-Time Alerts By Text To Speech Mechanism.

- The Research Integrates
  1.Data Collection
  2.Model Training
  3.Performance Evaluation High Accuracy

IMPORTANT USE CASE

- **Drive Safe, Even When No Ones Watching**
- **Ola, Uber, Safe Driving, Cab**
- **Driving Schools, Post In Person Lectures Driver Monitor System.**
- **Cargo Safety, Ensure Goods Are Safe**
- **TARGET AUDIENCE :-**
  1.Cab Service Providers
  2.Car Rental Service Providers
  3.Driving School.
  4.Insurance Providers.
- **Logistic Service Providers Insurance Service Providers Law Enforcement**

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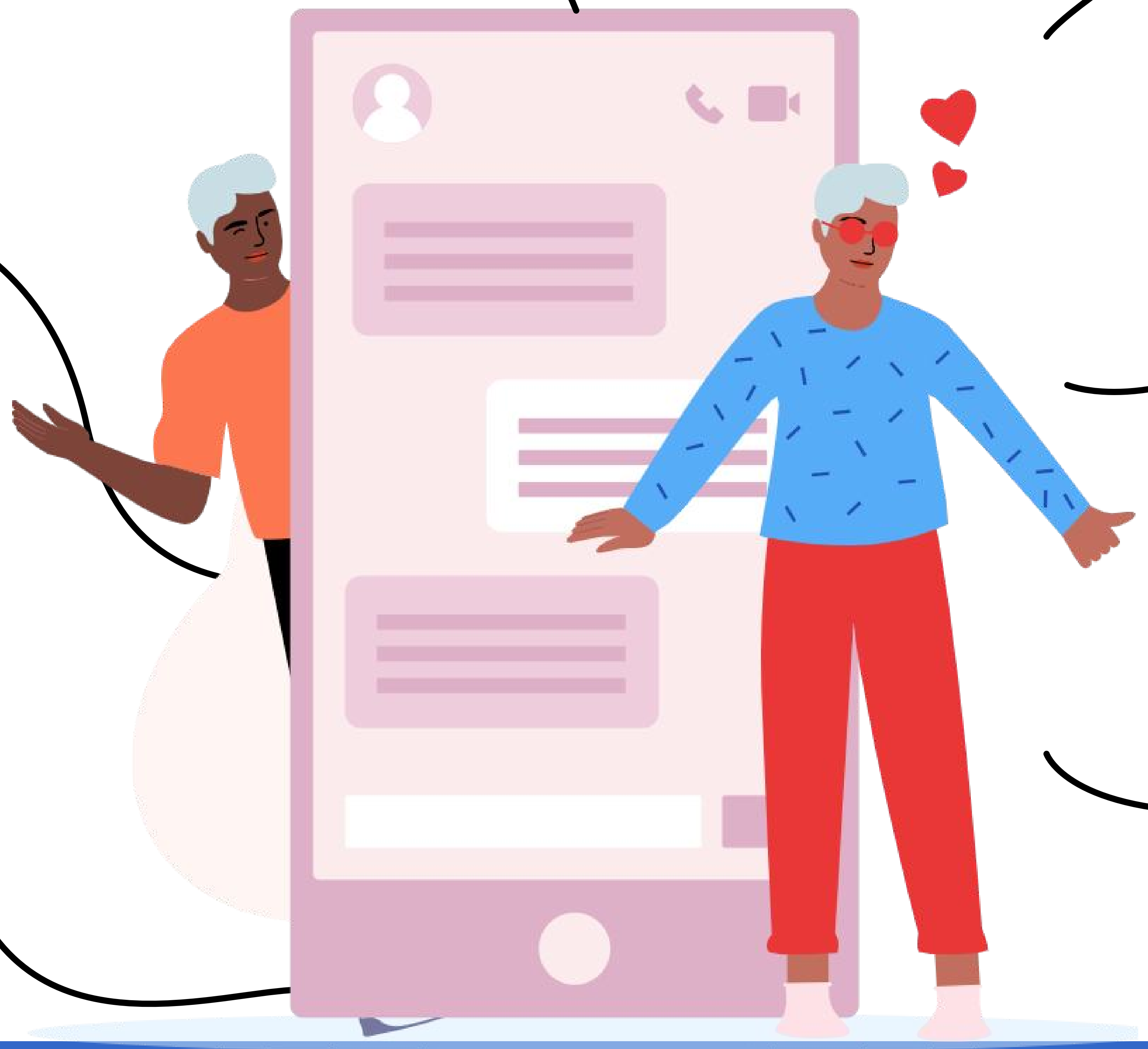
CONCEPTS USED

Streamlit
Frontend: Interactive web application

COMPUTER VISION
Image Classification: Predicting driver action
Preprocessing: Resizing and data augumentation

TENSERFLOW/KERAS
Frameworks: For neural network training
Training: Compiling, evaluating.

DEEP LEARNING
CNNs: For image data processing
Transfer Learning: Fine-tuning MobileNetV2



Data Augmentation:
Enhancements: Improving model performance.

MOBILE NET V2
Pretrained Model: Lightweight CNN
Custom Layers: For classification

Model Evaluation:
Metrics: Accuracy and loss monitoring

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Data Used!

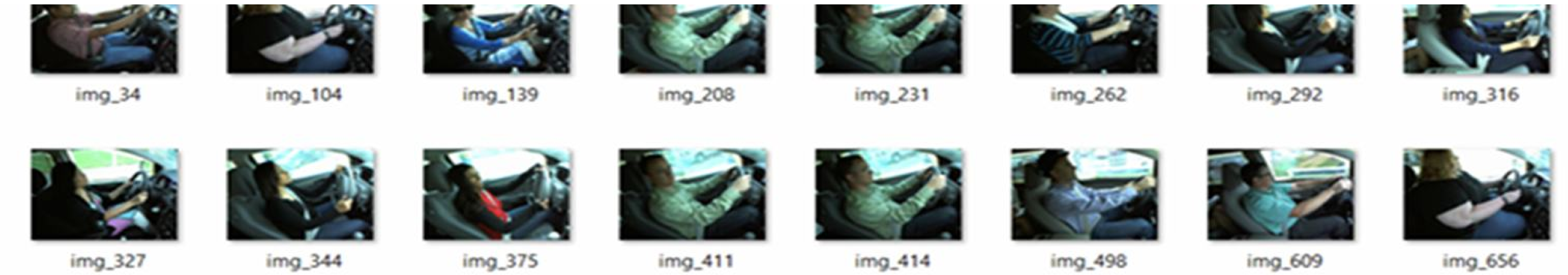
Driver Images, Each Taken In A Car With A Driver Doing Something Unsafe In The Car (Texting, Eating, Talking On The Phone, Makeup, Reaching Behind, Etc) Organized Into 10 Classes.

The 10 Classes To Predict Are:
Co: Safe Driving
C1: Texting-Right
C2: Talking On The Phone – Right
C3: Texting-Left
C4: Talking On The Phone – Left
C5: Operating The Radio
C6: Drinking
C7: Reaching Behind
C8: Hair And Makeup
C9: Talking To Passenger

GLIMPSE OF THE DATASET!

C0:Safe State

C8:Unsafe State(Hair And Makeup)



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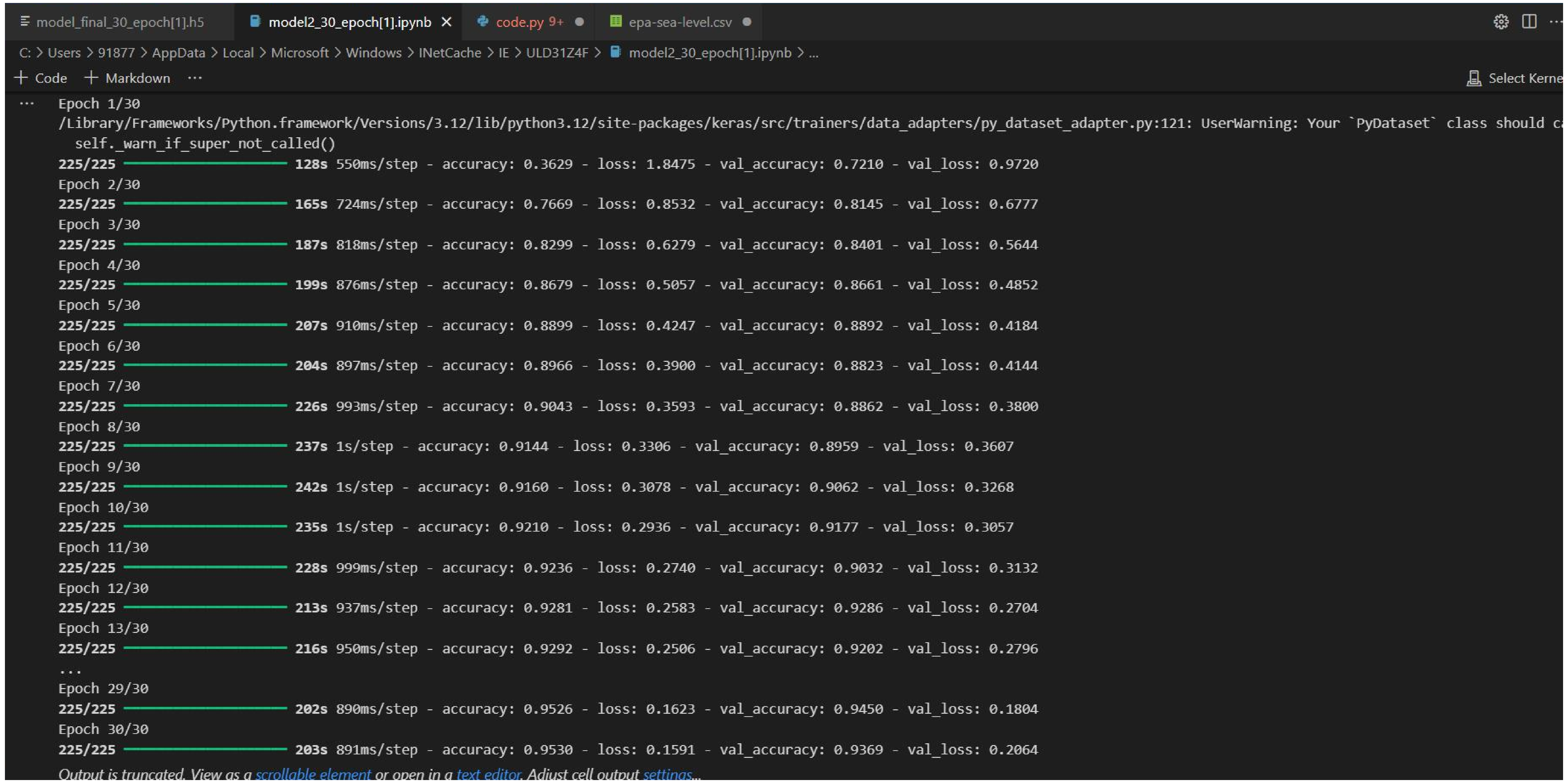
MODEL TESTING AND CELL OUTPUT




```
Epoch 1/30
/Library/Frameworks/Python.framework/Versions/3.12/lib/python3.12/site-packages/keras/src/trainers/data_adapters/py_dataset_adapter.py:121: UserWarning: Your `PyDataset` class should c
  self._warn_if_super_not_called()
225/225 ━━━━━━━━━━━━━━━━━━━━ 128s 550ms/step - accuracy: 0.3629 - loss: 1.8475 - val_accuracy: 0.7210 - val_loss: 0.9720
Epoch 2/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 165s 724ms/step - accuracy: 0.7669 - loss: 0.8532 - val_accuracy: 0.8145 - val_loss: 0.6777
Epoch 3/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 187s 818ms/step - accuracy: 0.8299 - loss: 0.6279 - val_accuracy: 0.8401 - val_loss: 0.5644
Epoch 4/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 199s 876ms/step - accuracy: 0.8679 - loss: 0.5057 - val_accuracy: 0.8661 - val_loss: 0.4852
Epoch 5/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 207s 910ms/step - accuracy: 0.8899 - loss: 0.4247 - val_accuracy: 0.8892 - val_loss: 0.4184
Epoch 6/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 204s 897ms/step - accuracy: 0.8966 - loss: 0.3900 - val_accuracy: 0.8823 - val_loss: 0.4144
Epoch 7/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 226s 993ms/step - accuracy: 0.9043 - loss: 0.3593 - val_accuracy: 0.8862 - val_loss: 0.3800
Epoch 8/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 237s 1s/step - accuracy: 0.9144 - loss: 0.3306 - val_accuracy: 0.8959 - val_loss: 0.3607
Epoch 9/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 242s 1s/step - accuracy: 0.9160 - loss: 0.3078 - val_accuracy: 0.9062 - val_loss: 0.3268
Epoch 10/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 235s 1s/step - accuracy: 0.9210 - loss: 0.2936 - val_accuracy: 0.9177 - val_loss: 0.3057
Epoch 11/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 228s 999ms/step - accuracy: 0.9236 - loss: 0.2740 - val_accuracy: 0.9032 - val_loss: 0.3132
Epoch 12/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 213s 937ms/step - accuracy: 0.9281 - loss: 0.2583 - val_accuracy: 0.9286 - val_loss: 0.2704
Epoch 13/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 216s 950ms/step - accuracy: 0.9292 - loss: 0.2506 - val_accuracy: 0.9202 - val_loss: 0.2796
...
Epoch 29/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 202s 890ms/step - accuracy: 0.9526 - loss: 0.1623 - val_accuracy: 0.9450 - val_loss: 0.1804
Epoch 30/30
225/225 ━━━━━━━━━━━━━━━━━━━━ 203s 891ms/step - accuracy: 0.9530 - loss: 0.1591 - val_accuracy: 0.9369 - val_loss: 0.2064
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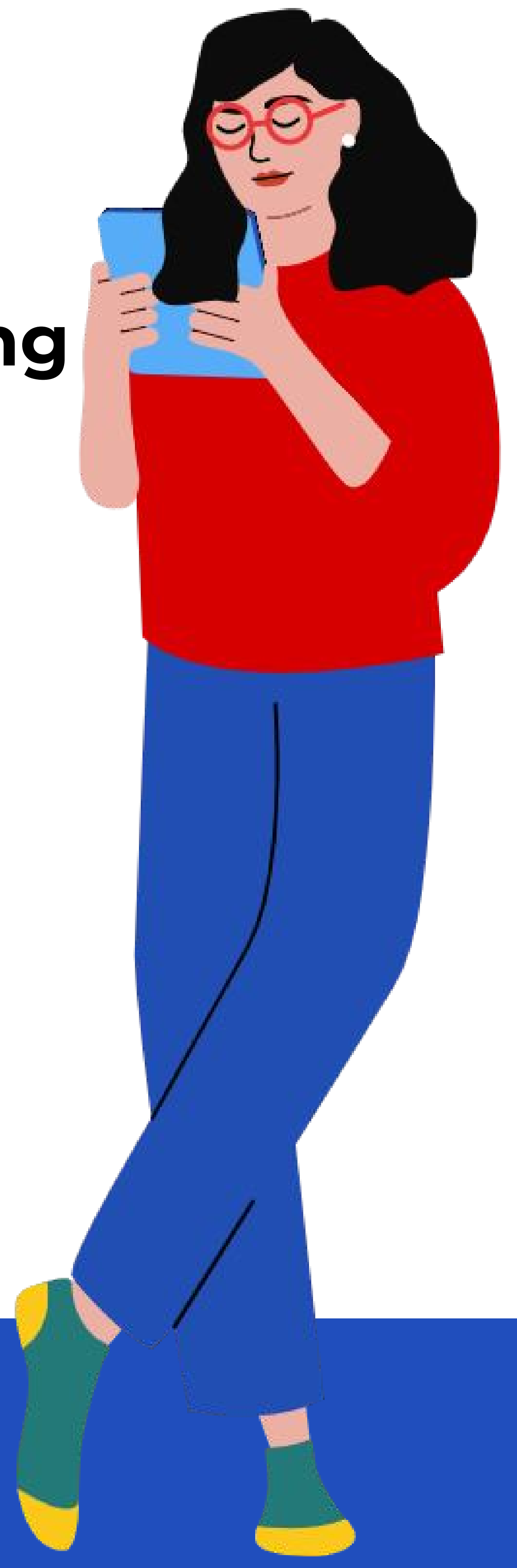
- **Model Testing**



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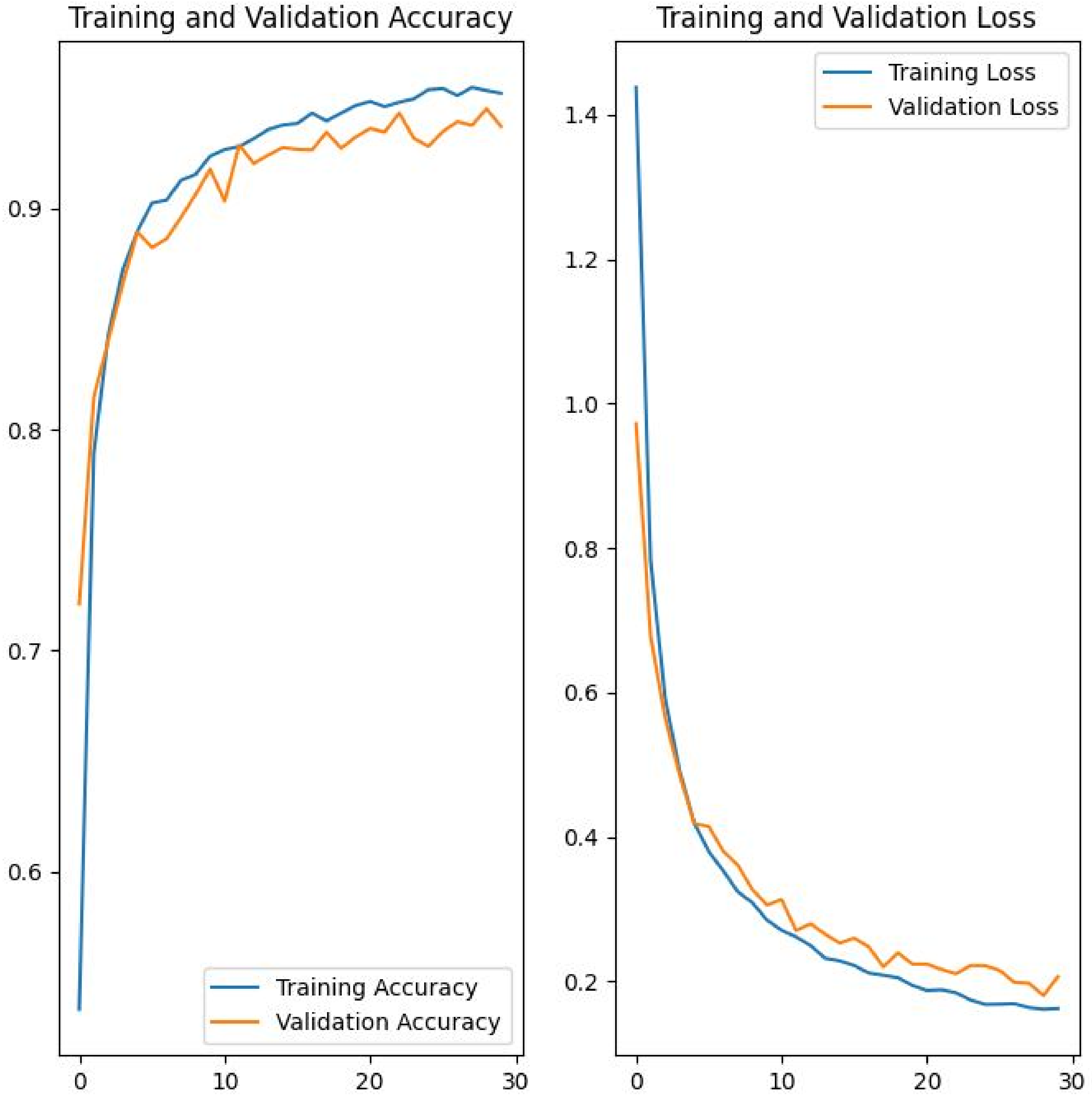
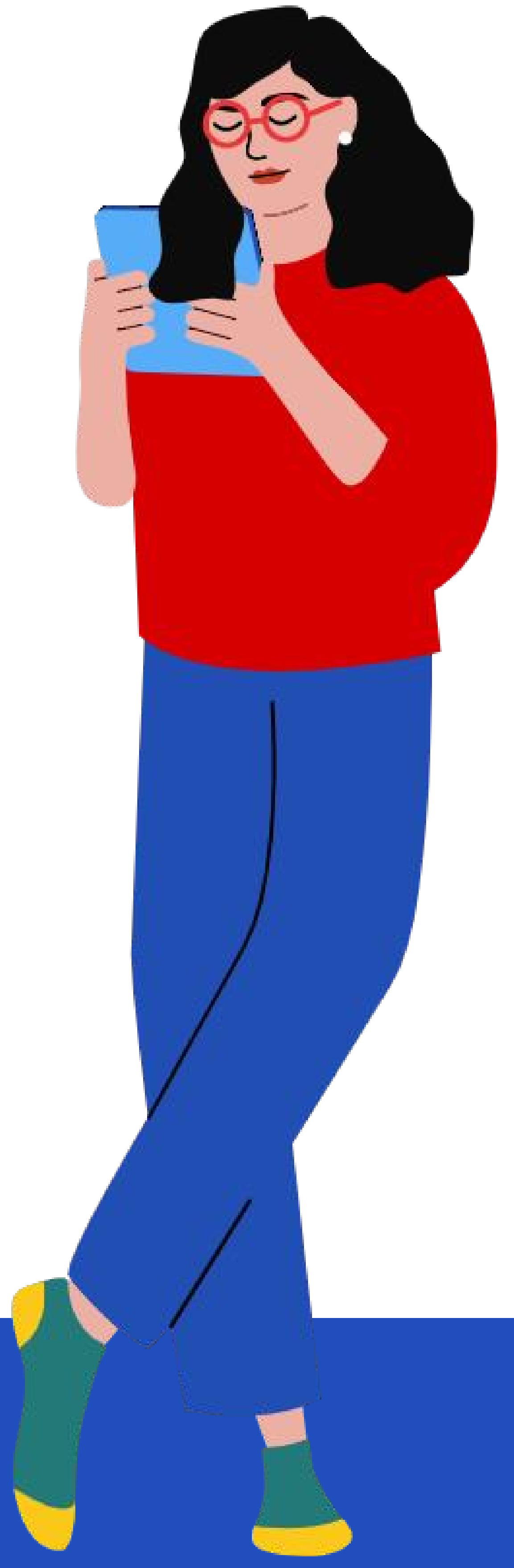
Model Testing And Accuracy



- Accuracy



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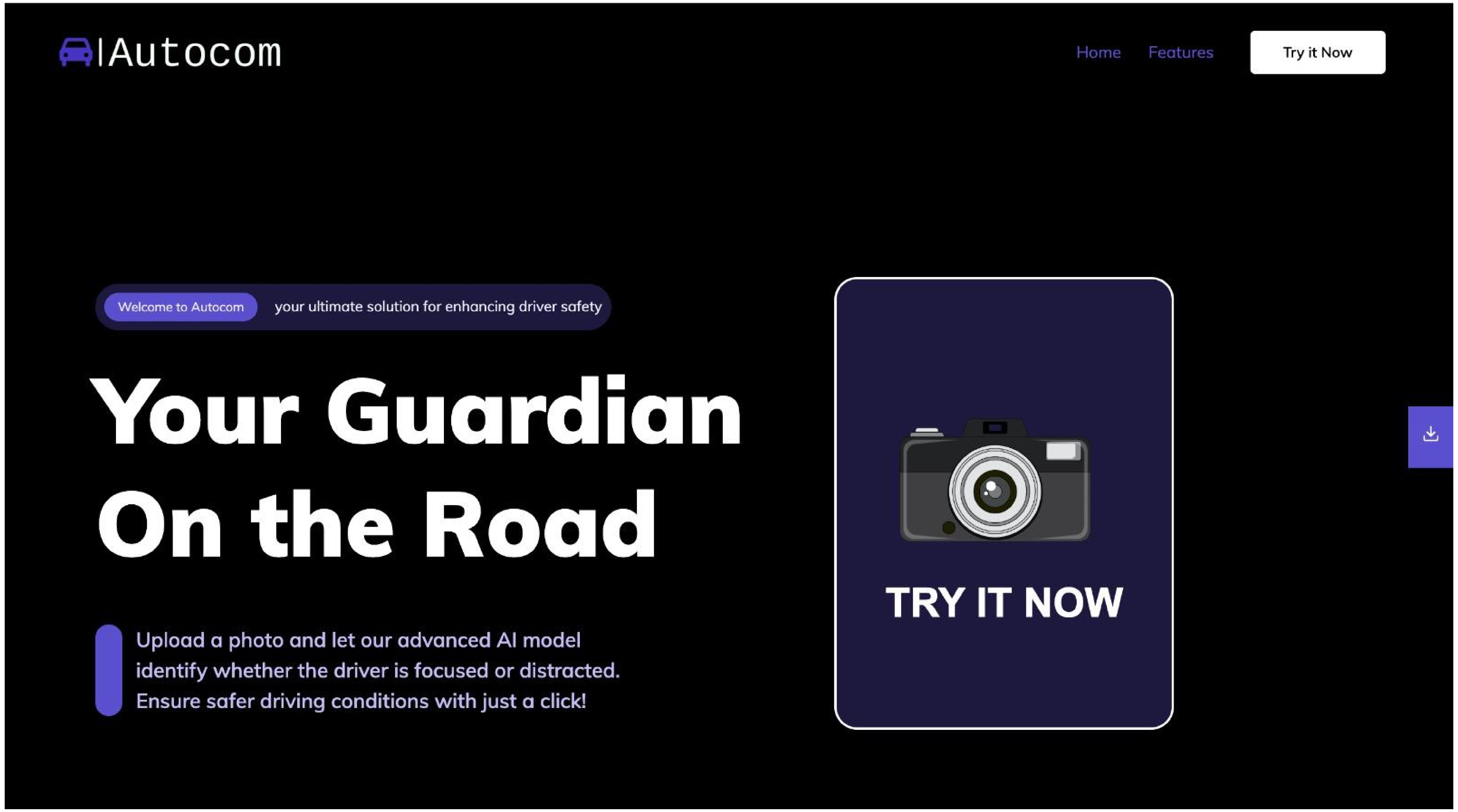
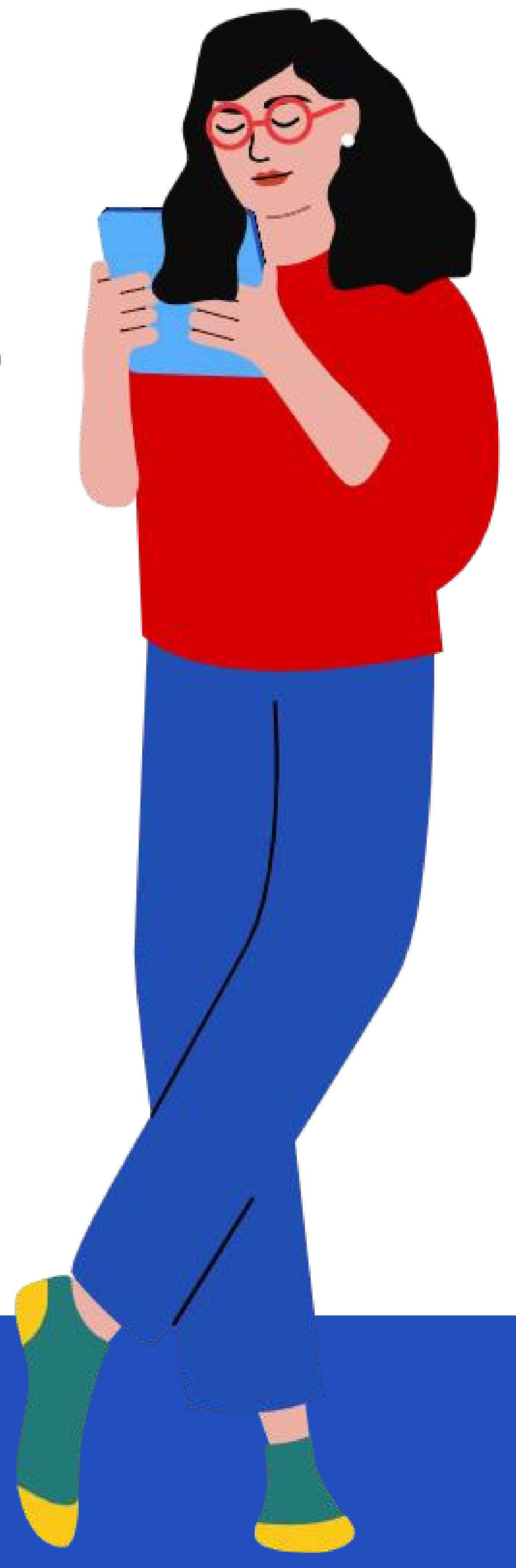
Glimpse Of The Project!



■ HOME PAGE



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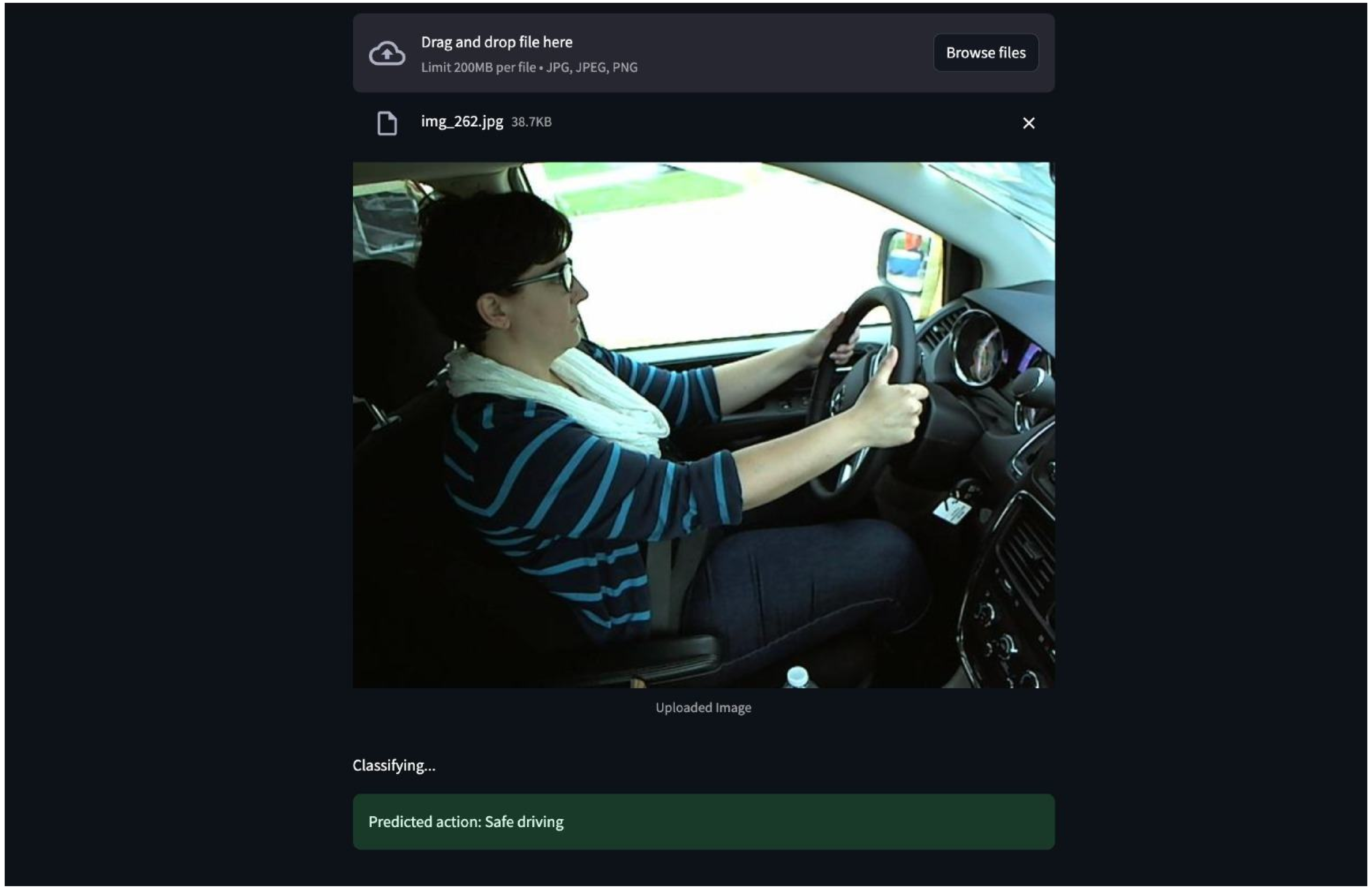
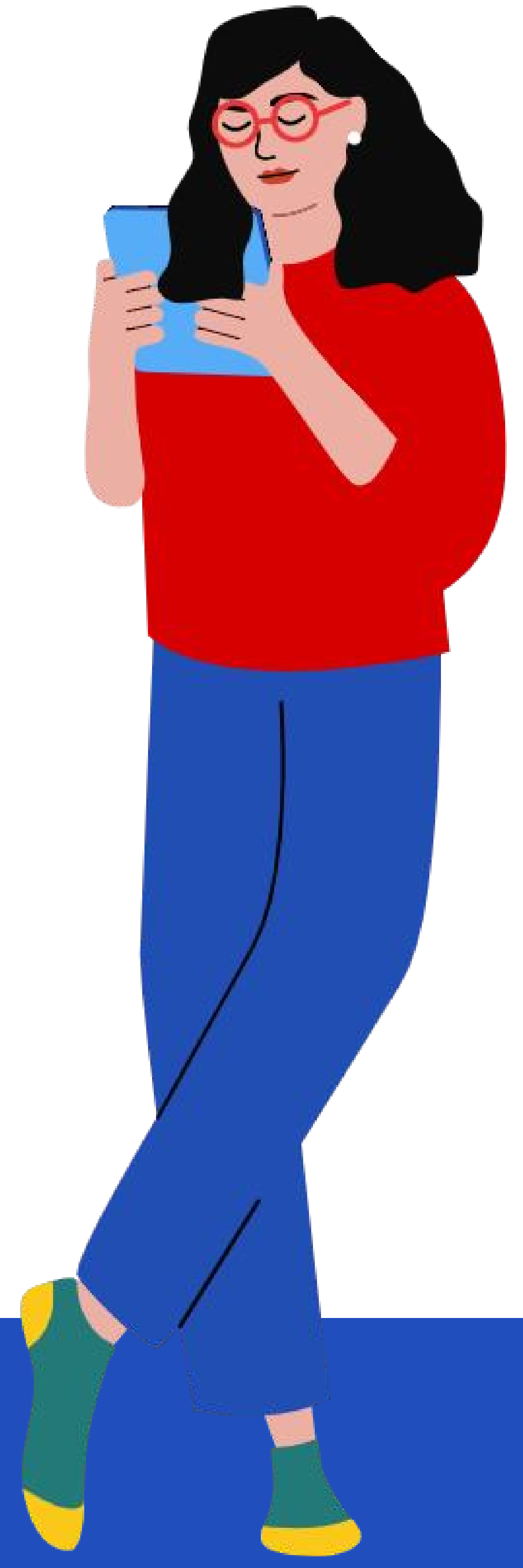
Glimpse Of The Project!



- **OUR MODEL**



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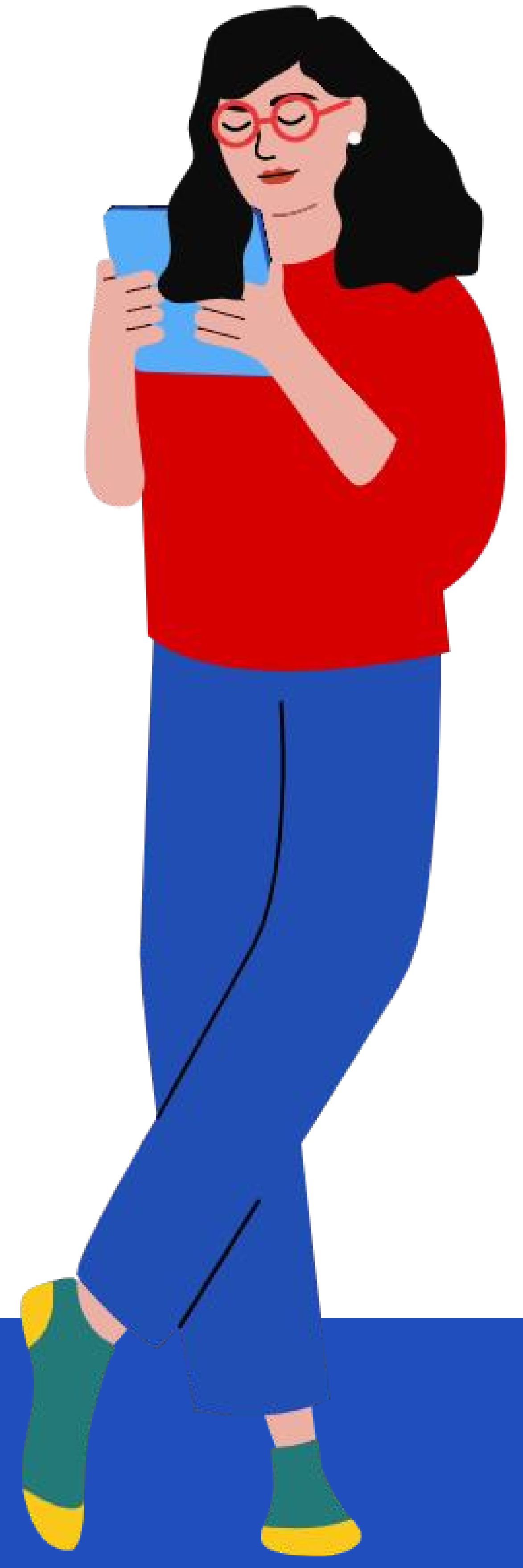
LET'S CHECK OUT THE PROTOTYPE!!!



MOBILE NET V2 ARCHITECTURE

Type: Convolutional Neural Network (CNN)

Key Features:

- **Depthwise Separable Convolutions: Reduces Computational Cost By Factorizing A Standardconvolution Into A Depthwise Convolution Followed By A Pointwise Convolution.**
- **Inverted Residuals And Linear Bottlenecks: Improves Model Performance By Optimizing The Flow Of Information Through The Network.**

WE LEARNT!

Deep Learning Implementation

Data Augmentation

Model Training and Evaluation

Image processing

Deployment with streamlit

TensorFlow lite

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Challenges faced

- Integration with Webcam
- Data Imbalance
- Model Optimization
- Real-Time Processing

Future Enhancement

1.Real-Time Alerts:
•Integrate Audio And Visual Alerts For Detected Risky Behaviors.

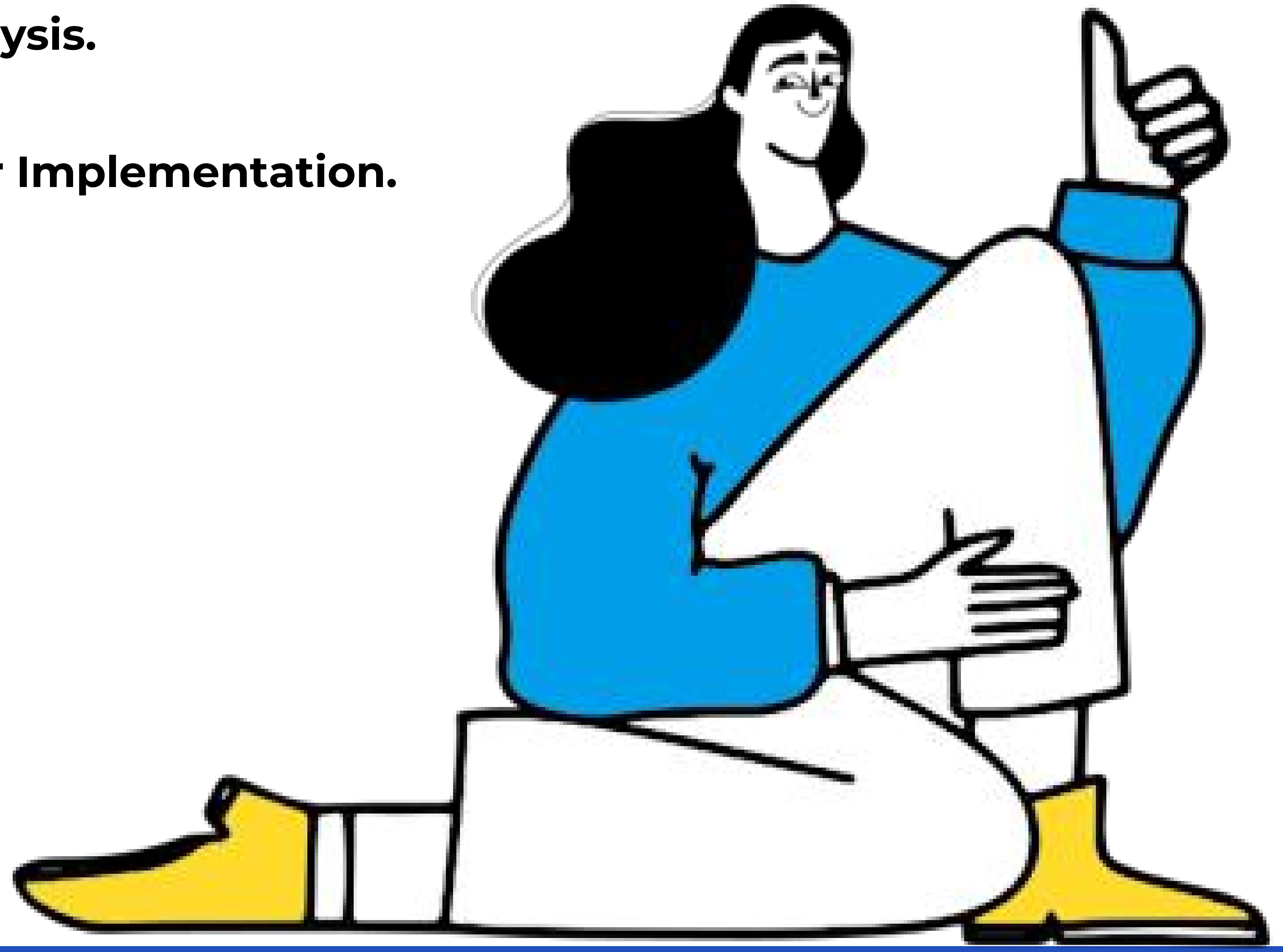
2.Extended Dataset:
•Incorporate Additional Driver Behaviors And Larger Datasets For Improved Accuracy.

3.Multimodal Inputs:
•Combine Image Data With Sensor Data (E.G., Speed, GPS) For Comprehensive Analysis.

4.Edge Deployment:
•Optimize The Model For Deployment On Edge Devices Like Raspberry Pi For In-Car Implementation.

5.Behavior Trends:
•Analyze And Visualize Driver Behavior Trends Over Time For Individual Drivers.

6.Custom Alerts:
•Allow Users To Set Custom Alerts For Specific Behaviors.



CONCLUSION

- This project demonstrates the potential of machine learning and computer vision techniques in enhancing road safety by detecting and classifying distracted driving behaviors.

- By accurately identifying various types of distractions from driver images, the developed model can be integrated into advanced driver assistance systems to provide real-time alerts, helping to mitigate the risks associated with distracted driving.