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A solution to detect violations
and take necessary action

HEXART.IN INNOVATION COHORT PROGRAM

Traffic Analysis

ABSTRACT

This project develops a **traffic management system** using **machine learning** and **computer vision** to detect "**No Parking**" and "**No Helmet**" violations. It involves capturing video data, converting it into frames, and **extracting features** for **model training**. The trained model is then used for real-time video stream analysis to identify and classify traffic violations. Leveraging **TensorFlow** and **OpenCV**, the system enhances traffic monitoring and enforcement through automated, real-time detection.

To develop an
intelligent system
that uses
machine learning
and computer
vision to detect
traffic violations
in real-time.

Mission

INTRODUCTION

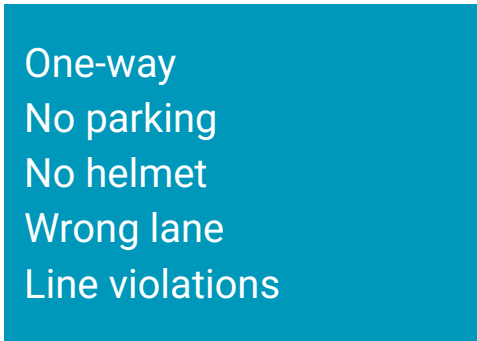
Previous problem statement was to be defined on these two classes:

- Knives
- Ambulances

We have broken it down to simple problem statements which will be solved sequentially to facilitate traffic analysis.

PROBLEM BREAK-UP

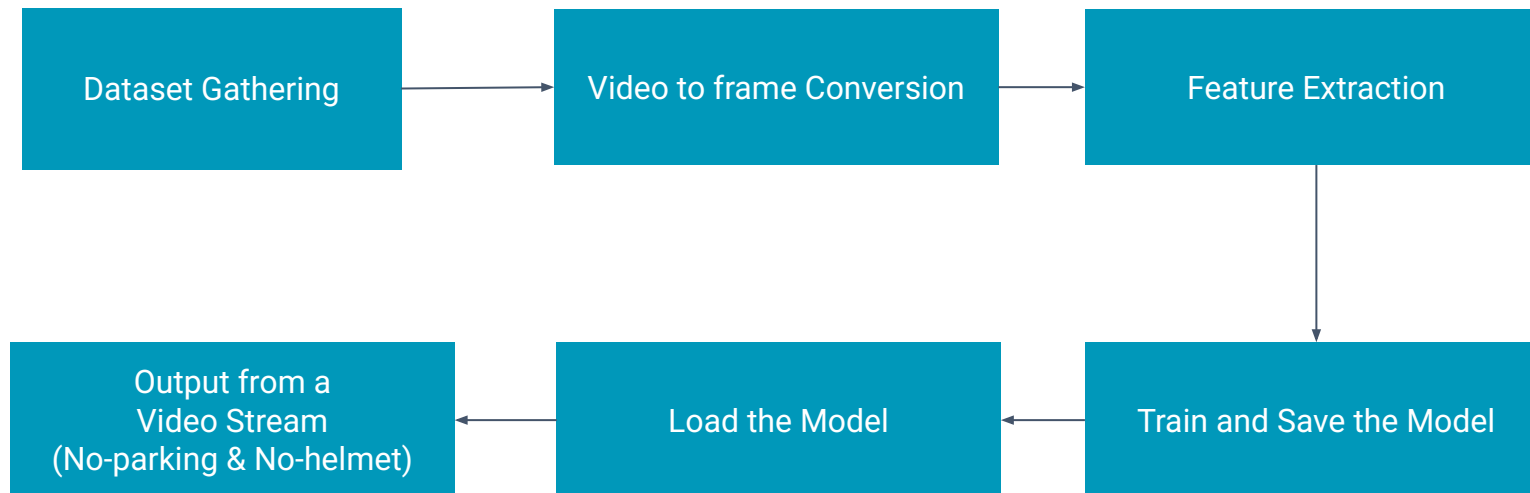
- Implementing YOLOv4 on CCTV camera footages.
- Implementing Vehicle Density on the roads: A measure of vehicle counts to determine traffic flow.
- Stop Line violation at traffic junctions.
- No Parking Violation.
- Wrong Lane Detection.



One-way
No parking
No helmet
Wrong lane
Line violations

Violations

PROPOSED SYSTEM



METHODOLOGY

Dataset Gathering

- **Objective:** Collect video data for model training and testing.

Video to Frame Conversion

- **Objective:** Prepare video data for analysis.
- **Method:** Use **OpenCV** to extract frames from the video using **Python**.

Feature Extraction

- **Objective:** Extract relevant features from frames.
- **Method:** Apply **OpenCV** for image processing and feature extraction.

METHODOLOGY

Train and Save the Model

- **Objective:** Develop a model to detect and classify traffic violations.
- **Method:** Train using **TensorFlow** and save the model in **TensorFlow SavedModel** format.

Load the Model

- **Objective:** Enable real-time model inference.
- **Method:** Load the trained model using **TensorFlow** in **Python**.

Output from a Video Stream

- **Objective:** Detect violations in live video feeds.
- **Method:** Integrate the model with live video using **OpenCV** for real-time processing.

TECHNICAL STACK

1. **Programming Languages:** Python
2. **Libraries and Frameworks:**
 - **OpenCV (cv2):** For real-time video capture, image processing, and display.
 - **TensorFlow:** An open-source machine learning framework for building and deploying neural networks, offering tools for model training, evaluation, and inference.
 - **scikit-learn:** For machine learning algorithms, specifically Random Forest classifier.
 - **NumPy:** For numerical computations and array manipulation.
 - **Pickle:** For saving and loading datasets and trained models.

OUTCOME



OUTCOME



Thank You

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Implementation Partner



CSR Partner