1. Give an elevator pitch about 100 words

This project leverages cutting-edge deep learning models, YOLOv5 and YOLOv7, for real-time traffic monitoring and safety analysis. It detects various types of vehicles, monitors vehicle count, estimates speed, and checks for motorbike helmet compliance. Using video input, it efficiently analyses traffic flow and highlights safety violations by displaying “helmet” annotations on bikers who comply. The system is scalable, offering applications in smart city infrastructure, traffic law enforcement, and accident prevention.

2. Give the following for your dataset

1. Collector: Andrew Mvd

2. Year : Not Specified

3. Title of Dataset : Helmet Detection and Traffic Rules

4. Version Number : NA

5. Publisher : Kaggle

6. URL :

<https://www.kaggle.com/datasets/ramoliyafenil/text-based-cyber-threat-detection>

7. Study/Paper/Reason: <https://ieeexplore.ieee.org/document/10215975>

Study/Paper/Reason: This dataset contains 764 images of two distinct classes for the objective of helmet detection. Bounding box annotations are provided in the PASCAL VOC format.

3. Python 3.7.0 :

For implementation the following libraries are required

* cv2
* numpy
* sklearn.model\_selection
* yolo\_traffic
* tensorflow
* matplotlib.pyplot
* pandas
* imutils
* time
* scipy
* Helmet

4. Data Preprocessing

Normalization and Shuffling

Model Training

Prediction

5. best model between YOLOv5 and YOLOv7 for this project (detecting traffic vehicles, types, speed, and helmet violations) involves evaluating several key aspects:

1. Model Performance Comparison

2. Key Metrics to Compare

3. Considerations for Traffic Detection

4. Hardware Availability

5. Recommendation

6. Model: Trained YoloV7 and YoloV5 algorithm to perform various detection such as Number of traffic vehicles, type of vehicle, vehicle speed and detecting weather biker has wear helmet or not

* Learning Rate: Controls how much to adjust the model's weights with respect to the loss gradient.
* Batch Size: The number of training samples utilized in one iteration.
* Number of Epochs: The number of times the learning algorithm will work through the entire training dataset.
* Confidence Threshold: The minimum confidence score for a detection to be considered valid.
* Input Image Size: Dimensions to which input images are resized before being fed into the model.
* Data Augmentation Techniques: Methods like flipping, scaling, or rotation applied to training images to improve model generalization.

7. Metrics: Accuracy, Precision, Recall, F1-Score Values