VEHICLE CLASSIFICATION USING YOLO

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Presented To

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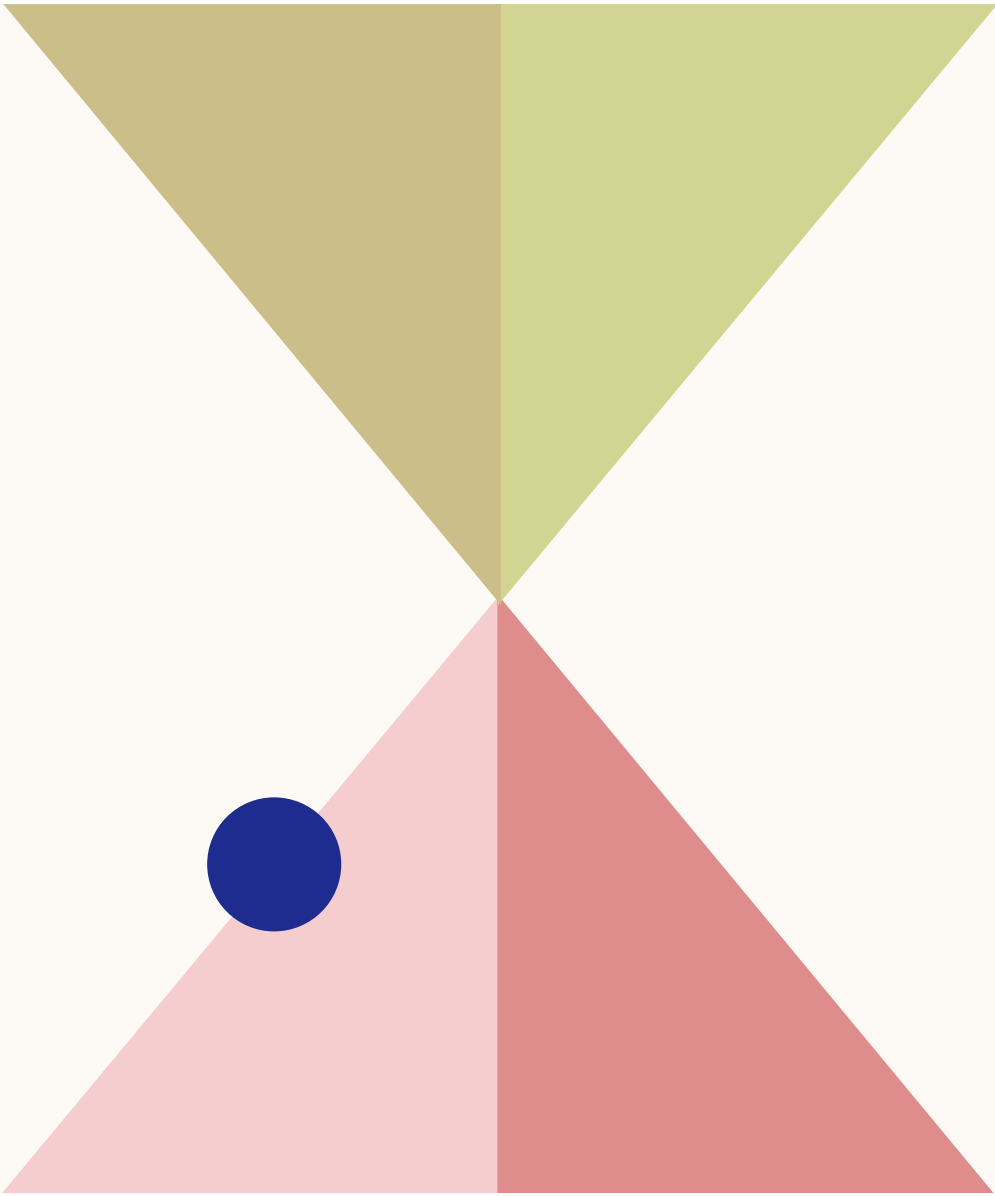
CONTENT

- Introduction
  - Motivation
  - Objective
  - Contribution
- Related Works
- Dataset
- Challenges
- Future Work



INTRODUCTION

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In every day, People use transportation services to reach their destination place. That's why road safety and parking area monitoring are essential in regular basis. So Some Agency and company need to collect those data for their business plan. But there are huge Collection of Traffic or Parking area data that are very crucial and difficult to handle manually.

To overcome this situation there are different types of algorithm in Artificial Intelligence to make life easier.

MOTIVATION

Vehicle classification is an important task in various fields. But our main goal is law enforcement and public safety.

- Vehicle classification can be used by law enforcement agencies to identify vehicles that may be involved in criminal activity.
- Vehicle counting can inform driver that which road is occupied with large number of vehicles and suggest a less busy road to driver.
- Vehicle classification can help identify overloading or overweight vehicles that may pose a safety risk on the road.

OBJECTIVE

- ✓ Detect or Identify the vehicles type
- ✓ Counting the Number of vehicles
- ✓ Inform about the traffic Condition
- ✓ In and Out Information about vehicles

CONTRIBUTION

- ✓ Analyze Existing Paper about Object detection
- ✓ Research about Yolo Pre-trained Model
- ✓ Trained and Detect vehicles Using COCO/Darknet Dataset
- ✓ Implement Yolo-v8 Algorithm to detect Vehicles Types
- ✓ Deep Sort Implemented for Vehicles counting

RELATED WORKS

Literature Review of Existing Paper about vehicle classification.

“An Improved YOLO v2 for Vehecle Detection”

In this paper, by improving YOLO- v2, a model called YOLOv2_Vehicle was proposed for vehicle detection. To obtain better anchor boxes, the vehicle bounding boxes on the training dataset were clustered with k-means clustering, and six anchor boxes with different sizes were selected. Next, the loss function was improved with normalization to decrease the influence of the different scales of the vehicles.
Based on the experimental results, them YOLOv2_Vehicle could reach 94.78%. In future work, we will collect more actual vehicle data to further study how to improve the accuracy and speed of vehicle detection.

"Vehicle Classification in Video Using Deep Learning"

In this paper, three training data set manually created from two videos in the low video quality category for training the Faster R-CNN and the YOLO deep learning methods Vehicle Classification in Video Using Deep Learning.
Also used AlexNet, a pre-trained convolutional neural network, is used to perform feature extraction which is an integral part of the tracking algorithm aimed at further reducing the errors in track association.

"Vehicle Classification Using Convolutional Neural Networks" by Zhang et al., published in 2018

This research study used YOLOv4 object detection and DeepSORT tracking models to count and classify vehicles into 13 FHWA vehicle classes from video footages from existing roadside cameras. YOLOv4 was also used to detect the presence of rumble strips from roadway images and used to create a rumble strip inventory map. The trained vehicle counting/classification model achieves a counting accuracy of ~97% at daytime and ~91% at nighttime. The rumble strip detection model has ~95% accuracy.

DATASET

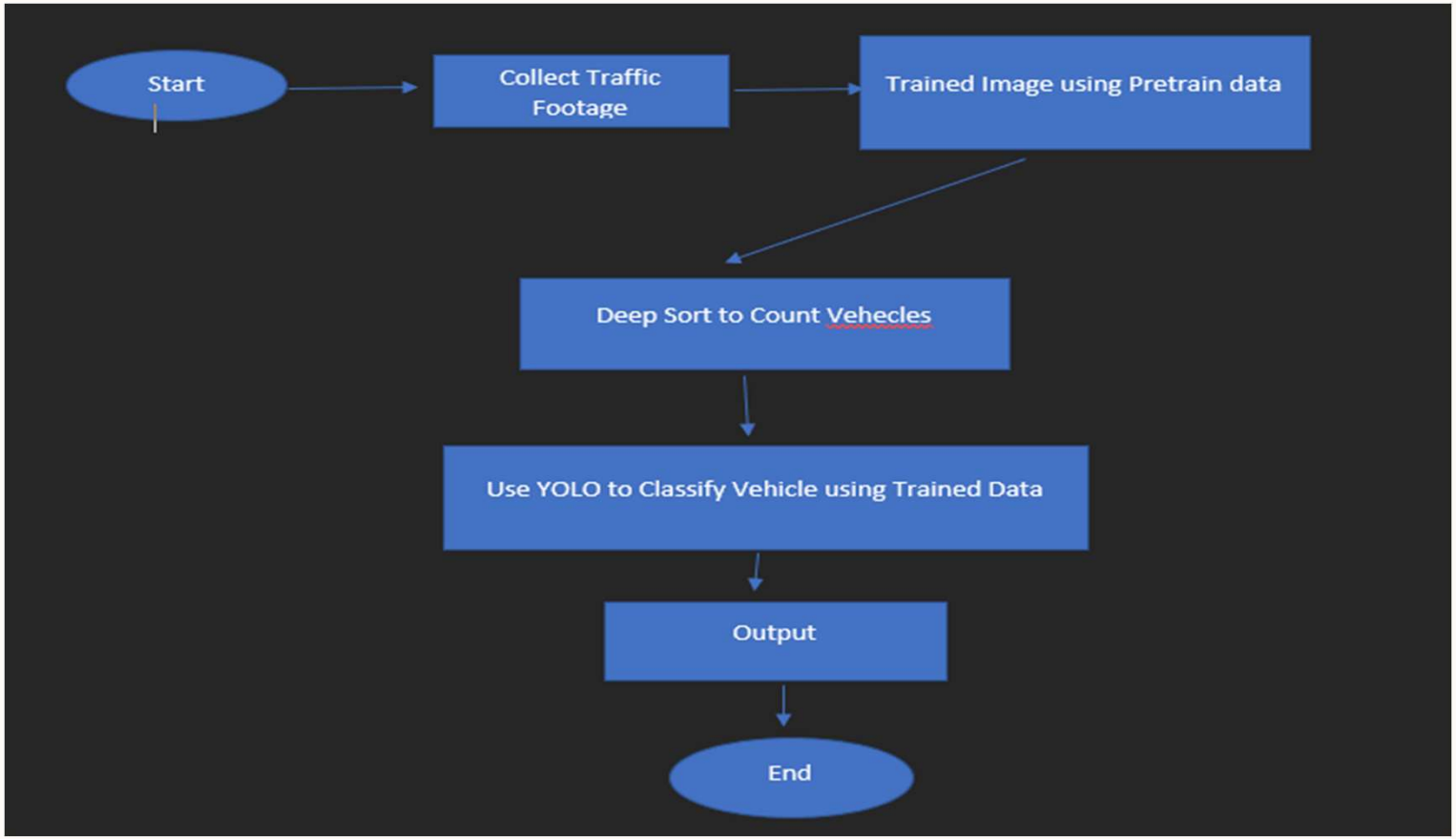
DATASET

The COCO (Common Objects in Context) or Darknet or AlexNet dataset is a widely used large-scale image recognition dataset for object detection, segmentation, and captioning tasks. It contains over 330,000 images, each annotated with bounding boxes around the objects in the image, as well as segmentation masks for some objects and captions describing the scene.

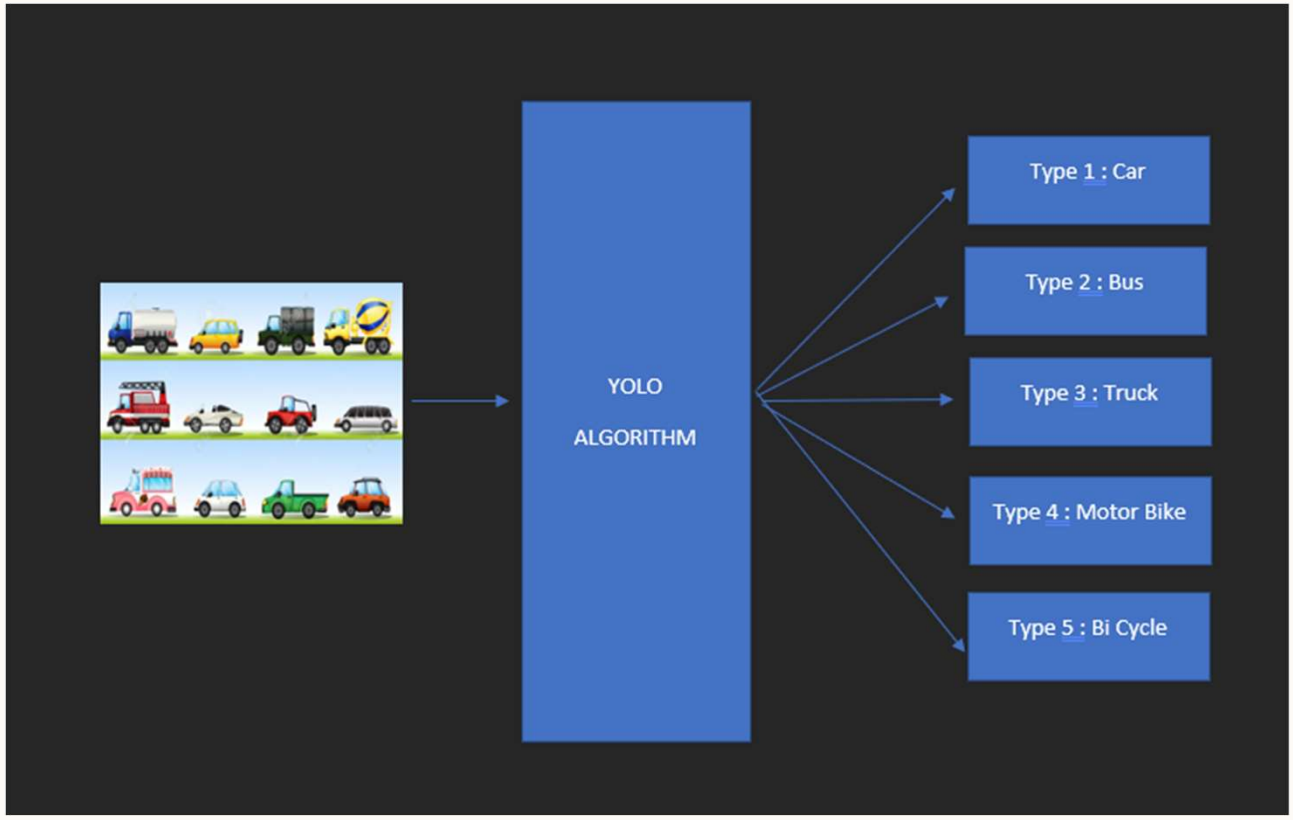
Pretrained models trained on the dataset are often used as a starting point for many computer vision tasks. There are several popular deep learning frameworks, such as Yolo, TensorFlow, PyTorch, and MXNet, that provide pretrained models trained on the COCO dataset. These models can be downloaded and used to perform object detection, segmentation, or captioning on new images or videos.

FLOW CHART

FLOW CHART


Start
Collect Traffic Footage
Trained Image using Pretrain data
Deep Sort to Count Vehecles
Use YOLO to Classify Vehicle using Trained Data
Output
End

YOLO


YOLO
ALGORITHM
Type 1 : Car
Type 2 : Bus
Type 3 : Truck
Type 4 : Motor Bike
Type 5 : Bi Cycle

CHALLENGES

CHALLENGES

Vehicle classification is a challenging task that requires careful consideration of the various factors that can affect the accuracy of classification.

- Variability : Vehicles can come in different shapes, sizes, and colors, which can make it difficult to accurately classify them based on their visual characteristics alone.
- Scale variation : Vehicles can appear at different scales, which can affect their visual characteristics and make it difficult to classify them accurately.
- Lighting conditions : Lighting conditions can affect the appearance of vehicles, making it challenging to classify them accurately under different lighting conditions.
- Class imbalance : Some vehicle classes may be underrepresented in the dataset, which can make it more difficult to train a classifier that performs well on all classes.
- Complex backgrounds : Vehicles may appear against complex backgrounds, such as busy streets or natural landscapes, which can make it difficult to isolate the vehicle and accurately classify it.

CONCLUSION
&
FUTURE WORK

CONCLUSION

Vehicle classification is an important task that has many applications in transportation, public safety, and other fields. In recent years, there have been significant advances in the use of deep learning algorithms, such as YOLO and Deep SORT, for vehicle classification.

Together, YOLO and Deep SORT can be used to accurately detect and classify vehicles in real-time. However, there are also many challenges associated with vehicle classification, such as variability in appearance, occlusion, and lighting conditions.

Overall, vehicle classification using YOLO and Deep SORT is a promising area of research that has important applications in a variety of fields. Further research and development in this area could lead to significant improvements in transportation safety and efficiency.

FUTURE WORK

- Multimodal classification : Vehicle classification can be improved by incorporating information from multiple modalities, such as images, videos, and sound.
- Transfer learning : Future work could explore the use of transfer learning for vehicle classification, which could reduce the amount of labeled data needed for training and improve performance on underrepresented classes.
- Real-time applications : Real-time vehicle classification has important applications in areas such as traffic management and autonomous driving. Future work could focus on developing efficient and accurate methods for real-time vehicle classification.

REFERENCES

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THANK YOU

ANY QUESTION?