Parking Space Identification for Indian Roads

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Abstract

Objective : Identifying free and legal parking spaces on the sides of indian roads.

Purpose : The purpose of this project is to develop an automated system for efficient parking space identification on Indian roads. Our objectives include addressing the issue of parking space scarcity, reducing traffic congestion, and enhancing urban mobility.

Method: To achieve accurate parking space identification, we have utilized the YOLOv7 Instance Segmentation framework.Instance segmentation allows us to detect and segment individual parking spaces, resulting in more precise identification compared to bounding boxes.

Dataset Collection

We attached two cameras to the side of a car to simultaneously obtain the image of what is in front and what is on the ground.

This provides the model better context as to how to decide if a spot on the road is considered a legal parking space or not. By taking into account the objects in front of it and the objects on the ground.

Why instance segmentation ?

In the context of parking space identification, instance segmentation plays a crucial role in accurately detecting and segmenting each parking space separately, allowing for more precise analysis and utilization of parking resources.

By utilizing instance segmentation, our project aims to overcome the limitations of traditional methods that only provide bounding box detection without distinguishing between individual parking spaces.

YOLOv7: A Powerful Framework

Our YOLOv7 instance segmentation model was trained on over 700 custom labelled images.

We used 15 different labels :
Bus_stand, Free_parking, No_parking, Property, Property_entrance, Side_street, Store, Store_entrance, Store_reserved_parking, Temple, Transformer, Utility_box, Vendor, Water_tank.

Training the model took around 3 hours and we obtained a mean average precision of 58.7%.

Sample outputs

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Even though this space may seem empty the model is trained to identify objects such as stores and parking spots specifically reserved for these stores. Due to this reason it will mark the empty space as No_parking even though you could park your car there.
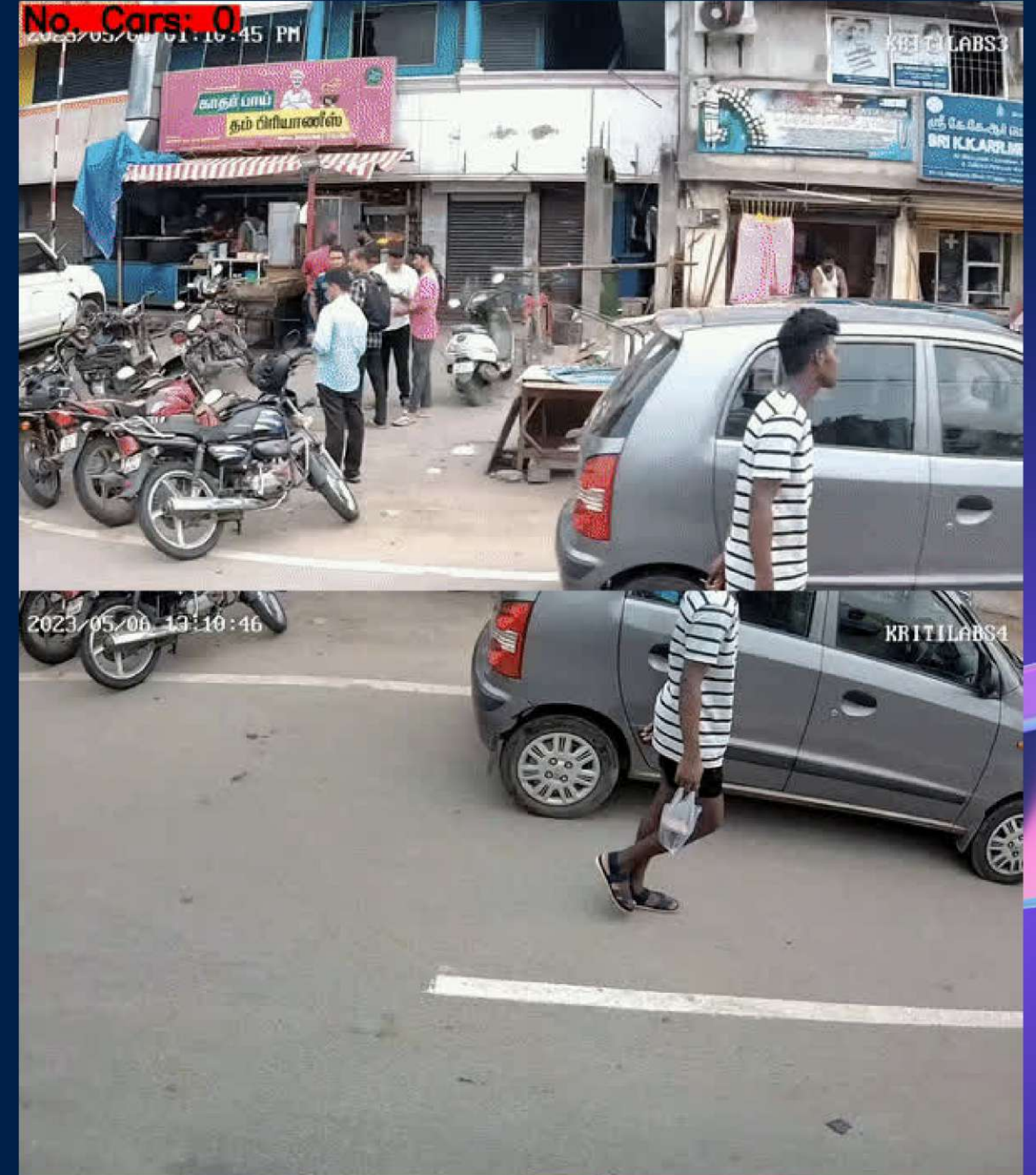
We have also developed an add-on function that is capable of dynamically segmenting parking spaces. To calculate the number of bikes that can be parked in the identified spot.

Future Work

- Implement deepsort library for automated parking space counting

- Label and segment more images to train the yolov7 model.

Thank You

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