HUMAN OBJECT DETECTION AND TRACKING ON STREETS FOR ROAD SAFETY USING MATLAB

Submitted by

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Contents

Introduction

- Human object detection is the process of identifying one or more human objects in videos.
- It has been regarded as the most complex and challenging problem in the Field of computer vision due to variations caused by the changes in physical appearance, lighting.
- Human object detection is an essential and significant task in any intelligent video surveillance system, as it provides the fundamental information for semantic understanding of the video footages.

Human object detection and tracking

- Detection and tracking is done using image processing techniques.
- First a video is captured on the street and it is processed in Matlab.
- In the process a Matlab code is developed that detects the human objects and highlights them using the tracker.
- The tracker tracks the highlighted human objects.
- The tracked objects can be useful for the people travelling on the roads for road safety purpose.
- It can run in Matlab or as a stand-alone application.

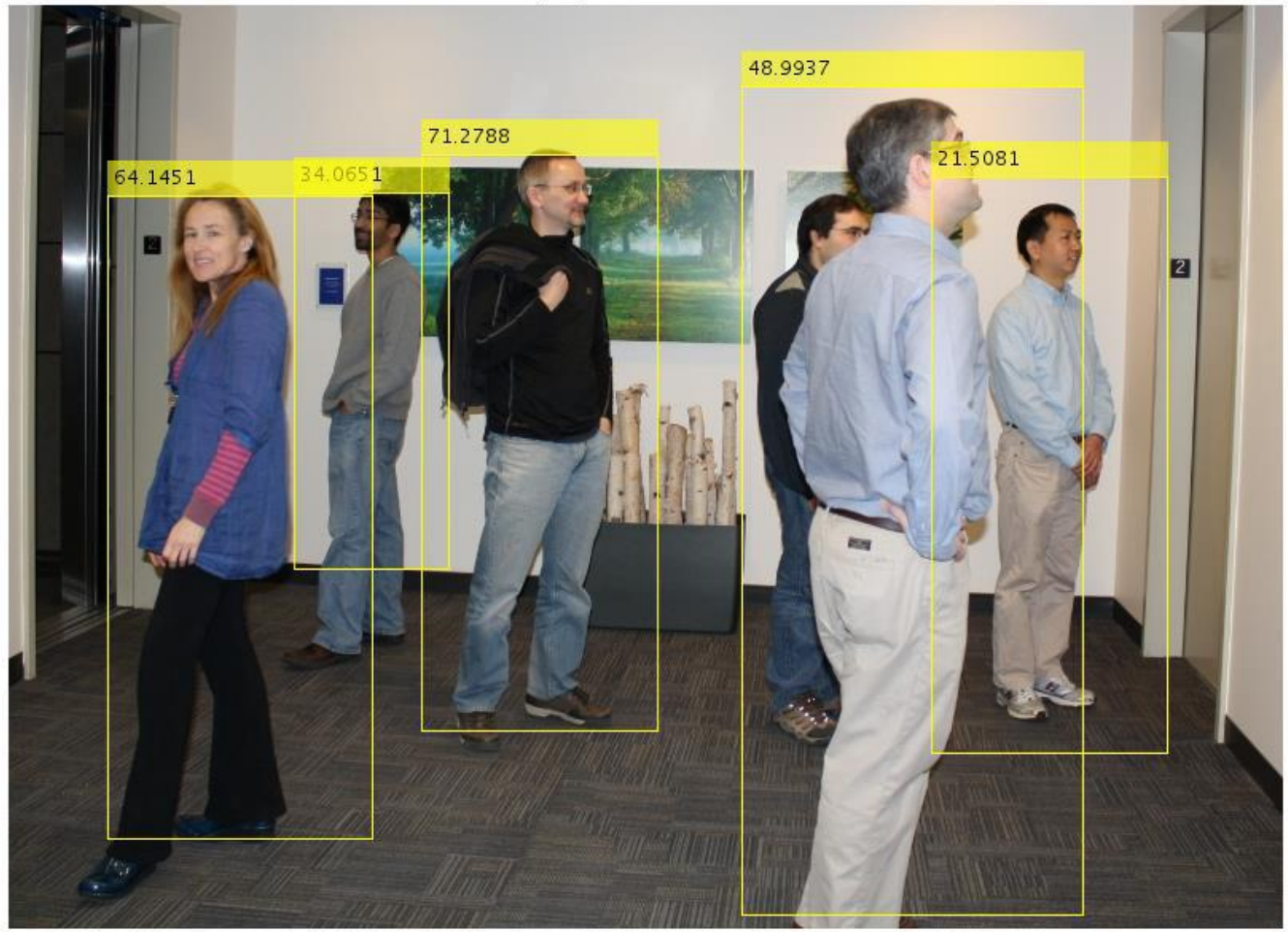
Techniques used in this process

Aggregate Channel Features Technique

Detect the human objects using aggregated channel features.

- Read an image.
- Detect people in the image and store results as bounding boxes and score.
- Annotate the detected upright people in the image.
- Display the results with annotation.

Detected people and detection scores



Kalman Filter

- Used for tracking the detected human objects.
- Kalman filter will predict the centroid of each track in the current frame, and update its bounding box accordingly.
- We take the width and height of the bounding box in previous frame as our current prediction of the size.

We preferred Kalman filter for tracking new locations because of the following reasons

- Good results in practice due to optimality and structure.
- Convenient form for online real time processing.
- Easy to formulate and implement given a basic understanding.

GUI

- We have created GUI using GUIDE.
- GUIDE is GUI Developing Environment.

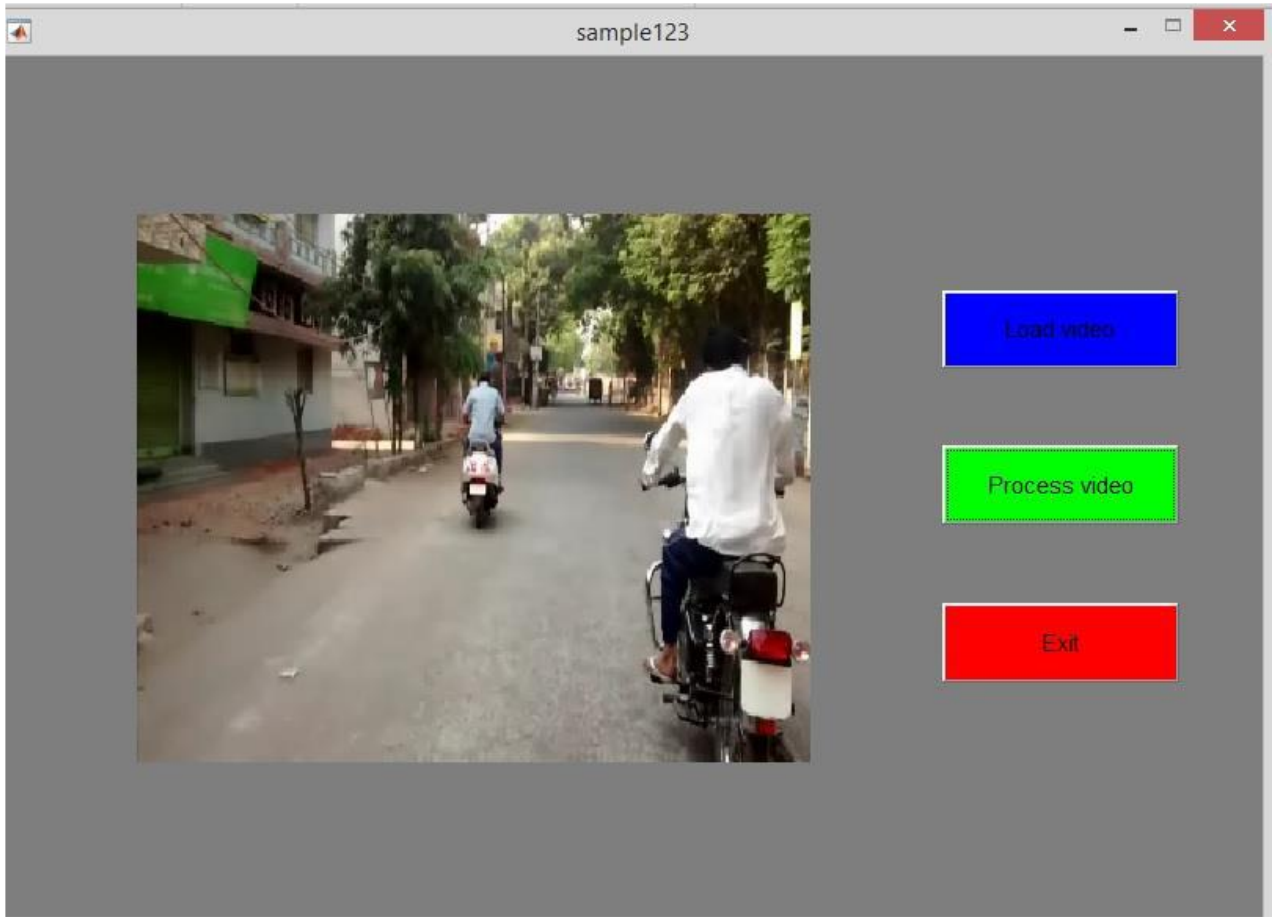
Steps Involved

- Auxiliary Input and Global Parameters of the Tracking System
- Create System Objects for the Tracking System Initialization
- Initialize Tracks
- Read a Video Frame
- Detect People
- Predict New Locations of Existing Tracks

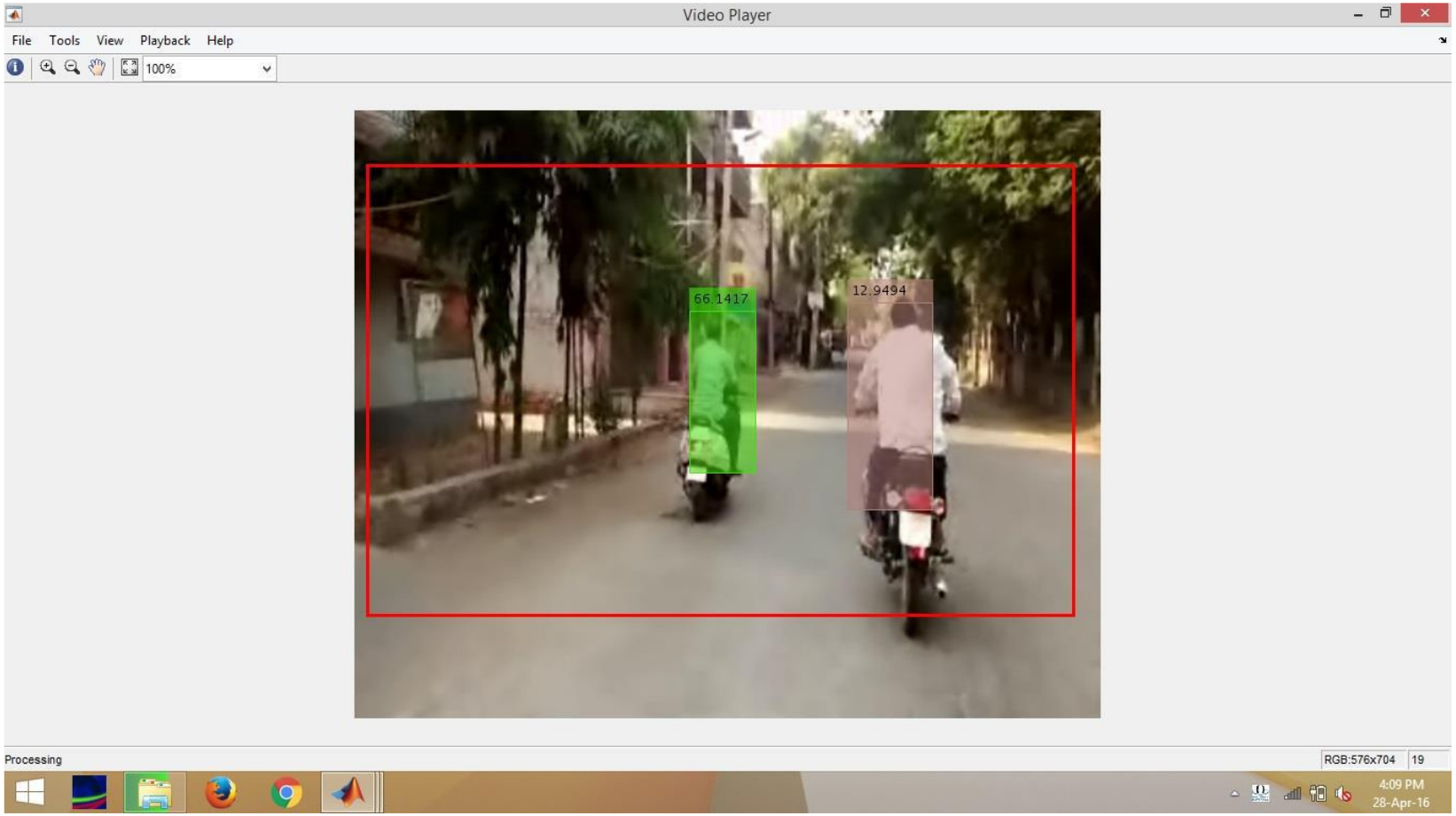
Steps Involved(cont’d)

- Assign Detections to Tracks
- Update Assigned Tracks
- Update Unassigned Tracks
- Delete Lost Tracks
- Create New Tracks
- Display Tracking Results

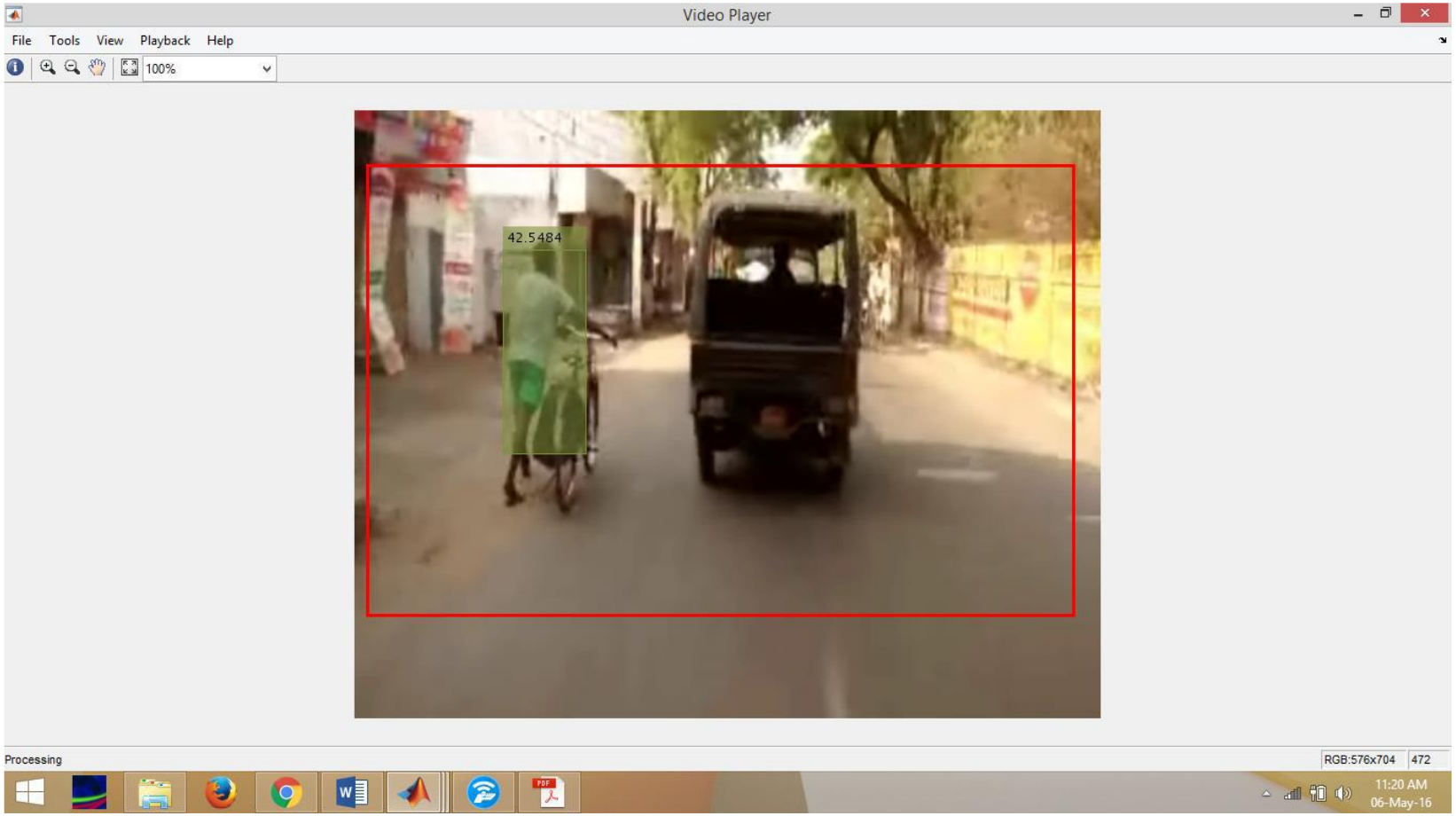
Results



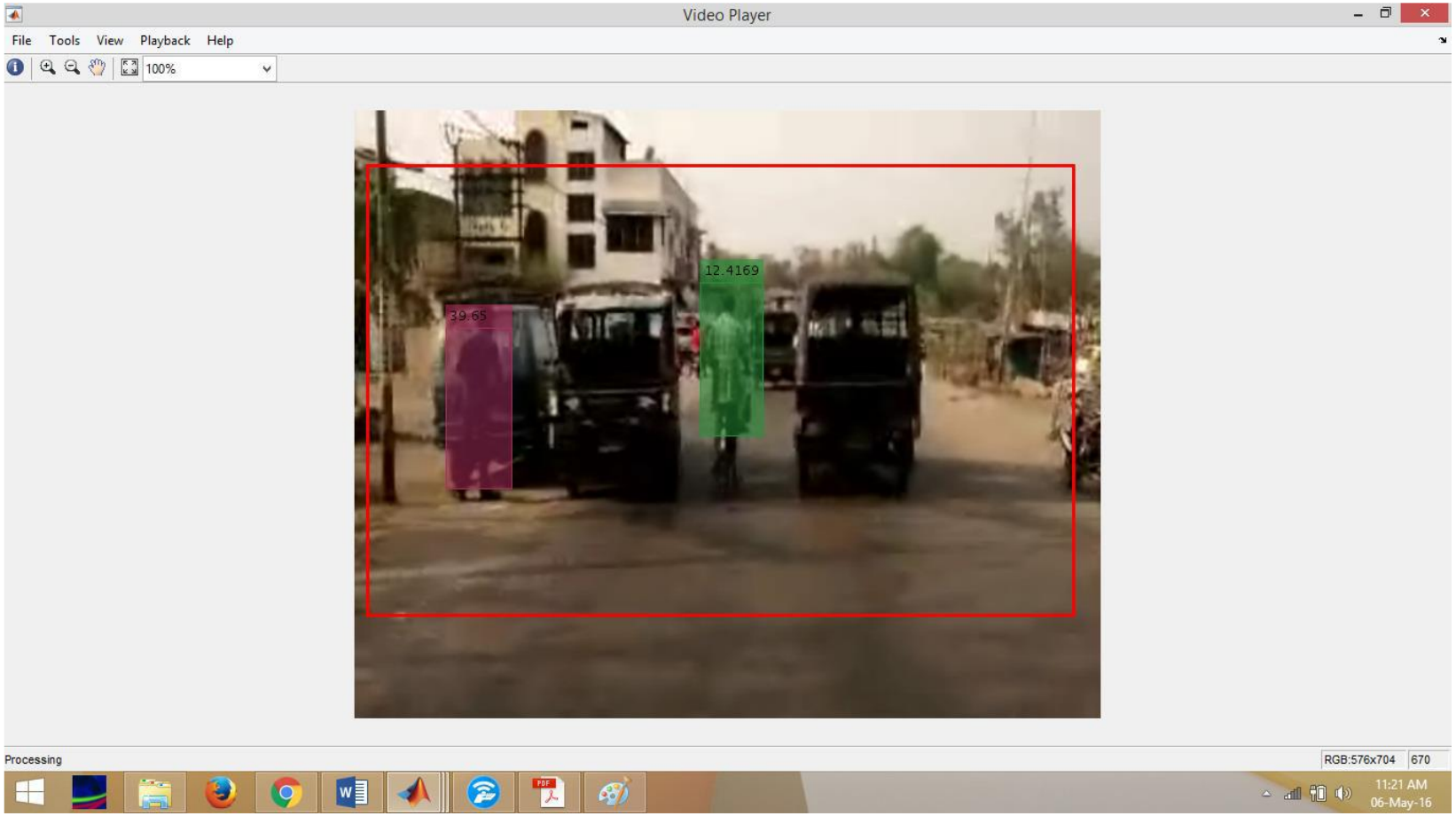
Results(cont’d)



Results(cont’d)



Results(cont’d)



Applications

- Road Safety by highlighting the pedestrians along the street.
- Providing enhanced view of the street for the people having poor vision.
- It can be used to prevent traffic jams by providing the information about the crowding on the roads in advance.
- This technique has application in driver-less cars.
- It is used in security and surveillance systems.

Conclusion

- “Human object detection using MATLAB” technique that we propose will overcome most of the limitations of the earlier and in use techniques.
- This project involves techniques like Aggregate Channel Feature , Kalman Filter etc. that are implemented in Matlab for detecting and tracking human objects .
- If we use live video by attaching the camera to the car, the pedestrians are highlighted and it helps the drivers for recognizing them in dim lights and for having an enhanced view of the street.
- As the equipment needed for the implementation of the project is very minimal, the project can be used on a large scale.

References

[1] Rafael C. Gonzalez and Richard E. Woods., “Digital Image processing”,3rd edition,pearson,2009.

[2] Dollar, C. Wojeck, B. Shiele, and P. Perona. "Pedestrian detection: An evaluation of the state of the art." Pattern Analysis and Machine Intelligence, IEEE Transactions.Vol. 34, Issue 4, 2012, pp. 743–761.

[3] Dollar, C., Wojeck, B. Shiele, and P. Perona. "Pedestrian detection: A benchmark." IEEE Conference on Computer Vision and Pattern Recognition. 2009.

[4] Hunt Lipsman & Rosenberg, “A Guide to MATLAB for Beginners and Experienced Users”,2nd edition,pearson,2009.

THANK YOU