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# Cars and Pedestrian Detection

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***Abstract*- Cars and Pedestrian detection are widely applied to intelligent video surveillance, intelligent transportation, automotive autonomous driving or driving-assistance systems. We select OpenCV as the development tool for implementation of cars and pedestrian detection in a video segment. This application will be developed in Python using OpenCV.**

***KeyWords: OpenCV, Machine Learning, Python, Pedestrian Detection, Vehicle Detection***

## 1.INTRODUCTION -

Lately, there has been a lot of advancement in the field of Computer Vision. Object tracking is the most commonly used procedure for detecting moving objects beyond time by utilizing the camera in video sequences. The main aim of object tracking is to relate the target objects as well as the shape or features, location of the objects in successive video sequences. Subsequently, the classification of objects and its detection is essential for object tracking in computer vision application. Additionally, the tracking is the initial step towards detecting any moving object in the frame. Furthermore, the objects that are detected could be divided as swaying tree, birds, human, and vehicles and so on. Although, in image processing approach object tracking with the help of video sequences, is a challenging task. Furthermore, several other issues appear ascribed to occlusion of the object to scene, object to object, complex object motion, real-time processing requirements as well as the improper or distorted shape of the object.

However, this type of tracking is being used in many places now-a-days, few of them are traffic monitoring, robot vision, surveillance and security and video communication, public areas like underground stations, airports, mass events and animation. Thus, the application needs an optimal trade-off among computing, communication, and accuracy over the network. The revenue related to computing and communication relies on the amount and type of cooperation executed among cameras for data collection, dispensing and processing to confirm decisions and to reduce the estimation errors and ambivalence. Subsequently, this tracking can be explained as the procedure of determining the orientation of object across the time as the object moves throughout a scene.

Object tracking is imposing its importance in the area of computer vision because of the expansion of high- powered computers and the growing need for automated surveillance systems and such. It is now-a-days mainly used in the sector of automated surveillance, robotics monitoring, human-machine interface, motion-based recognition, vehicle navigation, traffic monitoring and video indexing. A substantial number of such applications require much reliable and efficient tracking methods which meet to the real-time restrictions and are challenging and complex with respect to changes of object movement, scale and appearance, illumination of scene and occlusion. The results of object tracking could be impacted by the disparity of one among the parameters. To tackle the above explained issues and others in object tracking, a large number of approaches have been proposed. In this object tracking application, target will be cars and pedestrians. The capability of machines to identify the suspicious object and further identify their activities in a specific environment is an important part of permitting a machine to interact with humans in effective and easy manner. The current approach for analyzing and detecting the suspicious object usually needs exceptional marker connected to the suspicious object that prevents the extensive technology application. In this paper, we try to implement cars and pedestrian detection and try to provide efficiency by adding time library.

## 2.LITERATURE REVIEW

In the previous study the papers were only focusing on object detection or object tracking. (Ben Ayed et al., 2015; Najva and Bijoy, 2016; Ramya and Rajeswari, 2016; Risha and Kumar, 2016; Shen et al., 2013; Soundrapandiyan and Mouli, 2015; Viswanath et al., 2015) ,Object tracking (Bagherpour et al., 2012; Foytik et al., 2011; Lee et al., 2012; Poschmann et al., 2014; Yilmaz et al., 2006; Zhang et al., 2016) and Object recognition (Chakravarthy et al., 2015; Gang et al., 2010; Ha and Ko, 2015; Nair et al., 2011) for tracking the object using video sequences with the help of camera. These are discussed as follows. The basic flow diagram of an object tracking shown in shown in figure 1.

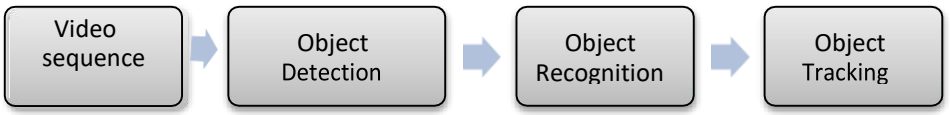


Figure 1 The Basic flow diagram of Object tracking

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## 3.STUDIES RELATED TO OBJECT DETECTION

In most of the application, object detection plays a vital role and specifically in video surveillance applications where objects are detected through a video footage (Amandeep and Goyal, 2015). Various types of object detection are illustrated in the figure 2.

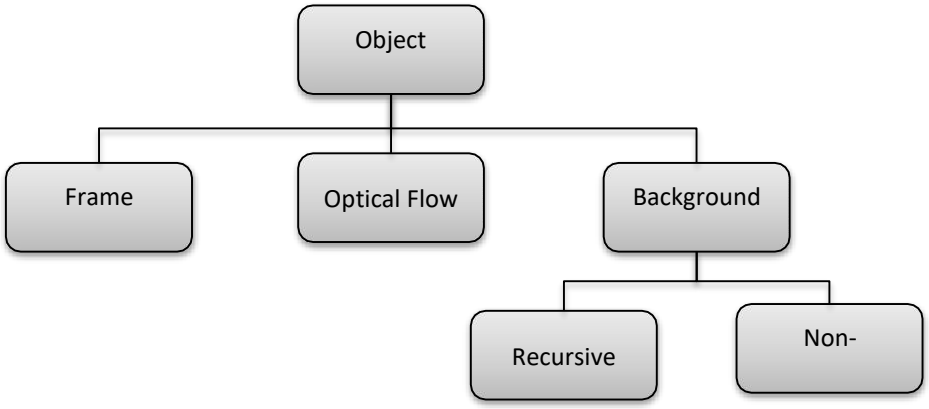


Figure 2 Types of object detection method

Table 1 Comparative Study of Object Detection technique

| **Object D Method** | | **Basic Principle** | **Computational Time** | **Accuracy** | **Comments** |
|---|---|---|---|---|---|
| Temporal Differencing | | Pixel-wise Subtraction of Current & Background frame | Low | High | Easy to implement (Chate et al., 2012; Mohan and Resmi, 2014) |
| | | | | | Sensitive to dynamic changes (Haritaoglu et al., 2000) |
| | | | | | Needs background frame with still objects (Mohan and Resmi, 2014) |
| Background Subtraction | Frame Differencing | Current frame is subtracted from background frame | Low to Moderate | Moderate to High | Simplest background Subtraction (Aldhaheri and Edirisinghe, 2014; Haritaoglu et al., 2000) |
| | | | | | Cannot be used for real-time applications (Mohan and Resmi, 2014) |
| | Approximate Median | Simple subtraction between median frame & test frame | Low to moderate | Moderate | No need for adequate background modeling (Aldhaheri and Edirisinghe, 2014) |
| | | | | | Requires a buffer with recent pixel values (Aldhaheri and Edirisinghe, 2014) |
| | Running Gaussian Average | Based on Gaussian probability density function of pixels | Moderate to high | Moderate | Much suitable for real-time applications (Aldhaheri and Edirisinghe, 2014) |
| | | | | | Statistical calculations consumes more time |
| | Mixture of Gaussian | Based on multimodal distribution | Moderate to high | Moderate to high | Low memory requirement (Zhiqiang et al., 2006) |
| | | | | | Cannot cope up with objects as well as noise(Tao Zhang et al., 2010) |
| Optical Flow | | Uses optical flow distribution characteristics of pixels of object | Moderate to high | High | This approach offers entire moving data(Krishna et al., 2011) however require more calculations |
| | | | | | |

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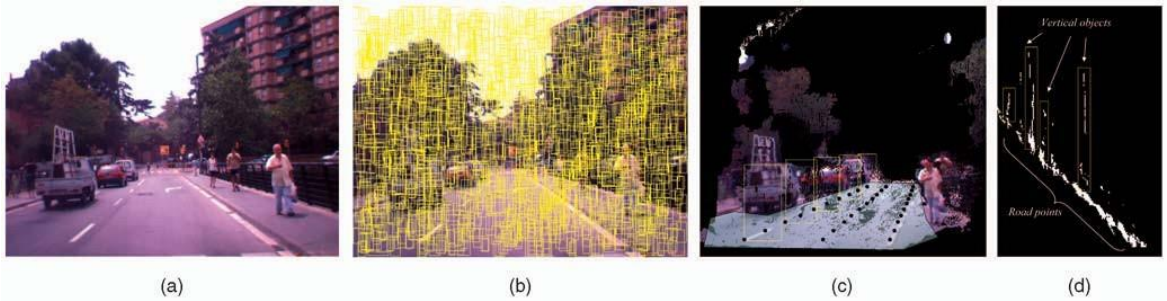
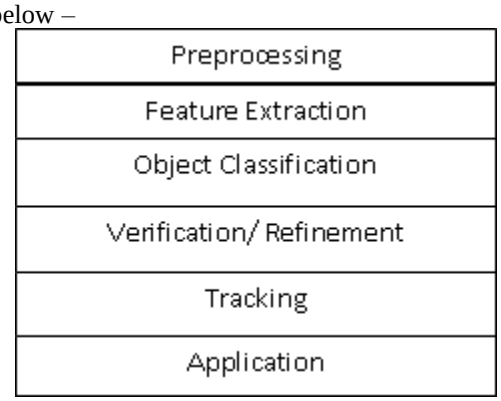
## 4.LITERATURE REVIEW –




The above diagram or figures represent foreground segmentation schemes. Here, (a) Original image. (b) Exhaustive scan (just showing 10 percent of the ROIs). (c) Sketch of road scanning after road fitting in euclidean space . (d) Results of v-disparity applied to the same frame.

## 5.WORKFLOW OF SYSTEM-

Working flow of system is depicted as below –




Work flow of cars and pedestrian detection system

## 6.PREPROCESSING –

The preprocessing segment consists of various tasks which are required at the initial stage such as exposure time, gain adjustments, and camera calibration, to mention a few. Some low-level adjustments are done which are normally not illustrate in ADAS literature, some of the researchers have targeted image enhancement through these systems. There are two approaches for this namely monocular and stereo vision based.

We can classify the different features as:

- General features: General features are features that are application independent such as color, texture, and shape. According to the abstraction level, they can be further divided into: Pixel-level features: Features that calculated at each pixel, for ex. color, location.
- Local features: Local features are those features that are calculated over the results of subdivision of the image band on image segmentation or edge detection.
- Global features: These are the features that are calculated over an entire image or just regular sub-area of an image.
- Domain-specific features: Domain-specific features are nothing but application dependent features such as fingerprints, human faces and also conceptual features. These features are nothing but a synthesis of low-level features for a specific domain.

All of the available features can be classified into either low-level features or high-level features. Low-level features are extracted directed from the original images whereas the extraction of high- level feature is based on low level features.

## 7.TRACKING-

The most of the advanced systems use a tracking module in order to track detected cars and pedestrians over time. This step has several reasons like avoiding false detections over time, predicting future positions of cars and pedestrians, thus feeding the foreground segmentation algorithm with pre-candidates, and, at a higher level, making useful inferences about pedestrian and cars behaviour (e.g., walking/driving direction).

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## 8.CONCLUSION

In this paper, review on different object detection, tracking, recognition techniques, feature descriptors and segmentation method which is based on the video frame and various tracking technologies along with our proposed cars and pedestrian detection system. This application provides accuracy and efficiency over such similar applications. We have also considered various limitations as well as advancement regarding this proposed application but it is way too complex at this day.

## 9.FUTURE SCOPE

- We could design simulation of complex video sequence and test them using same tracking algorithm. In the expected scenario, occlusion is used for an object with the same color for the moving objects or else using bigger occlusion with longer occlusion time. Increasing the number of objects will provide better efficiency and functionality to the tracking algorithm.
- Weight parameters could be added for the intensity of each individual pixel. In any image, if the intensity value is assigned as foreground based on the current frame then the probability that foreground also has similar pixel coordinate is reduced in order for BG weightage for the pixel is set to the minimum than the initial value. By adding a weightage lower than the initial value can provide with the advantage of removing the old pixel value with least probability rather than the evolved scene.

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