Object Detection and Motion Tracking

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ABSTRACT
Tracking, learning and detection in the real video is very important for video surveillance. In this paper we proposed the object detection method.In this project we have implemented deep learning algorithm which uses OpenCV framework. Output is depends on complex shapes, rapid motion and illumination changes.

Keywords:-*Deep Learning, OpenCV framework, object detection, Neural Networks*

INTRODUCTION

Human eye's can easily detect the things in real time, but make computer to do this by AI plays important role. Our goal is to automatically determine the object's bounding box or indicate that the object is not visible in every frame that follows tracker assigns consistent labels to the tracked objects in different frames of video.

Applications of object detection and tracking involves human-computer interaction, security and surveillance, video communication and compression, augmented reality, traffic control, medical imaging [1] video editing.

LITERATURE REVIEW

Bhusan Nemade and Dr.Vinayak Bharadi, "Adaptive Automatic Tracking, Learning and Detection of any real time object in the video stream" 2015 International conference on Next generation Information Technology. [2]

Here authors have tried to implement P-N learning algorithm for the detection of object in the surveillance video.

This paper has tried to overcome the problem that occurs when tracking becomes difficult due to the change in the appearance of object when projected on image plane.

This project also overcomes the problem related to the object having similar shape and color as that of undesirable object.

Xiao Liu, Dacheng Tao, Mingli Song, Luming Zhang, Jiajun Bu, and Chun Chen "Learning to Track Multiple Targets" IEEE Transaction on Neural Networks And Learning System. This paper have proposed a framework for detection and tracking of multiple objects.[4]

In this authors are trying to implement algorithm for detecting, learning and tracking of multiple object. Each of these algorithms will work simultaneously for the object.

This paper deals with the problem of automatically tracking a variable number of targets by using high definition camera to capture video and processes using video processing techniques in congested scenes camera.

This method decreases the post processing mistake risk and improves the performance in tracking. It is efficient in many cases like vehicle tracking in congested traffic.

Bin Sun, Zhi Liu, Yulin Sun, Fangqi Su, Lijun Cao and Haixia Zhang "Multiple Objects Tracking and Identification Based on Sparse Representation in Surveillance Video." IEEE International Conference on Multimedia Big Data." [3]

In this paper, authors have proposed an efficient multiple objects tracking and identification method based on sparse representation in surveillance video.

Color histogram and Hash code are used as the feature for detection, and discriminative sparse similarity map method is used to guarantee the accuracy of tracking result.

Shen-Fu Hsiao, Guan-Fu Yeh, and Je-Chi Chen "Design and Implementation of Multiple-Vehicle Detection and Tracking Systems with Machine Learning" 17th Euromicro Conference on Digital System Design. [5] In this paper, authors will present a new vehicle detection system based on support vector machine (SVM), a machine learning technique.

In this paper authors have also discussed two stages for vehicle detection system:
a. Hypothesis generation (HG)
b. Hypothesis verification (HV).

HG uses frame division and shadow detection to find possible candidates of vehicles within a suitable region of the image frame. HV is used to eliminate unreasonable hypotheses.

In this paper, a driver-assistance system is developed that can detect the existence of multiple vehicles. Here HG finds vehicle candidates using shadow information based on cumulative density function (CDF).

HV removed non-vehicle hypotheses using ratio-constraint and a machine learning technique called (SVM).The system is implemented by both software and hardware running on a FPGA development board.

OBJECT DETECTION ALGORITHM

Object detection is used to identify the object in the image and video. Object detection has various applications in many fields.

Detection using Deep Learning

Artificial intelligence is making robots to do work automatically which requires human brain.AI is under the machine learning is the acquire skill and learn from past experience without involvement of human. Deep learning is under machine learning where artificial neural network is used like human brain to learn from large amount of data and it continuously to improve output and learn from experience. Neural network has various (deep) layers for learning.

Caffe Model

Caffe Model is the framework for Deep learning algorithm. By Caffe model we can implement and access the following things:

- ***Expression:*** Models and optimizations are defined as plaintext schemas .
- ***Speed:*** for research and industry alike speed is crucial for state-of-the-art models and massive data.
- ***Modularity:*** Flexibility and extension is majorly required for the new tasks and different settings.
- ***Openness:*** Common code, reference models, and reproducibility are the basic requirements of scientific and applied progress.

Types of Caffe Model:

➢ ***Open Pose***: It can collectively sight human body, hand, and facial key points (in total 130 key points) on single picture.

➢ ***Fully Convolutional Networks for Semantic Segmentation:*** Fully Convolutional Networks are the reference implementation of the models and code for the within the PAMI FCN and CVPR FCN papers.

➢ ***Cnn-vis:*** Cnn-vis is an open-source tool that lets you use convolutional neural networks to generate images.

➢ ***Speech Recognition:*** Speech Recognition with the caffe deep learning framework

➢ ***DeconvNet***: Learning Deconvolution Network for Semantic Segmentation

➢ ***Coupled Face Generation:*** This is the open source repository for the Coupled Generative Adversarial Network

➢ ***Deep Hand:*** It gives pre-trained CNN models.

PROPOSED SYSTEM

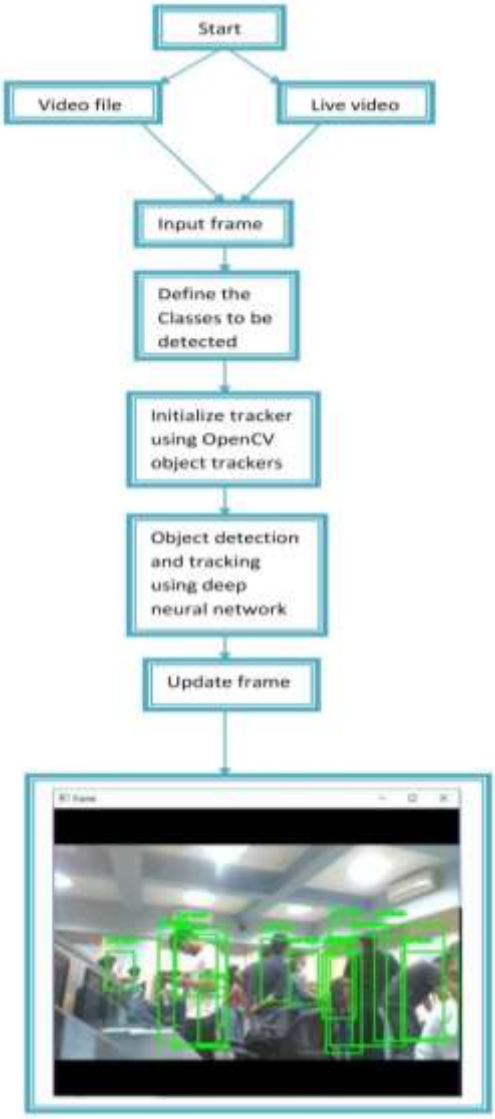

Fig.1:-*Architecture of proposed system*

In this project real time object tracking learning and detection is done. In this

project deep learning algorithm and coffe model framework is used. Proposed system used Region of Interest proposed system is processed video at frame rate.

We can take input as video file or live video then resize frame 600 pixel wide.to use dlib frame converted to rbg object are detected then confidence level is checked. For the object with low confidence than the limit are discarded else the bounding box is formed and the coordinates of bounding box is passed to the tracker for creating bounding box dlib retangle is used.

If we want to track the object of our choice then we have to select the region of interest by pressing 's' to select the bounding box by mouse by cv2.selectROI,we can click escape if we want to choose another object else we can click enter or space to start tracking.

METHODOLOGY

We used Tracing learning and detection. Tracking is done by considering object is visible and its motion is limited detector detect do full scanning of the image to see all appearance that observed. Learning checks the output of tracker and detector to find error and generate training example to avoid it in future.

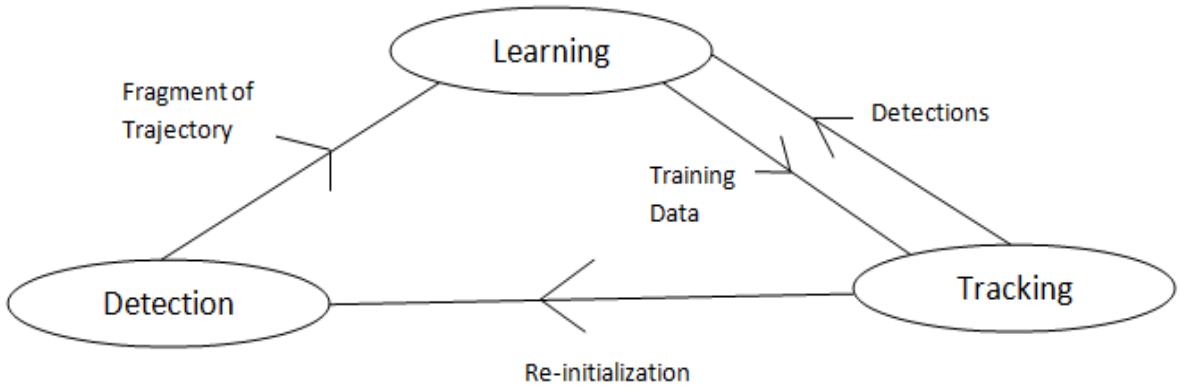

Fig.2:-*Block diagram of self- learning method*

EXPERIMENTAL RESULTS

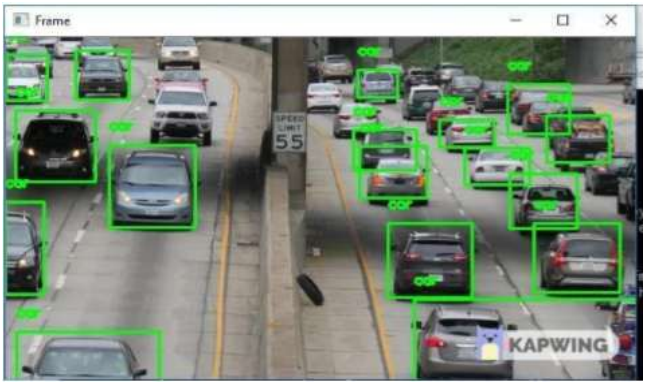

Fig.3:-*Object detection in video file*

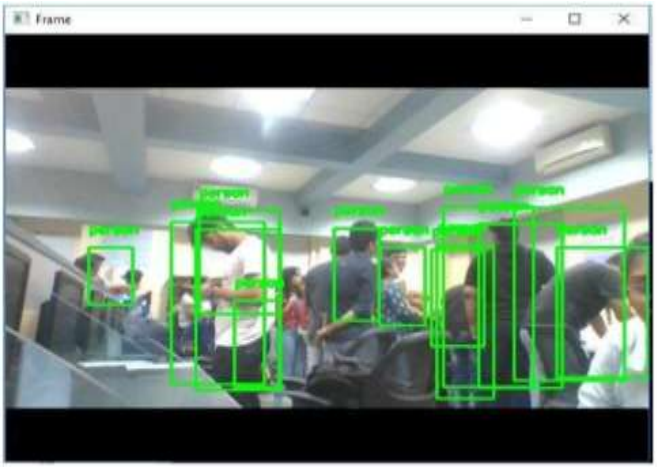

Fig.4:-*Object detection in Live video*

CONCLUSION

Detecting objects in real time video has various applications such as human-computer interaction, security and surveillance, video communication and compression, augmented reality, traffic control, medical imaging and video editing..In this project we have implemented deep learning algorithm which uses OpenCV framework. Output varies according to complex shapes, rapid motion and illumination changes in the video.

FUTURE WORK

In the proposed system list of trackers can be implemented and user can select the tracker then user can select the single or multiple object and track the objects of video or live video.

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