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Automatic Detection of Accidents under CCTV Monitoring

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Abstract: Object detection followed by tracking structure which incorporates deep learning concept recognized as the Faster Regional Convolution Neural Network(Faster R-CNN) which is introduced and applied in order to detect accidents automatically when CCTV is being watched which is done in following three ways (1) Wrong-Direction (2) Stop (3) Person out of vehicle. This mechanism accepts a video input file as input which results the identification of different objects and each object identified with unique number. Thus this video is split into number of images and each image is recognized as a frame .These frames are then compared with previous frames using R-CNN algorithm to find out the accident image. This accident detection mechanism can find out accidents with minimal time**.** The proposed algorithm improves the results based on the quality of the video input.

Keywords: Faster R-CNN; CCTV; Object Tracking; Object detection; Deep learning; Image; Video

I. INTRODUCTION

The methodology of object recognition is used to discover position of target pictures in the images or videos. This methodology has appeared mostly in cancer detection, security mechanisms, CCTV checking and so on. Tracking of objects is different study in which picture processing resulted by identification of unique and trailing the exact positions of tracked images. Thus it might be claimed that an object's results detection and trailing is fully subject to the activity of item noticing performed. This mechanism successfully traced the targeted pedestrian, car and other vehicles and some animals as well, and has been used successfully for targeting pedestrian and moving vehicle, accidents on roads, criminals as well as security monitoring under traffic camera. In the traffic controlling field of study, a case study has been imposed and analysed on automatic detection of accidents and this is summarized in this paper as follows. Resulting to an experiment on road vehicles noticing system this system takes help of Convolution Neural Network. It does by changing the tracing centre following to the place of target image. Thus output is shown like a bird's viewpoint it calculates space involving the vehicle moving and the visualized vehicle entity and thus results in process of system in which it allows for objectify sight of the placement of vehicle detected in order for it to be of aid.

Therefore finally, in this paper as a result a chance is created for detection of objects followed by trailing system (ODTS) which obtained active information of object identified and considered as target items through object combination with detection and trailing system followed by deep learning mechanism. Thus the full item noticing and trailing mechanism is explained in this following section. Also under CCTV surveillance, automatic accident detection will be taken into account. This mechanism is employed to notice and trail accidents or unplanned occurrences which is occurring between the target and moving item in the CCTV.

II. LITERATURE SURVEY

E. S. Lee, et al. [1] in 2019 proposed hawk's eye compete w positioning of encompassing automobiles :Long-term and horizontal separate evaluation with fractional presence in that a novel system for vehicle location and localization with halfway appearance is proposed utilizing stereo vision and geometry. To begin with, the first pictures from the stereo camera are prepared to create a v-disparity outline. After question discovery utilizing v-disparity, vehicle candidates are created with earlier information of conceivable vehicle areas on the picture. Profound learning-based confirmation completes vehicle location.

F. Cao, et al. [2] in 2016 proposed Vigorous vehicle discovery by blending profound highlights alongside model allocation vehicle location in disciple pictures has ended up an rising inquire about theme with different applications extending from military to commercial systems. In this we examine the plausibility to misuse profound neural highlights

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towards vigorous vehicle discovery. In expansion, beside the rapid development within the information volume, modern classification technique is additionally requested to expressly handle the intra-class varieties. In this paper, we propose a vehicle location Profound Convolution Neural Network (DNN)-based incorporate culture and Epitome-SVMs (E-SVMS)-based framework strong occasion classifier to attain strong vehicle location in toady pictures.

A. Arinaldi, et al. [3] in 2018 proposed Discovery and categories of automobiles for activity analysis of videos in this We display a activity video investigation framework computer vision-based procedures. The framework is planned to consequently accumulate critical measurements for arrangement creators and controllers in a mechanized mold. These insights incorporate automobiles summation, vehicle sort video categorization and vehicle speed estimation and path utilization observing. The centre of such framework is the location and vehicle categorization in activity recordings. We actualize these two models reason, to begin with may be a MoG+ SVM framework and the moment is founded on Speedier RCNN, a as of late prevalent profound learning engineering for discovery of objects in pictures.

K. B. Lee, et al. [4] in 2018 proposed Improvement based on deep literature programmed burrow occurrence location framework on CCTV Protest Discovery and Following Framework (ODTS) coupled with a famous profound culture organize, Quicker Territorial Contortion Neural Organize (Speedier R-CNN), for Protest Discovery and Ordinary Protest Following calculation will be presented and connected for programmed discovery and checking of unforeseen occasions on recordings in burrows, which are likely to (1) Driving the wrong way, (2) Halt, (3) Individual out of automobile (4) Fire. Proposed mechanism acknowledges a video outline as an input over time to get detention Box comes about by Question Discovery and examines the boxes of the current and previous videos outlines to allot a interesting Each moving object's unique identification number question. This plan makes it conceivable follow a moving object protest in era, which isn't normal to be accomplished in customary protest location frameworks. A profound learning demonstrate in item noticing and trailing was prepared with a data set of occasion pictures in burrows to Normal Accuracy vehicle, Individual, and Fire, individually.

A. Bewley, et al.[5] in 2014 proposed Online Self-managed Muti-detail Division of Energetic items in which a strategy for the persistent division of energetic objects utilizing as it were a monocular camera installed on a vehicle without any earlier information of how the thing looks. Earlier work in the static/dynamic divide of websites is amplified to distinguish different occasions of energetic objects by presenting an individual movement consolidation stride These band are at that point utilized to upgrade a various-class allocate inside a self-supervised system.

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III. PROPOSED METHODOLOGY

The following steps are to be followed in order to implement the proposed system successfully:

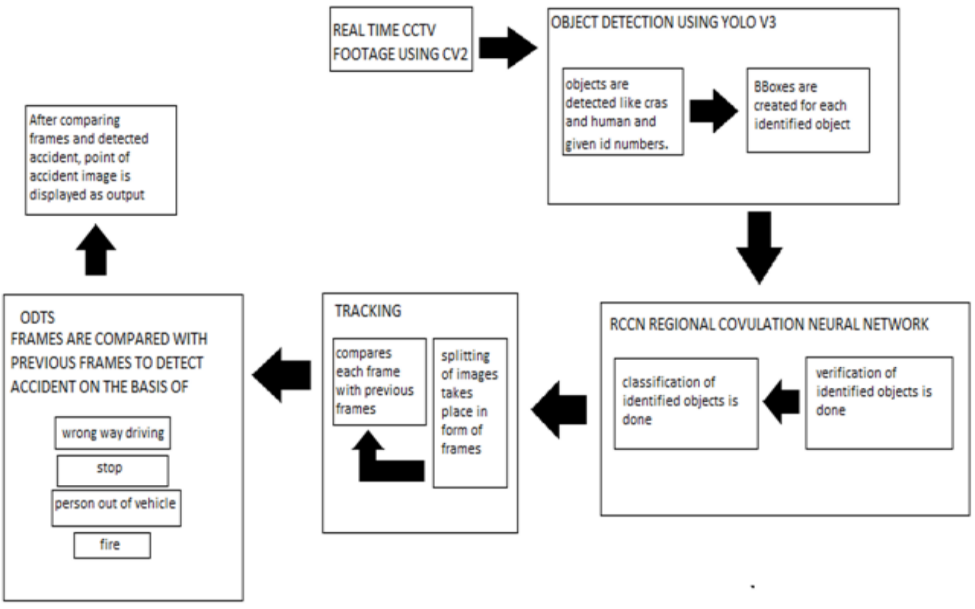

Fig:1. Proposed architecture of the accident detection system

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- CCTV video input
- Object detection and classification
- Splitting of frames
- Comparing of frames with previous frames
- Identification of accident image.

In this mechanism at first we need to give an input as video mp4 file as soon as the input is given the proposed system identifies objects in the video and classifies it , the identified object names are also given in the coco file as identification names, then this video is divided into number of frames into an output folder as frame1,frame2.. etc. these frames are then compared with previous frames for accident detection . These accident detection is based on the following reasons (1) person outside the vehicle (2) vehicle is stopped (3) vehicle is in wrong direction etc. Based on the above mentioned reasons frames are compared and crash images are found and stored. These crash images are the exact accident images found in the input CCTV video which we have given as input. Thus at last accident images are shown .

IV. RESULTS

The implementation procedure for Automatic detection of accidents is as follows:

- Install Python on the system (preferably any version 3.7-3.9) and download Pycharm.
- Import all the required packages like numpy,cv2, argparse, imutils, time, os, subprocess etc.
- Install all the libraries in the command prompt.
- After installing all the packages, download the mp4 file from Indian accidents videos.com file
- Then start running the program in pycharm, first run the “cctv_video.py” program then run the main program along with the cctv_video.py we should give input video as command “-- input test.mp4” and followed by “--yolo yolo-coco”.
- This will result in object detection in the video using ODTS then classification of objects using RCCN followed by splitting of frames for each second . These frames are then compared with previous frames for accident detection which are based on three parameters person out of vehicle, stop, wrong way driving etc.
- These frames are saved in an output folder. After comparing these frames with previous frames, crash images of accidents are also saved in this output folder.
- Each time a new video mp4 file is taken as input previous output images and crash images are automatically deleted from output folder.

Fig 2: User has to give video file as input

Fig 2 depicts user has to include video mp4 file in the command line as shown above.

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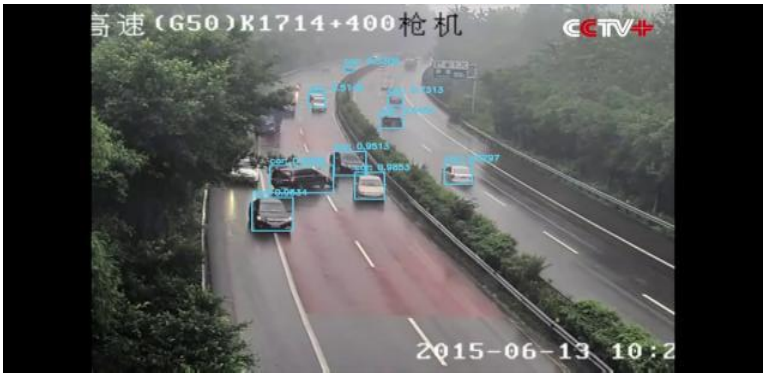

Fig 3: object detection using yolo

Fig 3 depicts after giving input video object detection is taken place and shown as blue coloured boxes and identified with object name and its identification number.

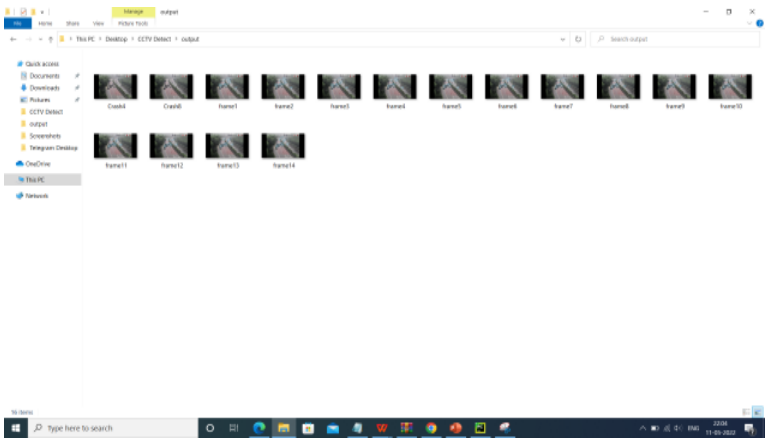

Fig 4: frames division in output folder

Fig 4 depicts the given input video file is divided into frames using cv2 module in python and images are stored in a folder named output.

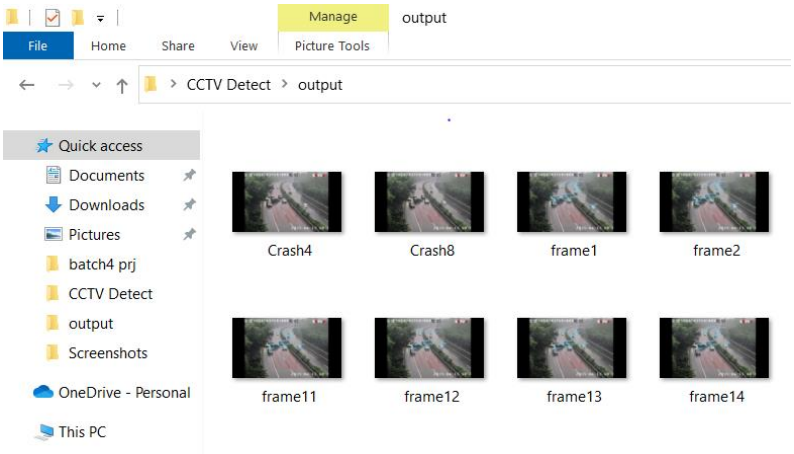

Fig 5: Accident images are appeared in output folder

Fig 5 depicts according to the three rules such as person out of vehicle, wrong way direction, vehicle is stopped in the middle of the road if anyone of the above specified rule is satisfied then accident images are stored along with frames in the output folder for detecting the accident exact frame.

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Fig 6: Accident image as output

Fig 6 depicts accident detection found and crash image is shown.

Giving an input mp4 video file with no accident scene

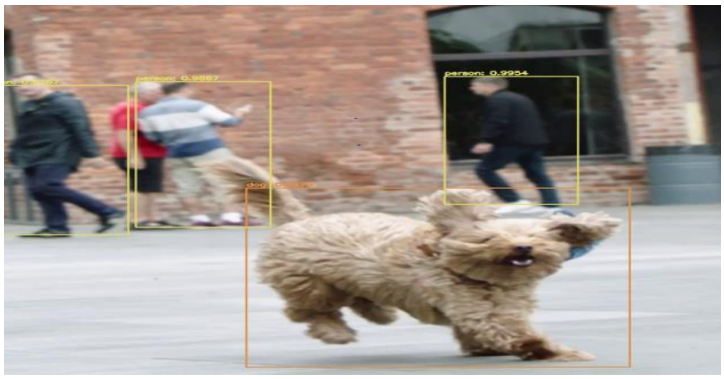

Fig 7: Identification and classification of objects

Fig 7 depicts an input with no accident scene is given remaining objects like dogs and human are also detected.

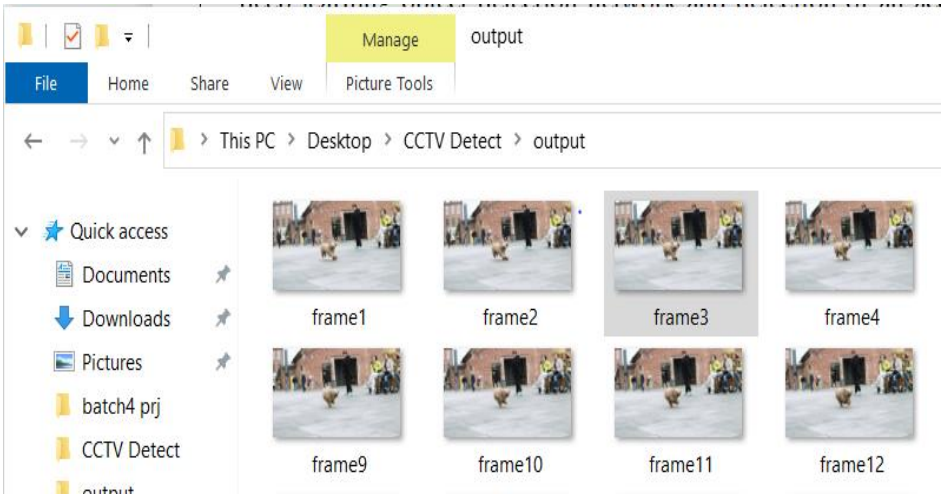

Fig 8: no crash images were stored in output folder

Fig 8 depicts after giving any input video file without having any three causes of accident then the video will be converted into frames without giving any accident images.

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V. CONCLUSION AND FUTURE SCOPE

The objective of proposed methodology concludes that ODTS in combination with deep-learning algorithm for detecting accidents in real time. On the other hand, the performance of object detection is important because this mechanism uses identification of objects for detection of accidents from the image generated by video input file with minimal time.
In future the fire detection of vehicles is also identified by including fire accident images dataset and performance of deep-learning mechanism of object noticing and tracking can be improved by including fire accident video input to increase the efficiency and reliability of the mechanism by including various images related fire and human objects and the further improvement of the proposed algorithm by including dynamic monitoring of objects with vehicle speed .

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