Image Processing based Tracking and Counting Vehicles

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Abstract:

Real-time backdrop changes are problematic, making it impossible to record the original background. It is also challenging to manage the update rate of traffic videos that detect moving autos. The project's goal is to create a moving vehicle detection technique that may be employedin situations when there is a traffic bottleneck. Both civil and military uses need the use of vehicle detection and tracking systems, such as: Vehicle tracking, vehicle counting, average vehicle speed, traffic analysis, and vehicle categorization goals are just a few of theapproaches used for on-road vehicle detection. We provide a short summary of the image processing methods and analytical tools employed in this study's development of the aforementioned applications, including the creation of traffic monitoring systems. For a more thorough knowledge of the traffic system than previous assessments, we categorise the processing techniques into three groups.

Keywords: Vehicle detection, Tracking, Traffic surveillance.

INTRODUCTION

Vision-based traffic scene perception is one of the many fast evolving subfields of intelligent transportation systems (TSP). The past 10 years have seen continued growth in this area of research. Object detection, object identification, and object tracking make up the three phases of TSP. TSP depends heavily on accurate objectdetection since the findings of detection are oftenused in both detection and tracking. Bicycles, automobiles, and road signs are the three primary object categories that are highlighted in this article. A typical road traffic situation with specified locations of interest demonstrates a number of strong examples from each of the threecategories.

1. LITERATURE REVIEW

H. Chung-Lin, et al and L. Wen-Chieh, et al provides a novel technique to make sure that one of the most crucial uses for video-based surveillance systems is traffic surveillance. Researchers have been researching applications for ITS (Vision-Based Intelligent Transportation System), traffic planning, and traffic engineeringfor many years in order to gather reliable and relevant traffic information for traffic image analysis and flow management. Examples of these applications include lane change detection, licence plate recognition, traffic density, vehicle categorization, vehicle flow, vehicle trajectory, and vehicle counting. Historically, vehicle identification, segmentation, and tracking were employed in automated toll collecting systems. methods for figuring out tolls for various kinds ofcars.

N. K. Kanhere, et al and S. T. Birchfield, et al Vehicle detection and tracking in real-time at low camera angles is accomplished by intelligent transportation systems using static characteristics. Visual detection, tracking, and classification of vehicles using static characteristics with automated camera calibration are all part of the Intelligent Transportation Systems research project "Vehicle Type Classification Using Visually-Based Dimensional Estimation." The Intelligent Transportation System (ITS) offers services to several transportation and traffic management systems via the integration of trafficcontrol centres. Video-based traffic monitoring research is a crucial part of ITS. Due to many factors such camera placement, backdrop clutter, position fluctuations, object occlusion, and shifting illumination, traffic monitoring in urban areas is more challenging than on highways. In- depth investigation of video-based vehicle surveillance for detection, tracking, and behavioural analysis is provided in this work. In this research, the speed, direction of motion, and trajectory of a moving object as seen by a single camera are used to describe the dynamic properties of a moving object.

Raad Ahmed Hadi, This article discusses uses for vehicle identification and tracking in both military and non-military settings, including traffic control and planning on roads and in cities. Vehicle detection technology is used to follow moving objects on roadways in order to count them, work out their average speeds, categorise them, and study traffic. This article aims to provide a succinct introduction to image processing methods, along with an analysis and discussion of how they might be used in different contexts. Three sets of processing techniques for developing traffic surveillance systems are closing. In traffic videos with shadows and partial occlusion, the suggested technique focuses on vehicle recognition, tracking, and classification. Examples of pertinent data gathered by traffic planning and traffic applications for trafficanalysis and traffic flow management include vehicle speed, count, speed, flow, categorization, destinations, and traffic density. For a broad range of issues, several academics have put forward a number of vehicle tracking strategies, including region-based tracking, texture tracking, 3D model tracking, and colour and pattern-based methods.

2. SYSTEM ANALYSIS

EXISTING SYSTEM:

Drivers may be alerted to changes in traffic flow by recognising traffic signs. Accurately identifying and recognising traffic signs in various traffic situations is difficult. Prior methods made use of colour and texture information. However, under poor weather and light circumstances, these techniques are ineffective. Additionally, weather and unintentional damage may cause traffic signs to lose their original design over time. Most recent techniques, such as local binary patterns (LBP) and histogram directed gradients, substitute texture or gradient information for colour and texture data (HOG).

Although these characteristics can withstand some distortion, they are nevertheless susceptible to changes in lighting and picture distortion. Due of the substantial intra-class diversity produced by various viewpoints and occlusion patterns, auto-identification provides a more challenging challenge than traffic sign recognition. Despite positive findings from sliding window-based face and person recognition techniques, it is challenging to reliably identify cars due to a variety of viewing angles. The deformable component (DPM) model, which has received significant attention in general object identification, has recently been effectively modified for vehicle detection.

Techniques based on scene subclassification were applied in addition to DPM to enhance the recognition model's generalisation performance.

PROPOSED SYSTEM

For each of these three classes, the bulk of earlier technologies have created individual detectors with distinctive properties. The approach described here varies from these other methods in that it identifies three significant object classes using a single learning-based recognition framework. A dense feature extractor and detectors from each of these three classes make up the proposed architecture. All detectors may utilise the dense features after they have been recovered. Using a single generic framework has the benefit of cutting down on detection time since all dense characteristics only need to be assessed once in the test phase. The suggested method incorporates spatially pooled characteristics [48] as a component of aggregated channel features [13], increasing the features' resistance to noise and picture distortion. To capture the variety of objects within a class and enhance generalisation performance, we suggest an element subclassification strategy.

1. Generic Object Detection:

Object recognition is a challenging but essential application in the area of computer vision. It has shown success in a range of practical applications, such as pedestrian detection and face recognition. See for a thorough examination of object recognition Some typical object identification methods are briefly described in this section. On rigid object classes, these frameworks provide good recognition results. They do far worse at recognising object classes with considerable intra-class variance, however. Recently, an innovative detection strategy using aggregate channel functions (ACF) and the AdaBoost classifier was put out. This framework uses a thorough sliding window search to locate things that meet certain criteria. It has been successfully altered for a number of practical applications.

2. Traffic Sign Detection:

Many traffic sign detectors have been released in the last 10 years with newly created, stricter criteria. Readers who are interested may examine an extensive analysis of the most recent advancements in traffic sign recognition. The majority of the traffic sign detectors in use today depend on visual signals. The four main types of these detectors are hybrid techniques, color-based approaches, shape-based approaches, and shape- based approaches. A typical benchmark for traffic sign identification is the German Traffic SignRecognition Benchmark (GTSDB), which gathersthree significant categories of traffic signs (prohibited, hazardous, and necessary) from diverse traffic situations. All traffic signs (ROIs) have rectangular areas of interest (ROI) that are appropriately indicated. Researchers may compare their findings simply based on this criterion.

3. Car Detection:

Currently, the market is flooded with vision-based autodetectors. Here is further information on several methods for detecting vehicles using mono, stereo, and other image sensors. In this study, we concentrate on information-based, vision-based monocular vehicle detectors.

These detectors come into three primary categories: DPM-based techniques, subcategory- based methods, and motion-based approaches.

4. Cyclist Detection:

Because walkers and bicycles look similar on the street, modern bicycle detectors also use pedestrian detection methods. These detectors mostly use technology based on fixed cameras. In fixed camera-based traffic surveillance techniques, corner feature extraction, motion matching, and object classification are employed to concurrently identify bicycles and people. For the purpose of detecting people and bicycles, a stereo vision-based technique is suggested. Shapecharacteristics and partial Hausdorff distance matching criteria are used to locate targets. To identify two-wheeled bicycles on the road, the authors suggested a bicycle detector, although thissystem can only identify riders who are moving.

4. ARCHITECTURE

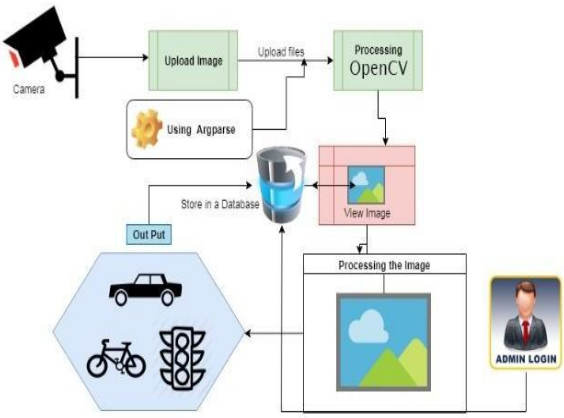

Fig1. System Architecture

5. Software Requirements

For developing the application, the followingare the Software

“Requirements:

1. Python
2. Django
3. MySql
4. MySqlclient
5. WampServer 2.4”.

“Operating Systems supported

1. Windows 7
2. Windows 8
3. Windows 8.1
4. Window 10

Technologies and Languages used toDevelop

1. Python

Debugger and Emulator

- Any Browser (Particularly Chrome)

Hardware Requirements

For developing the application, the followingare the Hardware Requirements:

- Processor: Pentium IV or higher
- Minimum RAM: 4GB Required
- 20 GB available hard disk space andOnly (64-bit) Version".

6. IMPLEMENTATION

UPLOAD IMAGES:

By the user, a photo is posted. An authorised person uploads the new arrivals that are shown tousers to the system. After the file has been uploaded, picture pre-processing is carried out before OpenCV in Serval is used to automaticallyidentify and recognise traffic scenes.

6.2. ANALYSIS IMAGE:

The goal of object detection is to locate a certain class of semantic items in digital images and videos, such as people, buildings, cars, bicycles, and traffic signals. The field of computer vision and image processing includes object recognition.

OBJECT DETECTION IMAGES:

The goal of object detection is to locate a certain class of semantic items in digital images and videos, such as people, buildings, cars, bicycles, and traffic signals. The field of computer vision and image processing includes object recognition.

OPENCV:

Real-time computer vision is the main emphasis of the Open CV programming feature set. Real-time computer vision applications may be made using a cross-platform toolkit called Open CV. Given that it primarily focuses on image processing, OpenCV Python is a great tool for quickly prototyping computer vision issues.

7. RESULTS

Fig2. vehicle detection is shown in this section.

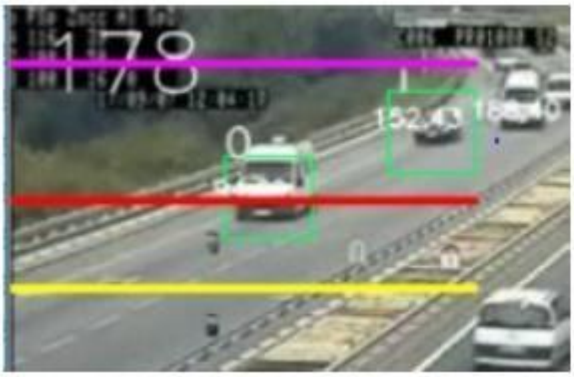

Fig3. Original Frame

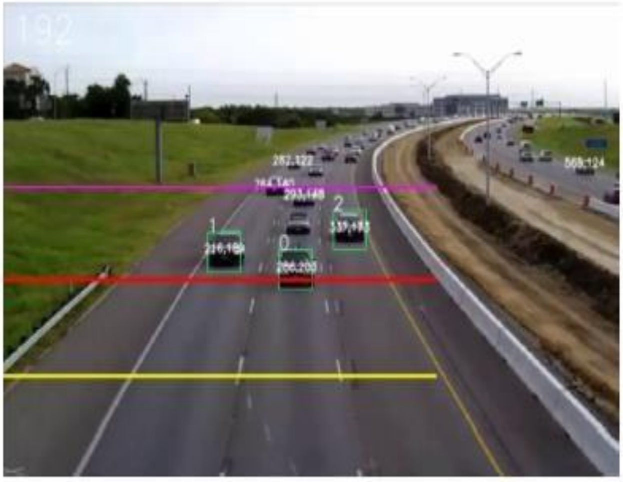

Fig4. Positive Image

CONCLUSION

We propose an all-encompassing framework for object identification in this application that may be used to identify three essential kinds of items in traffic scenarios. The suggested technique augments aggregated channel characteristics with spatially aggregated features to increase feature robustness. To discover many things, it additionally employs detectors from three important types. The framework's detection time is low since dense features only need to be examined once, rather than individually for each detector. In order to solve the limitation of the VJ framework for object classes with large inter- class variance, we provide an object subclassification strategy to enhance the generalisation performance by removing variation. We've shown that our detector can identify vehicles, bikers, and traffic signals with accuracy on par with modern detectors. Future research might investigate the utilisation ofcontextual information to facilitate narrative detection in traffic scenes using convolutionalneural networks to create more complex feature representations.

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