A Framework of Event-Driven Traffic Ticketing System

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ABSTRACT

This paper presents a new scheme to implement an event-driven traffic ticketing system. The system consists of two modules, namely, (1) event detection module, (2) database management module to execute information retrieval and deliver traffic tickets. In this paper, the notable contribution is an automatic detection of traffic ticketing events from video footages and immediate notification of such event when a car is passing the white stop line before a red traffic light. The results show the authors' work is efficient and could detect the events precisely.

KEYWORDS

Event Database, Event Detection, Traffic Ticketing System

1. INTRODUCTION

The field of event detection in surveillance video has drawn lots of attention from researchers ranging from engineering, manufacturing, computer science, machine learning and artificial intelligent and so forth. Traffic control and monitoring using event detection from live video streams are practical issues because of their low-cost and easy setup. For example, it is useful to reduce congestion and help construction of plan by analysing the video of traffic patterns on a highway. In terms of security, crimes or terrorist attacks could be prevented by pinpointing anomalies from surveillance (Xie, Sundaram, & Campbell, 2008). Traffic control and vehicle owner identification as an important branch of utilizing event detection from surveillance application is a popular research topic. To automatically identify the vehicle owner who violates traffic rules such as running through a red light, driving too fast, making illegal U-turn and so forth is one of the major event-driven applications. In these, plate number recognition module affects the whole event detection system accuracy. After successfully identifying the correct plate number, extra functionality modules such as violator database management, fine management or fine notification module would be implemented. The most significant advantage of such event-driven system is that all the work could be carried out automatically.

This paper presents a conceptual framework developed for a traffic ticketing system which detects traffic rule violations related to vehicles passing through the red light at the junction. The proposed event-driven system can be beneficial to other similar event-driven systems such as country border control system, access control system and so on. These event-driven systems have a close relationship with the crimes prevention and forensics. To be more exact, this event-driven traffic ticketing system is implemented with four fundamental functions, namely, (1) event detection from video frames, (2) registration plate detection and recognition, (3) database management, and (4) information notification which will email the user with the footage that the driver ran through the red light. As the final component of this system is the information notification module, the attached

images in the email can be the evidence provided in forensic if needed. Figure 1 shows a conceptual framework for the proposed system.

The functional stages of the system are defined as follows. First, if the event that vehicles run through the red light occurs, an event detection module will be triggered. As a result, an image with accident vehicle will be captured and temporarily stored. After that, digital image processing techniques such as image enhancement, image segmentation, and colour space conversion will be applied to the original captured image to clean away noises and redundant information. Then, the plate number recognition module will identify the number plate region and read it. Finally, the system automatically searches the database by the recognized plate number and sends an alert email to the owner of the vehicle to pay the fine for traffic

In this paper, our contribution is a new implementation of a system that detects traffic ticketing events from video footages and triggers actions almost immediately when a car passes through the solid white stop line located at the traffic light at the moment when it turns red. We detail the related work in Section 2, our contributions and implementations are addressed in Section 3 and 4; we conclude this paper in Section 5.

2. RELATED WORK

Nowadays, the word "event" frequently appears in digital lives. These events in general usually refer to something happens at a given time and place (Yan & Weir, 2011). Event is an elementary concept for both human and multimedia applications. Simply, an event can be considered as a story that involves with different objects or human. The event can also be considered as phenomena or circumstances that happen at a particular place and at a certain time, which can be identified without ambiguities (Castellanos, Kalva, Marques, & Furht, 2010). An event processes a duration, occurs in a specific

Figure 1. The framework of event-driven traffic ticketing system
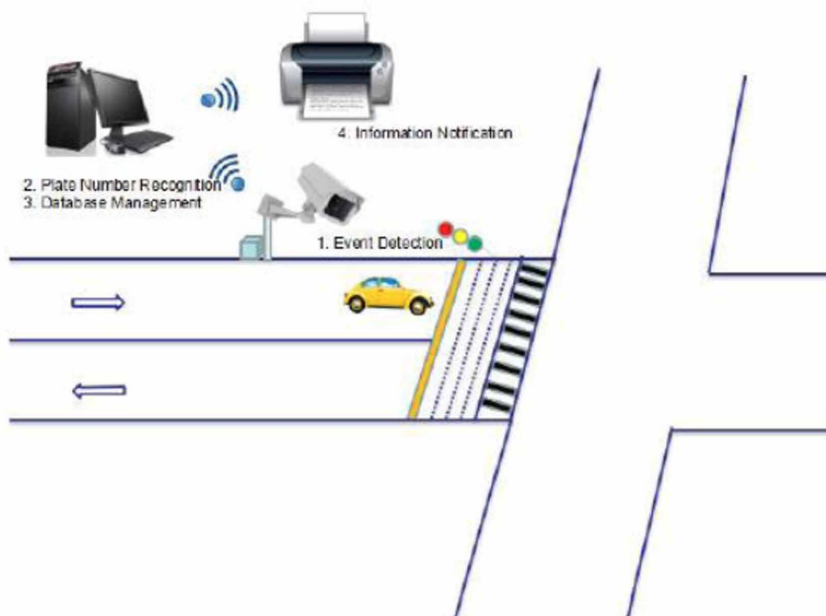
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