ОПРЕДЕЛИТЕ СКОРОСТЬ ТРАНСПОРТНОГО СРЕДСТВА

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Аннотация. В данной работе определение и оценка скорости транспортных средств являются важными задачами для многих систем управления дорожным движением и обеспечения безопасности. В этом исследовании мы предлагаем новый метод оценки и определения скорости автомобилей в режиме реального времени на основе компьютерного зрения. Для обнаружения автомобилей и определения их скорости наша система сначала анализирует видеозаписи движущихся транспортных средств с использованием алгоритмов обработки изображений. Алгоритм был протестирован на наборе данных с реальными сценариями дорожного движения, и результаты показали его высокую точность.

Ключевые слова. Программное обеспечение OpenCV, временной идентификатор, модельное окно, оптический поток, PPM (пиксели на метр), радар, базы данных Supabase и MongoDB, видеоданные, каскадный классификатор, режим реального времени.

Введение. За последние годы количество дорожно-транспортных происшествий значительно возросло из-за увеличения количества транспортных средств на дорогах. Мониторинг и контроль скорости транспортных средств в определённых зонах или участках имеет решающее

значение для обеспечения безопасности дорожного движения. Хотя методы измерения скорости с использованием радара регулярно применяются для этой цели, они имеют некоторые ограничения, такие как трудности с определением более мелких транспортных средств с низкими радиолокационными отражениями или ошибки при обнаружении автомобилей, которые быстро или часто изменяют скорость. В связи с этим растёт потребность в более точных и эффективных системах для расчёта скорости движущихся транспортных средств.

DETERMINE THE SPEED OF THE VEHICLE

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Annotation. In this paper, Vehicle speed detection and estimation is an important task for many traffic control and safety systems. In this study, we propose a new computer vision-based method for real-time vehicle speed estimation and detection. To detect cars and determine their speed, our system first analyzes video images of moving vehicles using image processing algorithms. On a dataset of real traffic scenarios, we test the proposed algorithm and the results show that it performs very well in terms of accuracy.

Keywords. OpenCV software, time identifier, model window, optical flow, PPM (pixels per meter), radar, Supabase and MongoDB database, video data, cascade classifier, real-time mode.

Introduction. Over the past few years, the number of road accidents has significantly increased due to the rise in the number of vehicles on the road.

Monitoring and controlling vehicle speed in specific areas or zones is crucial. Road traffic safety. Although methods for measuring speed using radar are regularly employed for this purpose, they may have some limitations, such as identifying smaller vehicles with weak radar reflections or errors in detecting vehicles that change speed very quickly or frequently. As a result, there is a growing demand for more precise and effective systems to calculate the speed of moving vehicles.

The algorithm for calculating vehicle speed is performed in the following sequence:

1. Import the necessary libraries: Supabase, Os, Cv2, Dlib, time, Math, Dotenv.
2. Establish connection to the Supabase database using the provided URL.
3. Load the cascade classifier for vehicle detection.
4. Open the video file for processing.
5. Set the width and height for processing the video frames.
6. Define the "Estimatespeed" function to calculate the speed based on the location of the vehicle along the trajectory.

The model for detecting and classifying vehicles' location and speed is implemented using the HAAR CASCADE program. The system for calculating vehicle speed utilizes image pixel manipulation and processing through OpenCV. By leveraging computer software from OpenCV, we have developed a system to determine vehicle speed in this research. The technology captures vehicle speeds in video images, allowing for real-time speed detection and monitoring. Various methods for image processing, such as image resizing, contour identification, and evaluating vehicle location, are available.

Method: The research results showed that the proposed vehicle speed detection system using OpenCV effectively demonstrated high accuracy in real-time detection and monitoring of vehicle speeds, proving its capabilities in accurately identifying vehicles under various road conditions and lighting environments.

Results: In conclusion, the vehicle speed detection system developed using OpenCV demonstrates promising results in real-life applications, offering valuable

tools for traffic management and law enforcement. Future research and development could help optimize this system and expand its application in various transportation conditions and environments.

This article presents a unique method for quickly and accurately assessing the speed of moving vehicles without the use of expensive sensors like radars. The proposed solution integrates into a video stream of moving cars and filters the data to calculate their speed. The process is divided into four main categories, which can be grouped based on the necessary components to accomplish the task:

1. Defining the area of interest through video: This involves identifying the specific area in the video where vehicle detection will occur.

2. Detecting vehicle objects from video frames: In this step, computer vision techniques are employed to recognize and track vehicles within the video frames.

3. Using the PPM (pixels per meter) algorithm to evaluate the speed of moving objects:This algorithm is crucial for determining the speed of vehicles by analyzing the distance covered over time in the video frames.

4. Creating a precise file image to record the vehicle's speed and

the image of the vehicle moving at that speed: This final stage involves saving both the detected speed and the corresponding image of the vehicle in a single file for further analysis.

In **conclusion**, road traffic management and law enforcement agencies can greatly benefit from the implementation of an automated vehicle speed detection system. The system can accurately detect and monitor vehicle speeds in real-time. Utilizing computer vision methods like OpenCV, and potentially incorporating more sophisticated tracking algorithms by analyzing vehicle flow and adding complexity, allows for increased speed detection accuracy, identification of violations, provides valuable data for traffic analysis, and contributes to improved overall road safety.

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