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Article

Multi Dashcam With Image Stitching Object Detection

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Abstract: Dashcam is a camera stored in a vehicle. This tool serves to record all events in front of the vehicle. Security and safety have become a major concern in various sectors, including transportation and public security. On the highway, traffic accidents caused by the driver's ignorance of objects around the vehicle are still a serious problem. In this study, the development of a simple dashcam built from an edge computer was carried out by combining the number of cameras. Image stitching is applied to combine images that have been collected by each camera. Next, object detection is carried out on the images that have been collected. The object detection system approach is carried out using YOLOv8 which is the latest variant of the YOLO series. This research is expected to be one step in the development of an Intelligent Transportation System that is in accordance with traffic conditions in Indonesia. The results obtained in the test used a system made using a configuration of 78000 datasets, 3332 data validation with 8 epochs, batch size 32, linear learning rate, and SGD optimization. The best results with real testing were obtained in the morning with an accuracy of 72.8% of detectable objects. In addition, further research may involve an in-depth analysis of factors contributing to the accurate results found, such as the impact of lighting variations, camera position, as well as the characteristics of detected objects.

Keywords: dual camera; image stitching; object detection, YOLOv8 (List three to ten pertinent keywords specific to the article; yet reasonably common within the subject discipline.)

1. Introduction

Security and safety have become key issues in a variety of industries, including transportation and public safety. On roads, traffic accidents caused by drivers' lack of awareness of objects around them remain a severe problem. For traffic surveillance, intelligent and effective object detection technology is becoming increasingly important. According to the camera's position, if the dashcam camera is on one side, the final capture often only includes that side. By conducting research that identifies things with the aid of two cameras or cameras located at various points in the vehicle, this study seeks to provide a solution to the issue. You can gain various perspectives and more information about the surroundings of the car by using multiple cameras. To create more precise findings that correspond to the actual circumstances in front of the user's vehicle, for instance, the left camera can assist in detecting vehicles on the left and the right camera can assist in detecting vehicles on the right.

As a result, research into the use of dual cameras for object detection is very important and interesting. It is envisaged that by maximizing the usage of dual cameras, this technology will provide an effective solution for boosting driver awareness and road safety. The use of dual cameras for object detection has the potential to minimize the number of accidents, avoid collisions, and increase overall safety for all road users Furthermore, the image stitching method is vital in the implementation of this technology. The act of integrating numerous photos from separate cameras into one larger, more comprehensive

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image is known as image stitching. When it comes to dual cameras for object detection, Image stitching can help create a more comprehensive and detailed view of the vehicle's surroundings.

In this research, we used a system that combines image fusion techniques to merge data from several picture sources with YOLO technology for real-time object detection. This allows for a thorough awareness of the traffic conditions and the surrounding surroundings by precisely detecting several things along a route. This research is anticipated to significantly improve traffic efficiency and safety by fusing the speed and accuracy of YOLO detection with the capacity to blend photographs to produce panoramic views.

2. Materials and Methods

Materials and Methods should be described with sufficient details to allow others to replicate and build on published results. Please note that publication of your manuscript implicates that you must make all materials, data, computer code, and protocols associated with the publication available to readers. Please disclose at the submission stage any restrictions on the availability of materials or information. New methods and protocols should be described in detail while well-established methods can be briefly described and appropriately cited.

Research manuscripts reporting large datasets that are deposited in a publicly available database should specify where the data have been deposited and provide the relevant accession numbers. If the accession numbers have not yet been obtained at the time of submission, please state that they will be provided during review. They must be provided prior to publication.

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3. Results

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation as well as the experimental conclusions that can be drawn.

3.1. Subsection

3.1.1. Subsubsection

Bulleted lists look like this:

- First bullet;
- Second bullet;
- Third bullet.

Numbered lists can be added as follows:

1. First item;
2. Second item;
3. Third item.

The text continues here.

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All figures and tables should be cited in the main text as Figure 1, Table 1, etc.

Figure 1. This is a figure. Schemes follow the same formatting. If there are multiple panels, they should be listed as: (**a**) Description of what is contained in the first panel. (**b**) Description of what is contained in the second panel. Figures should be placed in the main text near to the first time they are cited. A caption on a single line should be centered.

Table 1. This is a table caption. Tables should be placed in the main text near to the first time they are cited.

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Entry 2	Data	Data [1]

[1] Tables may have a footer.

The text continues here (Figure 2 and Table 2).

Figure 2. This is a wide figure.

Table 2. This is a wide table.

Title 1	Title 2	Title 3	Title 4
Entry 1 *	Data Data Data	Data Data Data	Data Data Data
Entry 2	Data Data Data	Data Data Data	Data Data Data
Entry 3	Data Data Data	Data Data Data	Data Data Data
Entry 4	Data Data Data	Data Data Data	Data Data Data

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Text.

Text.

3.3. Formatting of Mathematical Components

This is the example 1 of equation:

$$a = 1, \tag{1}$$

the text following an equation need not be a new paragraph. Please punctuate equations as regular text.

This is the example 2 of equation:

$$a = b + c + d + e + f + g + h + i + j + k + l + m + n + o + p + q + r + s + t + u + v + w + x + y + z \tag{2}$$

Please punctuate equations as regular text. Theorem-type environments (including propositions, lemmas, corollaries etc.) can be formatted as follows:

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The text continues here. Proofs must be formatted as follows:

Proof of Theorem 1. Text of the proof. Note that the phrase "of Theorem 1" is optional if it is clear which theorem is being referred to. □

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Authors should discuss the results and how they can be interpreted from the perspective of previous studies and of the working hypotheses. The findings and their implications should be discussed in the broadest context possible. Future research directions may also be highlighted.

5. Conclusions

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Abbreviations

The following abbreviations are used in this manuscript:

MDPI	Multidisciplinary Digital Publishing Institute
DOAJ	Directory of open access journals
TLA	Three letter acronym
LD	Linear dichroism

Appendix A

Appendix A.1

The appendix is an optional section that can contain details and data supplemental to the main text—for example, explanations of experimental details that would disrupt the flow of the main text but nonetheless remain crucial to understanding and reproducing the research shown; figures of replicates for experiments of which representative data are shown in the main text can be added here if brief, or as Supplementary Data. Mathematical proofs of results not central to the paper can be added as an appendix.

Table A1. This is a table caption.

Title 1	Title 2	Title 3
Entry 1	Data	Data
Entry 2	Data	Data

Appendix B

All appendix sections must be cited in the main text. In the appendices, Figures, Tables, etc. should be labeled, starting with "A"—e.g., Figure A1, Figure A2, etc.

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