IJEAST

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

VOLUME : 9 ISSUE : 11 Print / Issue Publication Date: 28-Apr-2025

ISSN : 2455-2143

DOI : 10.33564/IJEAST.2025.v09i11.009

Indexed In

Google SCHOLAR OPEN ACCESS doi Crossref

WWW.IJEAST.COM

editor@ijeast.com

International Journal of Engineering Applied Sciences and Technology, 2025
Vol. 9, Issue 11, ISSN No. 2455-2143, Pages 58-61
Published Online March 2025 in IJEAST (http://www.ijeast.com)

VELOSCAN FAULT DETECTOR AND INTENSITY MONITOR

Mrs.A. S Malleswari Mtech, (Ph.D), M. Lakshmidevi, R. Jaya Bhaskara Santhu, C. Keerthi Sri,
K. L.V. Chandra Mouli – Ug Scholars
Department of CSE,
Aditya College of Engineering and Technology, Surampalem.

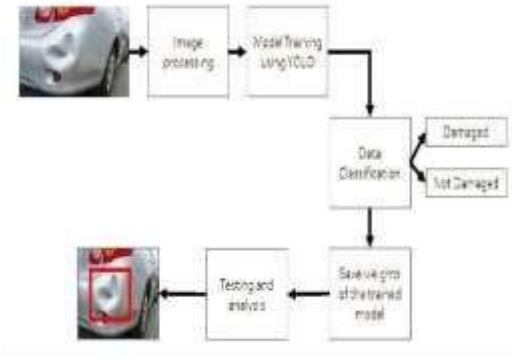
Abstract: **Vehicle damage estimation after accidents tends to be done manually, involves a time-consuming process, and is prone to inconsistencies, thereby causing inefficiency in insurance, repair estimating, and fleet maintenance. This paper proposes a sophisticated automated solution that relies on visual data in detecting damaged components of the vehicles, identifying the type of damages, and providing accurate estimations, simplifying the process of evaluation and maintaining consistent results. Building on the current image based framework, the system incorporates video analysis function, allowing damage assessment through holistic evaluation in various angles and viewpoints. This comes in response to the shortcomings of static images, including inconsistency or incompleteness of visual information, yielding strong and reliable results. By ensuring deeper analysis of complex damages, improving reliability, and reducing human error, the solution greatly enhances operational efficiency and provides a scalable platform for damage assessment, making it priceless to stakeholders in insurance, auto services.**

Keywords: **Vehicle Damage Assessment, Image and Video Processing, Deep Learning YOLO (You Only Look Once) Networks, Convolutional Neural Networks (CNNs), Multiangle Video Analysis.**

I. INTRODUCTION

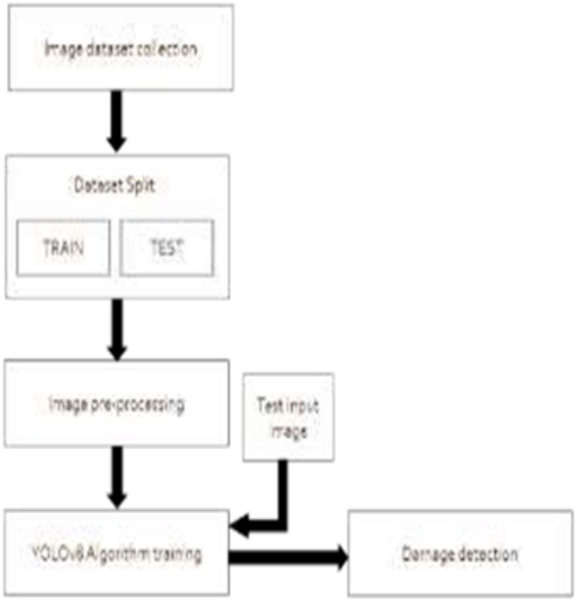
Precise vehicle damage inspection is central to insurance claims, repair estimation, and fleet management. Existing inspection practices rely extensively on human assessment, which is time-intensive, variable, and susceptible to human error. Such inefficiencies create delay, faulty damage assessments, and business issues for motor vehicle service providers To bridge these limitations, VeloScan Fault Detector and Intensity Monitor brings an AI-powered automated vehicle damage assessment system. Utilizing state of-the-art computer vision, the system detects damaged parts, categorizes fault severity, and provides accurate estimates. In contrast to traditional image-based solutions, VeloScan incorporates video analysis to record multi-angle images, overcoming the drawbacks of static images and providing a more complete evaluation. Through improved precision, reduced manual intervention, and streamlined evaluation procedure, VeloScan provides insurers, repair stores, and fleets with a scalable and economical solution. VeloScan reduces operational efficiency while speeding up the decision making process and raising new standards for automated estimation of vehicle damages.

II. BLOCK DIAGRAMS



The YOLO-based model for analyzing automobile damages is methodical in its approach to precisely detect damaged regions. The input images are first pre-processed, wherein their dimensions are resized and other enhancements such as noise removal and normalization are used to enhance quality and make it uniform. Then, the YOLO model is trained on a dataset of labelled images, both damaged and undamaged cars, to enable it to recognize various damage patterns efficiently. Upon completion of the training, the model scans new images to ascertain if they include damage by detecting certain features like dents and scratches. The training optimized weights are saved to allow future detections without the necessity of retraining. Lastly, the trained model classifies new images, identifying and marking damaged regions with bounding boxes and measuring performance to ascertain accurate and consistent identification.

International Journal of Engineering Applied Sciences and Technology, 2025
Vol. 9, Issue 11, ISSN No. 2455-2143, Pages 58-61
Published Online March 2025 in IJEAST (http://www.ijeast.com)



The car damage detection system which employs YOLOv8 operates through a step-by-step process. A collection process gathers both damaged and undamaged vehicle images that are afterwards prepared through techniques such as image resizing and noise reduction while also employing image augmentation methods. The data undergoes division into training and testing sections while YOLOv8 receives training to detect dents and scratches effects. After completion of training the model assesses new input images by scanning them for damage and classification of detected issues. About 50 images contain damage along with non-damaged examples which the system uses to develop a detection method for insurance claims and vehicle inspections.

III. METHODOLOGY

The VeloScan Fault Detector and Intensity Monitor employs a methodical process for inspection of vehicle damage through sophisticated image and video processing. The procedure involves the following major steps:

3.1 **Data Collection**

- Good-quality images and videos of vehicles with different kinds of damage are gathered from various sources.
- Data is captured under diverse angles and lighting to provide complete coverage.

3.2 **Image Preprocessing**

- Processed images are applied with preprocessing operations such as noise filtering, contrast modification, and edge detection.
- Distracting backgrounds are minimized, and the region of interest (vehicle damage) is extracted and separated for inspection.

3.3 **Training YOLO (You Only Look Once) Model**

•Pre-processed data are applied to train an object detection model based on deep learning (YOLO).
The model is trained to categorize and identify classes of vehicle damage, like dents, scratches, and cracks.
Data augmentation methods are used to make the model more accurate and resistant.

3.4 **Damage Class and Severity Evaluation**

- The developed model classifies vehicle damage as "Damaged" or "Not Damaged" classes.
- Further analysis provides the extent of damage by depth, size, and location.
- A scoring process gives a score for damage extent.

3.5 **Model Updating and Weight Retention**

- Repeat training with progressively updated datasets tunes the model better over time.
- Optimized model weights are stored in cache to enhance the efficiency of prediction and decrease the computation load.

3.6 **Testing and Validation**

- Thorough testing on actual images and videos is performed.
- Performance measures such as accuracy, precision, recall, and F1-score are assessed.
- Misclassifications are examined to improve the detection algorithm even further.

3.7 Deployment and Integration

- The final model is implemented on a web-based application or cloud platform for real-time vehicle damage evaluation.
- It is linked with insurance companies, fleet management systems, and motor service apps for smooth damage detection and reporting.

IV. OBJECTIVE OF THE PROJECT

The main goal of the VeloScan Fault Detector and Intensity Monitor is to create a sophisticated, automated vehicle damage assessment system that maximizes accuracy, efficiency, and reliability. The system has the following goals:

1. Automate Vehicle Damage Detection – Use AI based image and video processing to detect damaged vehicle parts with little human intervention.
2. Classify Damage Types – Classify damage into different types like dents, scratches, and cracks for accurate assessment.

International Journal of Engineering Applied Sciences and Technology, 2025
Vol. 9, Issue 11, ISSN No. 2455-2143, Pages 58-61
Published Online March 2025 in IJEAST (http://www.ijeast.com)

3. Measure Damage Severity – Have an intensity monitoring system to check the extent of damage and give a severity score.
4. Minimize Human Error – Reduce inconsistencies in manual inspection by applying deep learning methods for consistent and accurate results.
5. Increase Insurance and Repair Processing – Accelerate the processing of claims and repair estimates by giving real-time, reliable damage reports.
6. Enhance Operational Efficiency – Provide an scalable solution to automotive service providers, fleet management businesses, and insurance companies to automate vehicle inspections.
7. Facilitate Multi-Angle Video Analysis – Transcend the constraints of still images by incorporating video-based assessment for thorough damage evaluation.
8. Deliver a User-Friendly Solution – Create an intuitive and easy-to-use platform for easy adoption by end users within the automotive and insurance sectors.

V. OUTPUT

Fig. 1.login page

Fig. 2. detection page

Fig. 3. prediction page

Fig. 4. Report page

VI. CONCLUSION

The VeloScan Fault Detector and Intensity Monitor is a major breakthrough in the application of automated damage assessment of vehicles. Through AI-based image and video analysis, the system increases the accuracy, efficiency, and reliability of damage detection and classification. Through deep learning models, it reduces human error, streamlines insurance claim processing, and maximizes repair cost estimations. The inclusion of multi-angle video analysis guarantees a thorough examination, bypassing the constraints of static picture-based assessments. This breakthrough is advantageous to multiple stakeholders such as insurance firms, fleet operators, and automotive service providers, as it simplifies the damage assessment process and enhances decision-making. With its scalability, automation, and accuracy, VeloScan is a breakthrough towards making vehicle damage assessment a quick, uniform, and economical process.

With further development of the system, future enhancements can be directed towards real-time damage cost estimation, integration with IoT-enabled vehicles, and more advanced AI training for various vehicle models and conditions. By adopting VeloScan, the auto and insurance sectors can achieve a high degree of operational efficiency, minimize the risk of fraud, and give end-users an excellent experience.

VII. REFERENCE

[1]. **Zhang, K., Li, J., and Wang, H.** (2024). Deep Learning for Autonomous Vehicle Damage Assessment, IEEE Trans. Image Process., 33(5), (pp. 1024–1035).

[2]. **Chen, Y., Patel, S., and Ahmed, M.** (2024). Advancements in Computer Vision for Automated Vehicle Inspection, in Proc. IEEE Conf. Comput. Vis. Pattern Recognit., (pp. 456–467).

[3]. **Lee, J., and Kim, T.** (2024). YOLO-Based Vehicle Damage Detection and Classification, IEEE Access, 12, (pp. 34567–34578).

[4]. **Gupta, S., and Roy, L.** (2024). Automated Vehicle Insurance Claim Processing Using AI, in Proc. IEEE Int. Conf. on Intelligent Systems, (pp. 123–134).

[5]. **Singh, R., Bose, A., and Iqbal, M.** (2024). Multi-Stage CNN for Vehicle Damage Localization and Severity Prediction, IEEE Trans. Neural Netw. Learn. Syst., 35(3), (pp. 2458–2469).

[6]. **Li, Y., and Zhou, X.** (2024). Transformer-Based Image Analysis for Vehicle Damage Detection, in Proc. IEEE Int. Conf. on Artificial Intelligence Applications (ICAI), (pp. 789– 798).

[7]. **Brown, C., and Wilson, T.** (2024). AI-Driven 0Approaches to Vehicle Damage Assessment: A Review, in Proc. Int. Conf. on Machine Learning Applications, (pp. 98–112).

[8]. **Kim, P., and Wang, R.** (2024). Real-Time Vehicle Damage Detection Using Deep Learning and Edge Computing, IEEE Trans. Autom. Sci. Eng., 18(2), (pp. 789–803).

[9]. **Patel, V., and Das, M.** (2024). Enhanced Vehicle Damage Classification Using Hybrid CNN-RNN Models, in Proc. IEEE Conf. Image Process., (pp. 234–245).

[10]. **Nguyen, H., and Tran, D.** (2024). Improving Vehicle Damage Segmentation with Attention Mechanisms, IEEE Trans. Comput. Vis., 45(1), (pp. 67–79).

[11]. **Kumar, A., Sharma, R., and Verma, P.** (2024). A System for Automated Vehicle Damage Localization and Severity Estimation Using Deep Learning, in Proc. IEEE Int. Conf. on Artificial Intelligence and Machine Learning (AIML), (pp. 20–200).

[12]. **Johnson, E., and Carter, S.** (2024). Blockchain-Enabled Secure Vehicle Damage Assessment for Insurance Claims, in Proc. Int. Conf. on Emerging Technologies, (pp. 156– 170).

[13]. **OpenCV Team.** (2024). OpenCV: Open-source computer vision library, [Online]. Available.

IJEAST

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

ABOUT IJEAST

International Journal of Engineering Applied Science and Technology (IJEAST) is a peer-reviewed, open access journal that publishes high-quality research papers in the field of Engineering, Applied Science and Technology.

IJEAST aims to provide a platform for researchers, academicians, and professionals to share their innovative ideas, research findings, and practical experiences with the global scientific community.

FOCUS AREAS

- Engineering
- Applied Science
- Technology
- Innovation & Development
- Interdisciplinary Studies

PEER REVIEWED
All submissions are rigorously peer reviewed to ensure quality.

OPEN ACCESS
Free and unrestricted access to research for all.

GLOBAL REACH
Connecting researchers and professionals worldwide.

TIMELY PUBLICATION
We ensure a swift and efficient publication process.

For more information, visit our website
www.ijeast.com

INTERNATIONAL JOURNAL
OF ENGINEERING APPLIED SCIENCE
AND TECHNOLOGY

editor@ijeast.com
www.ijeast.com
India

2455-2143