

INTELLIGENT DAMAGE ASSESMENT AND ESTIMATION SOLUTION FOR VEHICLE INSURANCE CLAIM IN REALTIME

Project Reference No.: 49S_BE_4251

College : Sri Siddhartha Institute of Technology, Tumakuru
Branch : Department of Computer Science & Engineering (Data Science)
Guide(s) : Dr. Pushpalatha K R
Dr. Vidyalakshmi K
Student(s) : Ms. Sanmitha H B
Ms. Supritha K S
Ms. Trupthi K J
Ms. Vanishree K R

Keywords:

Inspection, YOLOv5, Vehicle Damage Detection, Cost Estimation, Deep Learning, Insurance Automation.

Introduction:

This project, Intelligent Vehicle Damage Assessment and Cost Estimator, uses AI and the YOLOv5 model to automatically detect vehicle damages such as scratches, dents, and broken parts. The system analyzes uploaded images in real time and generates annotated outputs along with repair cost estimation. It reduces manual effort and improves accuracy in insurance claim processing. The system supports multiple vehicle types, making it scalable and suitable for real-world applications, while providing a faster and more efficient solution for the automotive and insurance industries.

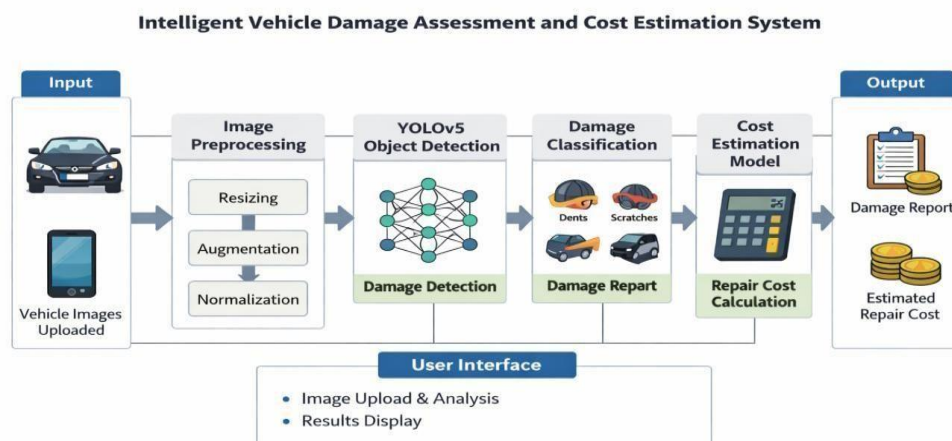


Figure 1: **System Architecture of Intelligent Vehicle Damage Assessment and Cost Estimation**

Objectives:

1. End-to-End AI Pipeline for Damage Assessment
2. Standardized and Evaluation for Insurance Claims
3. Multi-Vehicle Damage Classification Capability
4. Intelligent Report Generation for Decision Support

Methodology:

1. **Data Collection**
Collect vehicle damage images for two, four, and six-wheelers.
2. **Preprocessing**
Resize, normalize, and prepare images for YOLOv5 model input
3. **Model Training**
Train the YOLOv5 model to detect and classify vehicle damage.
4. **Prediction and Cost Estimation**
Map detected damage to standardized repair costs.
5. **User Interface**
A simple and interactive web dashboard allow user to upload the image.

Result presentation

The system outputs result as annotated images with bounding boxes, damage labels and confidence scores.

1. Continuous Learning

The model can be retrained with updated accident datasets to improve prediction accuracy and adapt to latest industry requirements

Result and Conclusion:

1. VDA Pro is an AI-based system for the vehicle insurance industry that automates vehicle damage assessment.
2. The system provides real-time repair cost estimates based on detected damages.
3. It uses the YOLOv5 model to accurately detect, classify, and localize damage on 2-, 4-and 6-wheelers.
4. It automatically generates detailed PDF/CSV reports with annotated images and transparent cost breakdowns.
5. VDA Pro reduces manual effort, improves accuracy, and ensures consistent claim evaluations.

The system automates vehicle damage detection and cost estimation using YOLOv5, ensuring high accuracy and fast processing. It reduces manual effort, minimizes errors, and speeds up insurance claims. The integration of cost estimation provides quick financial insights, making it a complete and efficient solution.

References:

- Pandey et al., "Car Damage Detection Based on Multi-View Fusion," IEEE, 2022.
- Midha et al., "Enhanced Car Damage Classification," IEEE, 2024.
- Sneha et al., "Vehicle Damage Estimator Using AI," IJNRD, 2024.
- "Vehicle Damage Level Estimator For Claiming Insurance Using AI",IJNRD, 2024, Sneha M,Velmurugam M,Shabikha Faiza I,Shabika Sri S,Umaparameshvari P.
- "Enhanced Car Damage Classification: A Fusion of Deep Learning and Random Forest Methods," IEEE,2024,Manu Midha; Aunj kumar Jain; Vikrant Sharma;Shubham; Gaganpreet Kaur; Deepak Banerjee.
- "Image-Based Classification for Vehicle Accident Detection and Insurance Claim Using Artificial Intelligence," IEEE, 2024, M. Rithik; Sp. Chokkalingam.
- "Vehicle Damage Level Estimator For Claiming Insurance Using AI," IJNRD, 2024, Sneha M; Velmurugam M; Shabikha Fiza I; Shobika Sri S; Umamaheshwari P.

Future Scope:

The future scope of this project includes:

1. Integration of fraud detection mechanisms in insurance claims.
2. Deployment as a mobile application for real-time usage.
3. Use of advanced models like YOLOv8 for improved accuracy.