

Project Title	Damaged Car Image Preprocessing Pipeline for Computer Vision using OpenCV
Skills take away From This Project	Python, Computer Vision, OpenCV, Streamlit
Domain	Computer Vision Preprocessing

Problem Statement:

In the automotive industry, assessing damage to vehicles (e.g., cars) is a critical task for insurance claims, repair estimates, and quality control. Manually inspecting and processing images of damaged cars is time-consuming and prone to human error. This project aims to automate the preprocessing of damaged car images using computer vision techniques to prepare them for further analysis, such as damage detection or severity classification.

Business Use Cases:

- 1. Insurance Claims Processing:**
Automate the preprocessing of damaged car images to speed up claim processing and reduce manual effort.
- 2. Automotive Repair Shops:**
Use preprocessed images to estimate repair costs and identify damaged areas.
- 3. AI-Based Damage Detection Systems:**
Provide clean, preprocessed images as input to machine learning models for damage detection and classification.
- 4. Quality Control in Manufacturing:**
Inspect vehicles for damage during production or before delivery.

Approach:

1. Image Preprocessing Pipeline:

- a. Resize and crop images to focus on the damaged area.
- b. Convert images to different color spaces (RGB, BGR, HSV) for better analysis.
- c. Apply thresholding techniques to highlight damaged regions.

2. Streamlit Integration:

- a. Create an interactive web application to upload images, apply preprocessing techniques, and display results.

3. Exploratory Data Analysis (EDA):

- a. Analyze the dataset of damaged car images to understand image dimensions, color distributions, and damage patterns.

Streamlit Integration:

- Build a user-friendly web interface using Streamlit to:
 - Upload damaged car images.
 - Apply preprocessing techniques (resizing, cropping, color space conversion, thresholding).
 - Display the original and preprocessed images side by side.
 - Allow users to download the preprocessed images.

Exploratory Data Analysis (EDA):

1. Image Dimensions:

- a. Analyze the width, height, and aspect ratio of images in the dataset.

2. Color Distribution:

- a. Plot histograms for RGB channels to understand color patterns.

3. Damage Patterns:

- a. Identify common regions of damage (e.g., front bumper, side doors).

Questions to be Answered (OpenCV Computer Vision):

1. How can we resize and crop images to focus on the damaged area?
2. Which color space (RGB, BGR, HSV) is most effective for analyzing car damage?
3. What thresholding technique (binary, adaptive, Otsu's) works best for highlighting damage?
4. How can we automate the preprocessing pipeline for large datasets?
5. How can we integrate the pipeline into a user-friendly application?

Data:

Take any damaged car image from web and do preprocess stages mentioned in approach.

Results:

1. A fully functional image preprocessing pipeline for damaged car images.
2. A Streamlit web application for interactive image preprocessing.
3. Insights from EDA on image dimensions, color distributions, and damage patterns.
4. Preprocessed images ready for further analysis or input to machine learning models.

Technical Tags:

- Python
- OpenCV
- Streamlit
- Image Processing
- Computer Vision
- Exploratory Data Analysis (EDA)
- Thresholding Techniques
- Color Space Conversion

Project Deliverables:

1. **Jupyter Notebook:**
 - a. Contains the complete code for the image preprocessing pipeline.
2. **Streamlit Web Application:**
 - a. A deployed app for users to upload and preprocess images.
3. **Documentation:**
 - a. A detailed README file explaining the project setup, usage, and results.
4. **Preprocessed Images:**
 - a. Sample output images after applying the preprocessing pipeline.

Timeline:

The project must be completed and submitted **within 10 days from the assigned**

Date.

PROJECT DOUBT CLARIFICATION SESSION (PROJECT AND CLASS DOUBTS)

About Session: The Project Doubt Clarification Session is a helpful resource for resolving questions and concerns about projects and class topics. It provides support in understanding project requirements, addressing code issues, and clarifying class concepts. The session aims to enhance comprehension and provide guidance to overcome challenges effectively.

Note: Book the slot at least before 12:00 Pm on the same day

Timing: Tuesday, Thursday, Saturday (5:00PM to 7:00PM)

Booking link : <https://forms.gle/XC553oSbMJ2Gcfug9>

LIVE EVALUATION SESSION (CAPSTONE AND FINAL PROJECT)

About Session: The Live Evaluation Session for Capstone and Final Projects allows participants to showcase their projects and receive real-time feedback for improvement. It assesses project quality and provides an opportunity for discussion and evaluation.

Note: This form will Open on Saturday and Sunday Only on Every Week

Timing: Monday-Saturday (11:30PM to 12:30PM)

Booking link : <https://forms.gle/1m2Gsro41fLtZurRA>