

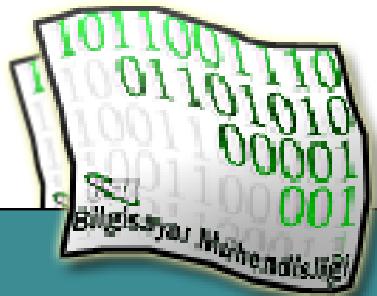


GTU CSE 495

UNDERSIGHT Detecting the Suspicious Object on Vehicle Underbody Images

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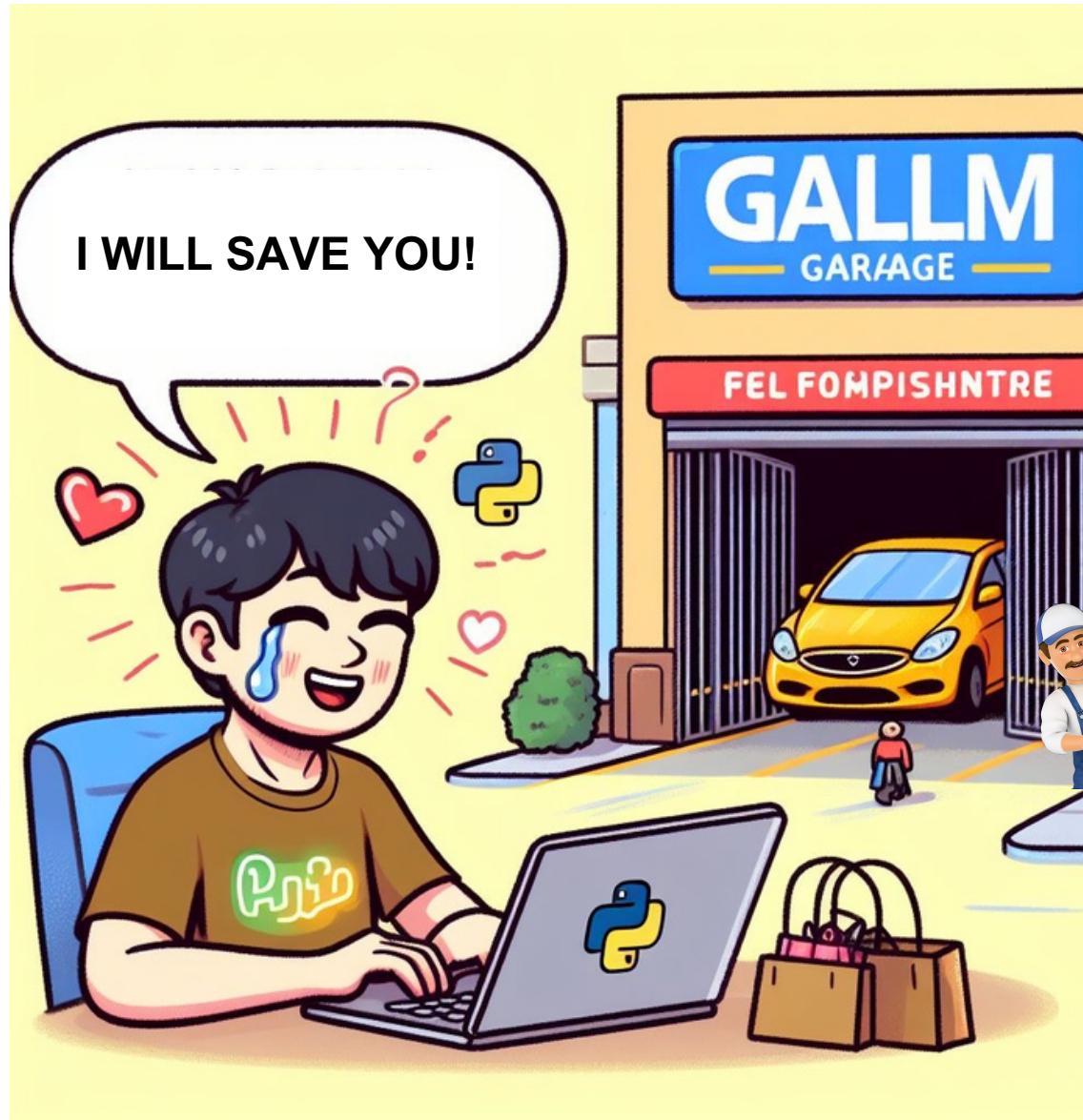
**Proje Danışmanı: Assoc. Prof Habil KALKAN
OCAK 2024**



- Abstract
- Introduction
- Project Design
- Final Situation about Success Criteria
- Bibliography



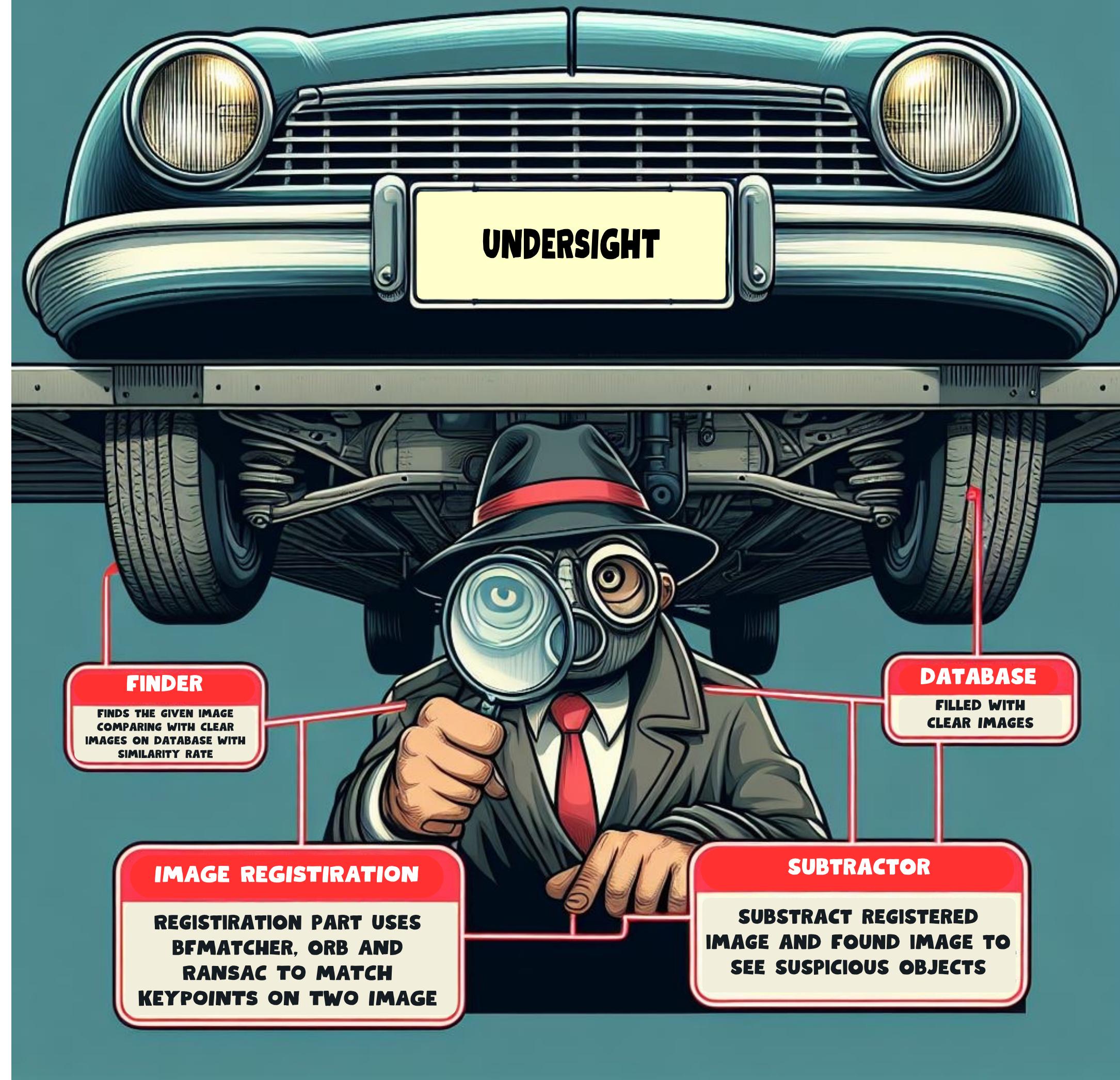
Abstract



- This project has a heroic mission: to rescue the individual patiently holding the fort at the gates, employing a lineup of Image Registration and Image Processing algorithms.
- Usually, the gatekeeping system operates manually as follows:
 - Undercarriage photos are taken by the system to identify and monitor the gatekeeper's appearance.
 - The gatekeeper then assesses whether there are any suspicious objects. Let the automated gatekeeping adventures begin!



INTRODUCTION



DUCTION

INTRODUCTION

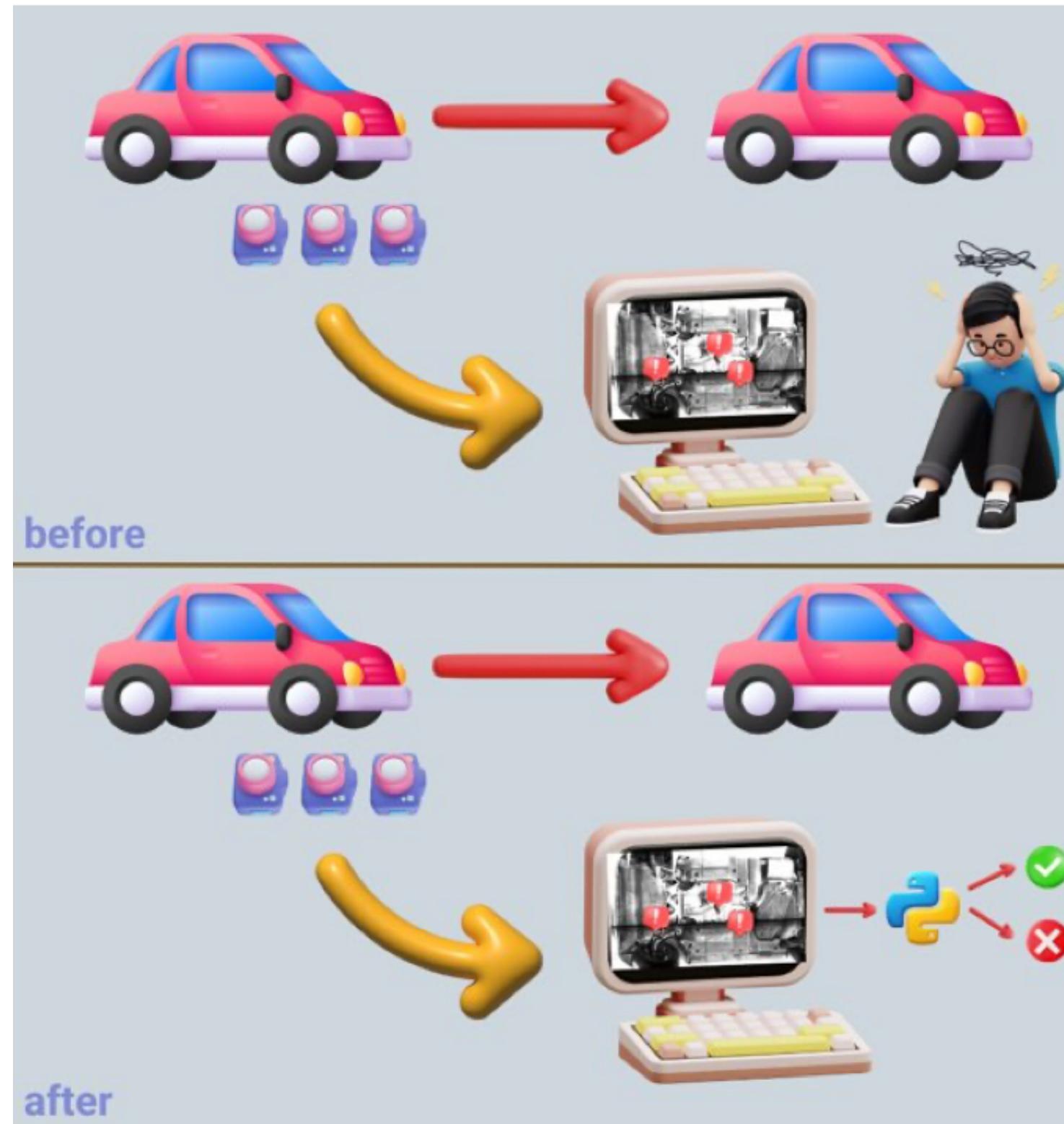


Image Loading and Preprocessing

Feature Extraction with ORB

Feature Matching with Brute-Force Matcher

Sorting Matches

Top-N Matches Selection

Homography Calculation with RANSAC

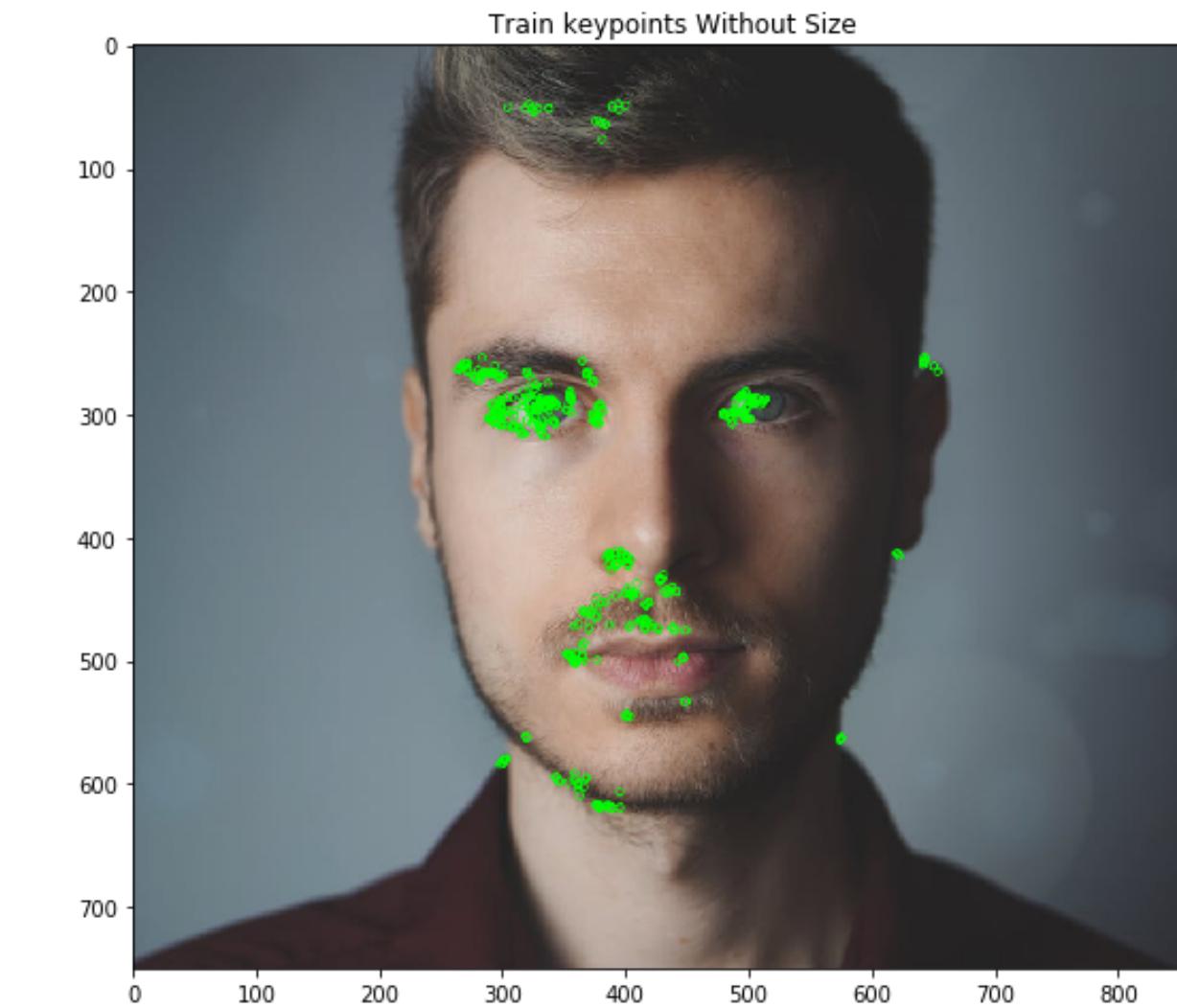
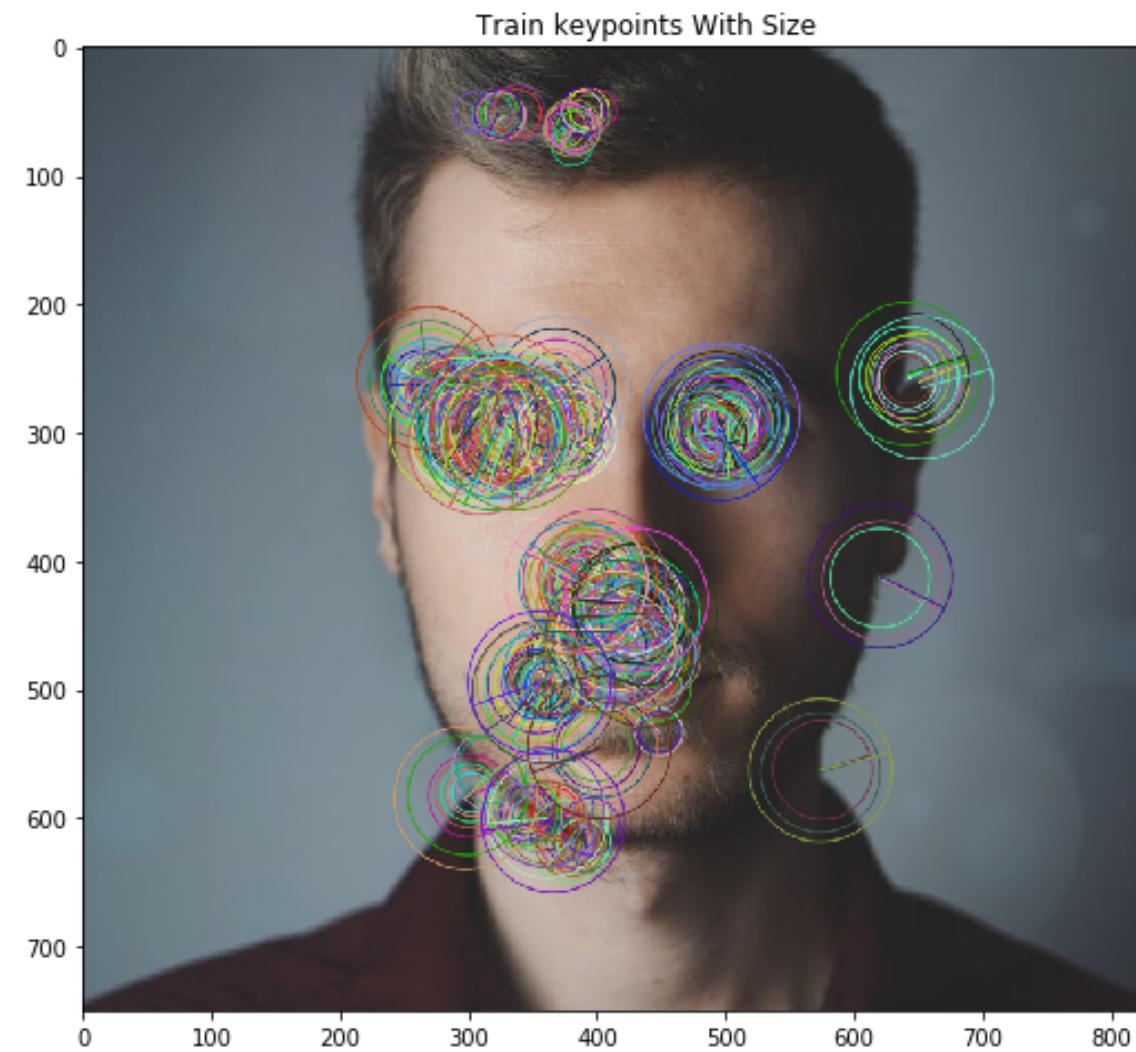
Image Registration

Image Resizing

Difference Calculation and Thresholding

Contour Detection and Filtering

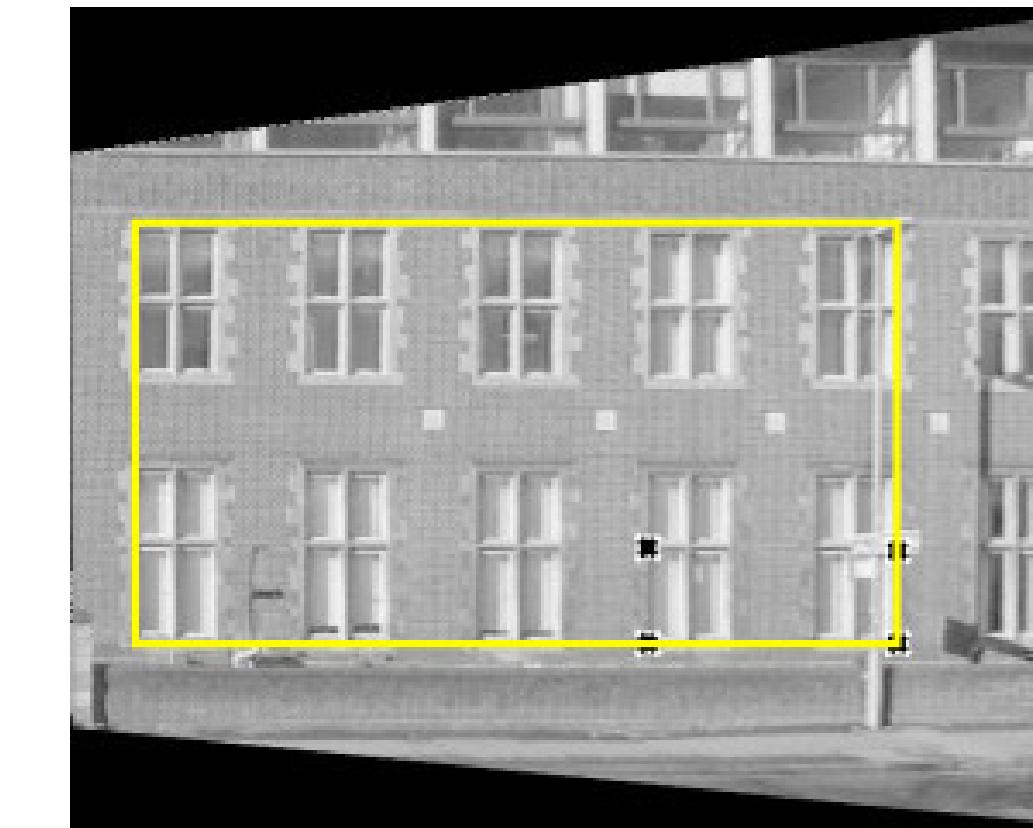




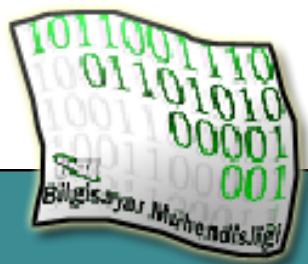
what does orb do?



Homograph Calculation



from Hartley & Zisserman



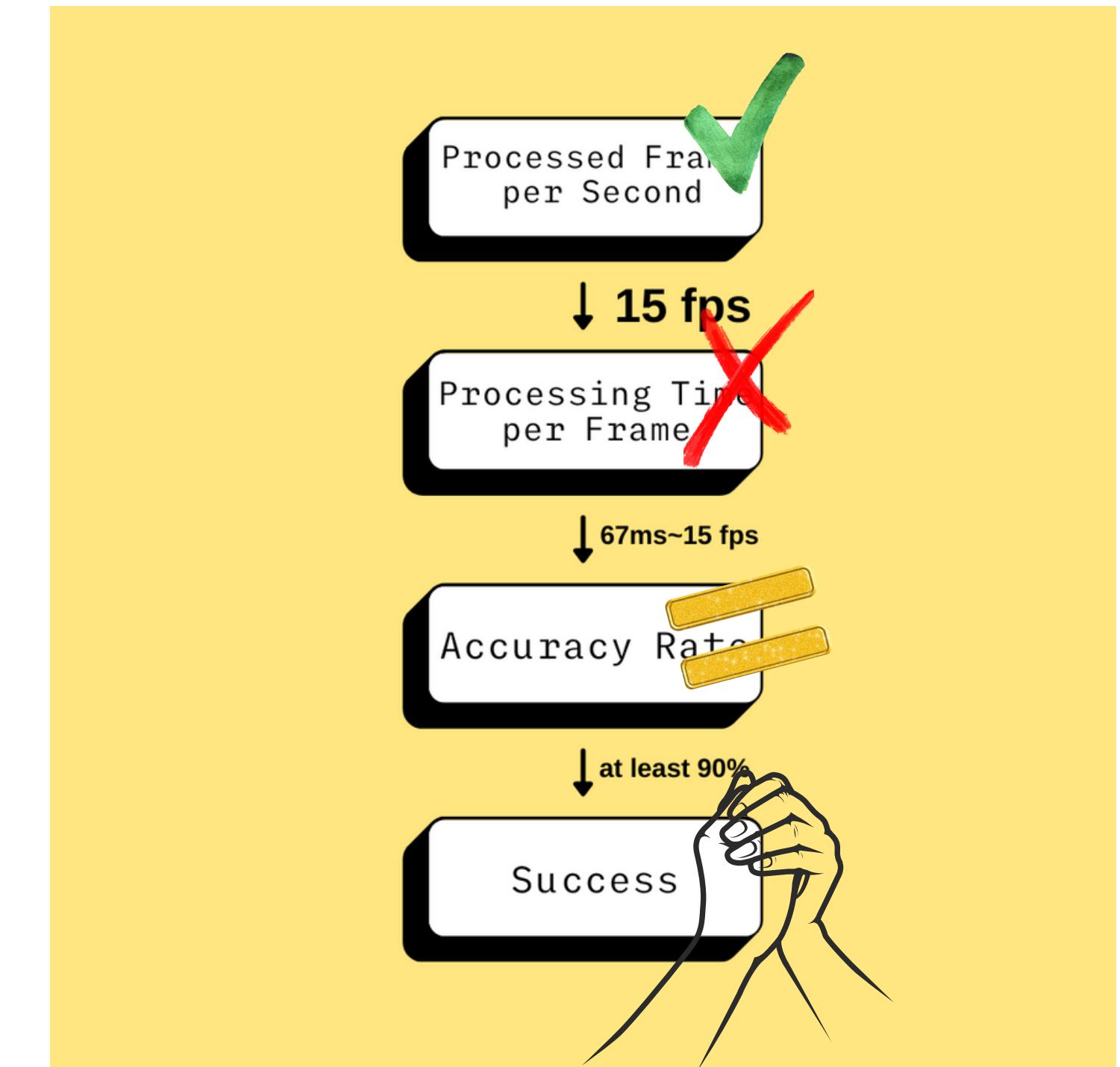
Success Criterias

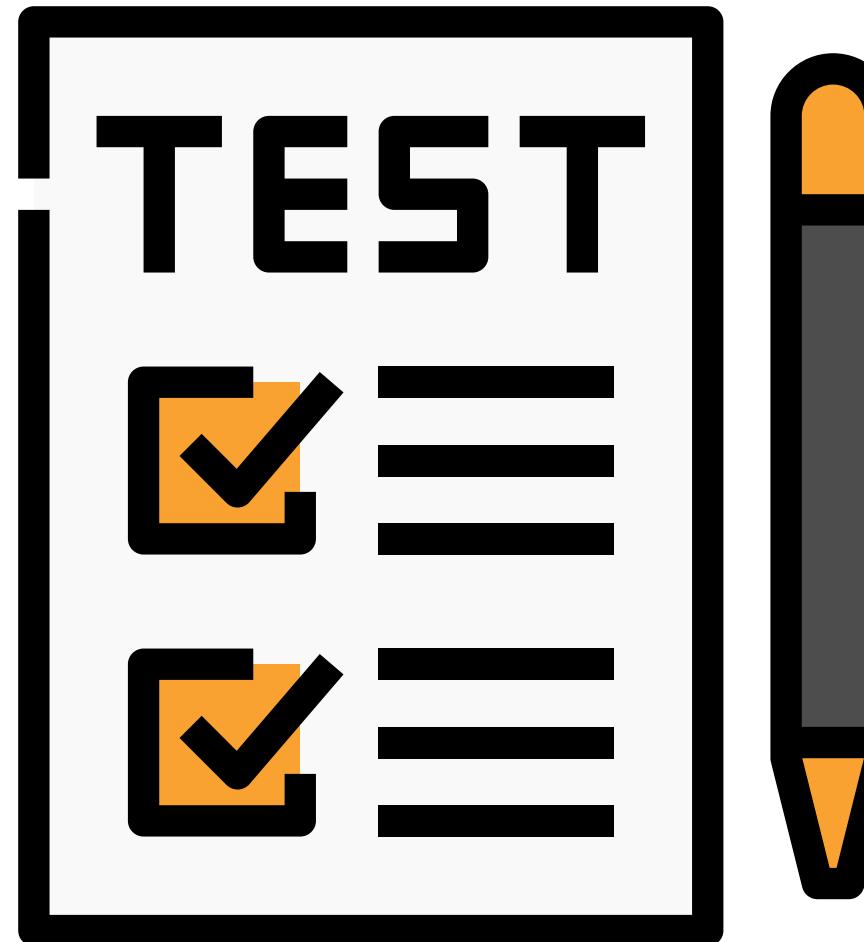
System can process 15 frame per second if the operations are parallel

Processing Time criteria couldn't match. System process images around 0.5 seconds
It's about 500 ms for a frame.

Accuracy Rate is tentative. According to tests that run there is 3 different results.

- Best Case: 100% accuracy
- Average Case: 85% accuracy
- Worst Case: 65% accuracy





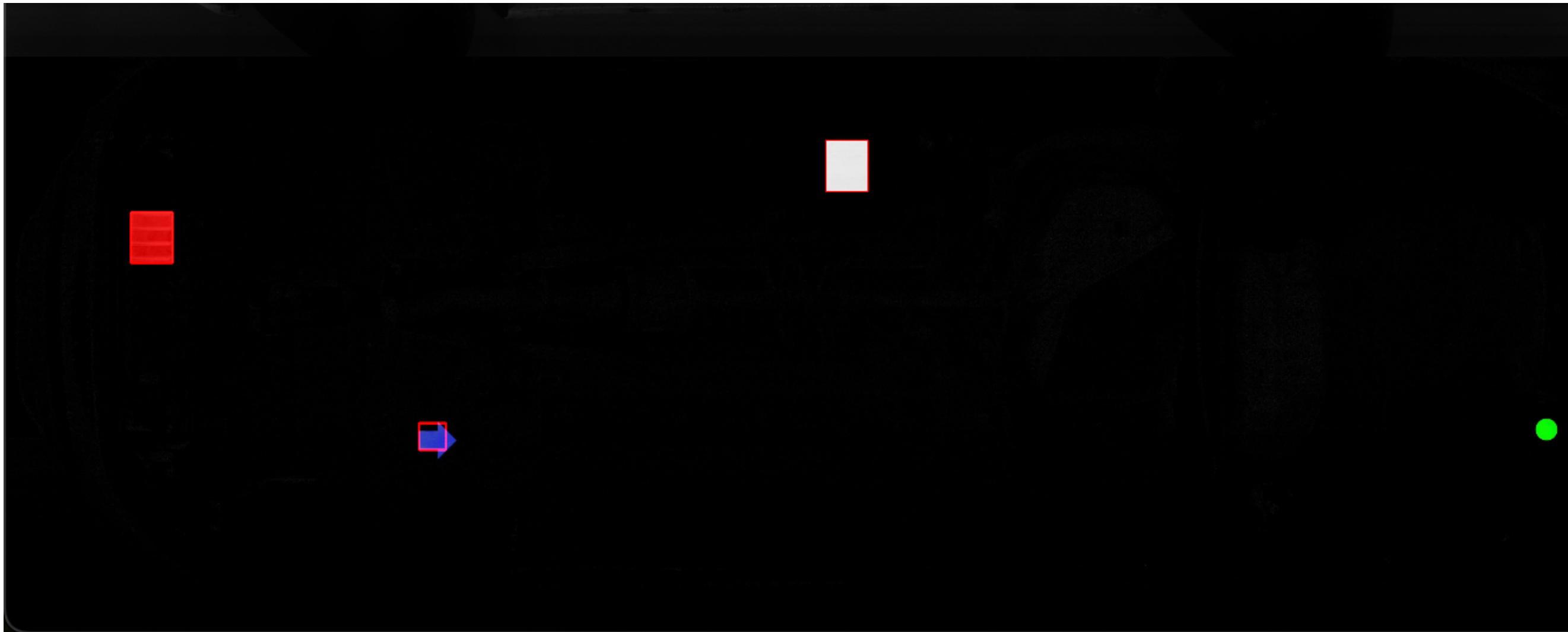
BEST CASE:
IMAGE DIMENSIONS ARE THE SAME
AND THERE IS NO CONTRAST
DIFFERENCE

AVERAGE CASE:
IMAGE DIMENSIONS ARE THE SAME
AND IMAGE SHIFTED RIGHT.
IT MEANS IMAGE REGISTRATION
REQUIRED

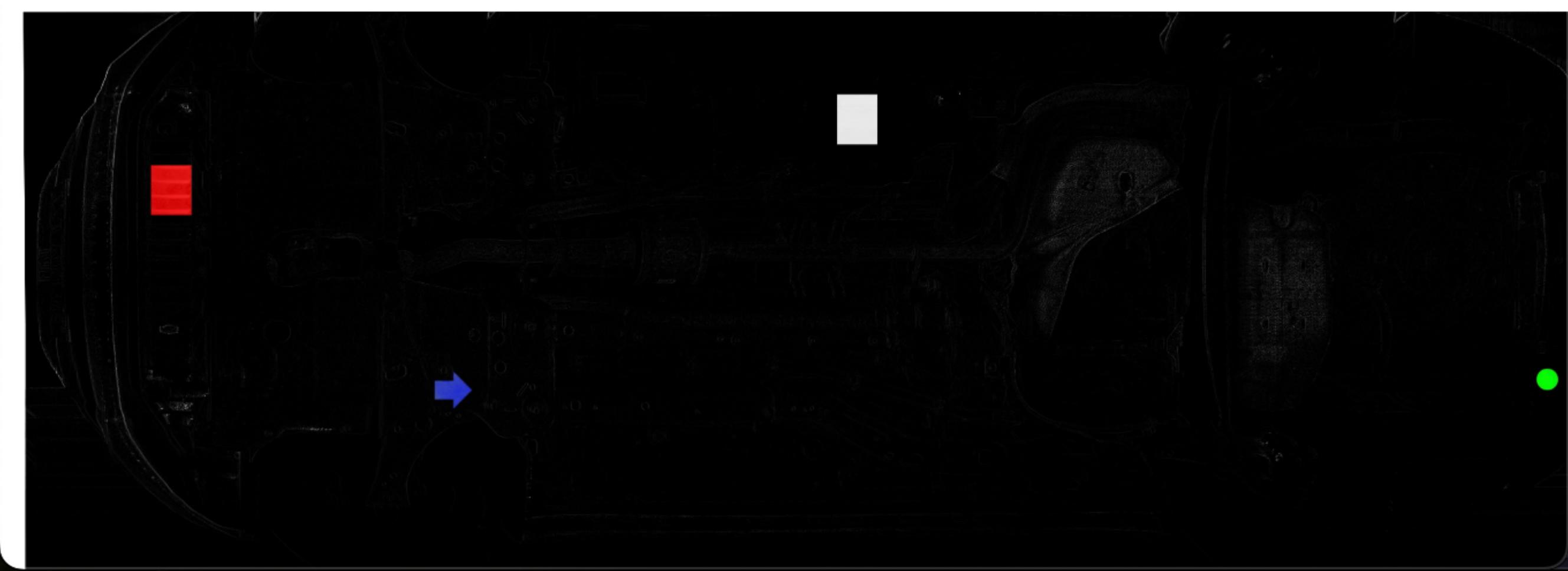
WORST CASE:
IMAGE DIMENSIONS ARE DIFFERENT
AND THERE IS CONTRAST
DIFFERENCE



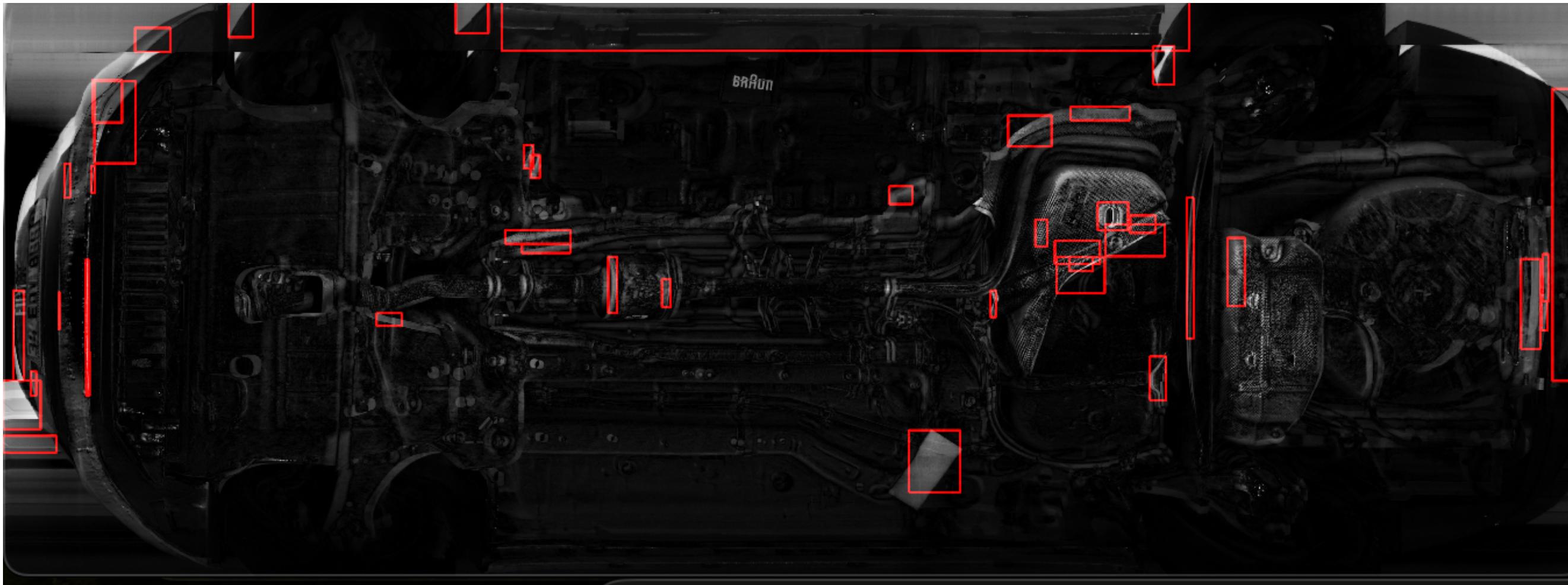
BEST CASE RESULT



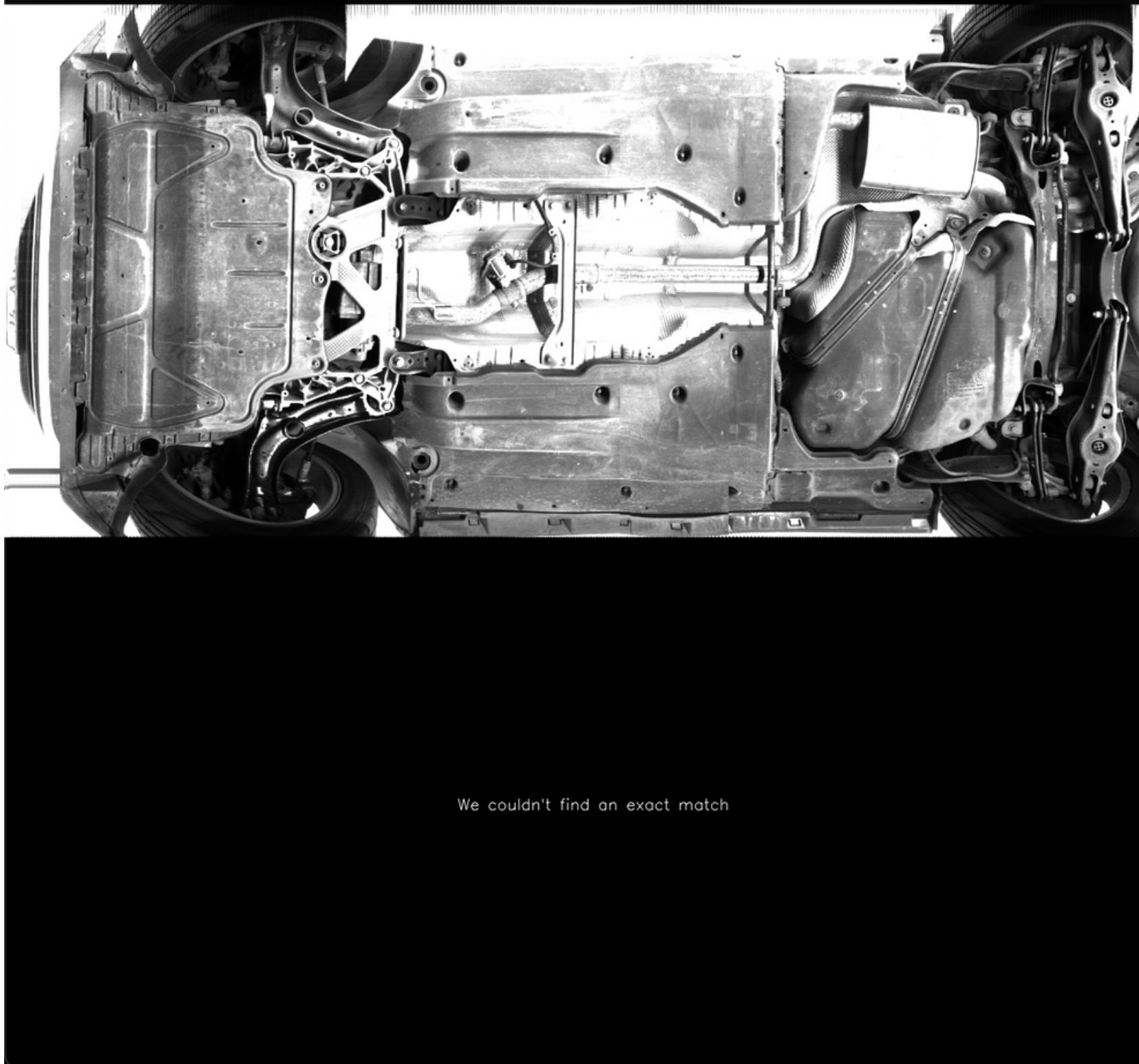
AVERAGE CASE RESULT



WORST CASE RESULT



OUT OF CASE RESULT



similarity rate

0 . 04655492562062585



- [1] "J.M. Hart, E. Resendiz, B. Freid, S. Sawadisavi, C.P.L. Barkan, N. Ahuja", "Machine vision using multi-spectral imaging for undercarriage inspection of railroad equipment," [Online]. Available: http://vision.ai.illinois.edu/html-files-to-import/publications/WCRR_Paper_Hart_et_al_WCRR_MultiSpectralMachineVision-Korea.pdf.
- [2] Medha V. Wyawahare, Dr. Pradeep M. Patil, and Hemant K. Abhyankar. "Image registration techniques: An overview." ()
- [3] F. C. C. Kiong, "Vehicle undercarriage scanning system," [Online]. Available: <https://eprints.usq.edu.au/536/1/frederickCHONGchuenkiong - 2005.pdf>.
- [4] IVUS Gatekeeper Security, <https://www.gatekeepersecurity.com/products/intelligent-vehicle-undercarriage-scanner/>

