NON-TEXTUAL DATA EXTRACTION

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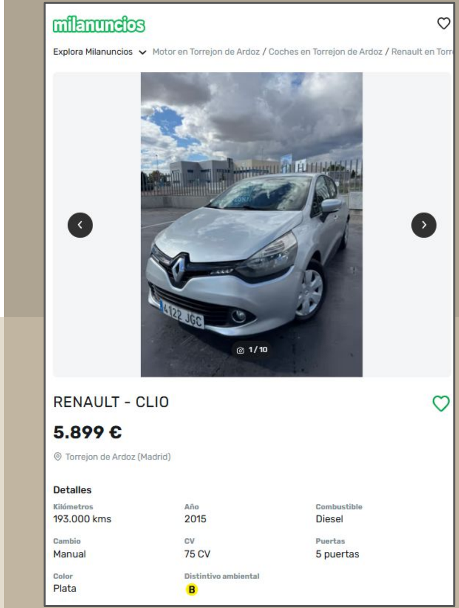
MOTIVATION

- **Problem:** Incomplete and inaccurate car listings on Milanuncios.
- **Solution:** Use CBIR to suggest accurate car details from images.
- **Method:** ORB for shape matching + CCH & SCH for color refinement.
- **Challenges:** Image variations, similar models, and color inconsistencies.
- **Impact:** More accurate listings, better search results, improved user experience.



milanuncios

Explora Milanuncios Motor en Torrejon de Ardoz / Coches en Torrejon de Ardoz / Renault en Torr

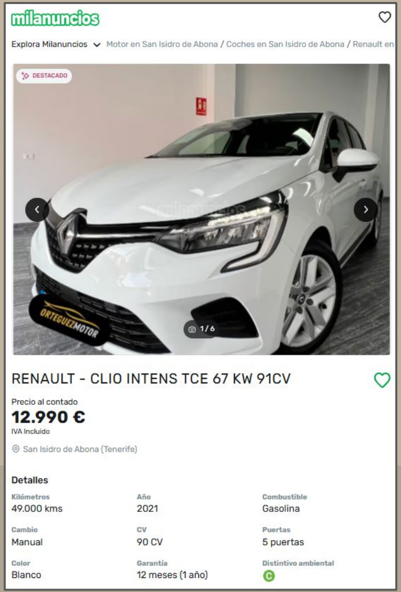
RENAULT - CLIO

5.899 €

Torrejon de Ardoz (Madrid)

Detalles

Kilómetros 193.000 kms	Año 2015	Combustible Diesel
Cambio Manual	CV 75 CV	Puertas 5 puertas
Color Plata	Distintivo ambiental B	



milanuncios

Explora Milanuncios Motor en San Isidro de Abona / Coches en San Isidro de Abona / Renault en

RENAULT - CLIO INTENS TCE 67 KW 91CV

Precio al contado

12.990 €

IVA Incluido

San Isidro de Abona (Tenerife)

Detalles

Kilómetros 49.000 kms	Año 2021	Combustible Gasolina
Cambio Manual	CV 90 CV	Puertas 5 puertas
Color Blanco	Garantía 12 meses (1 año)	Distintivo ambiental C

STATE OF THE ART

ORB: Fast and Robust Feature Detector

Open-source alternative to SIFT & SURF

Key Components:

- **FAST** (with intensity centroid)
- **rBRIEF** (with learning-based feature selection)

Applications:

- **Feature extraction** for tracking & recognition
- Enhanced **object detection**
- Efficient large-scale **image search**
- Hybrid **image retrieval**

COLOR: CCH & SCH

Double Color Histogram for CBIR

- Conventional Colour Histogram (**CCH**) for global color distribution
- Stacked Colour Histogram (**SCH**) to capture texture information

Why It Matters for Car Image Matching

- Robust against *lighting*, *angle*, and *transformation* variations
- Distinguishes cars with similar shapes but different textures/colors
- Improves accuracy in identifying visually similar vehicles

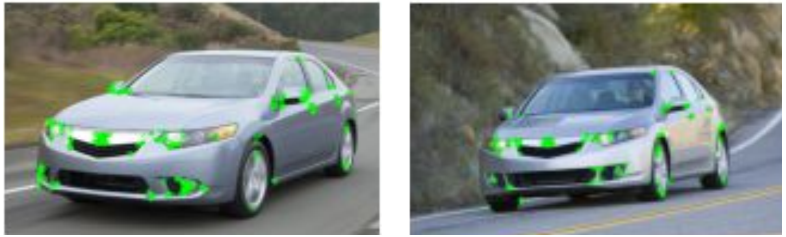
CONSTRUCTING THE TRAINING DATASET

Stanford Cars Dataset with **16,185** images

Diverse range of **vehicle models**

Dataset’s detailed metadata offer additional classification insights for future improvements

IMPLEMENTATION



ORB MATCHER

Uses **ORB (Oriented FAST and Rotated BRIEF)**

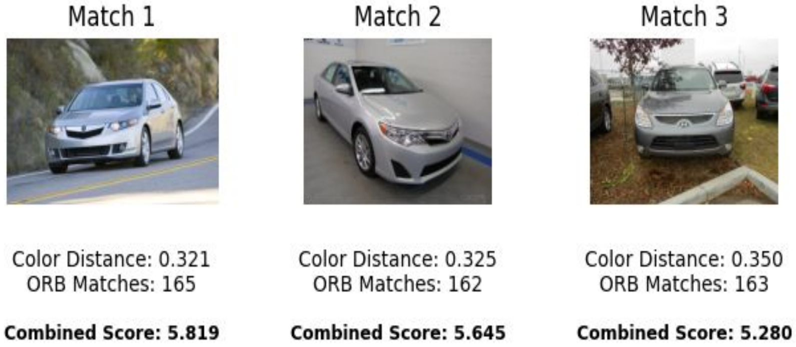
- Compares the **query image's** descriptors against the descriptors of the **dataset**
- Matches based on the number of keypoint using a **brute-force matcher**

COLOR MATCHER

Computes two types of **color-based features**:

- **CCH** based on standard RGB color histograms.
- **SCH** applies blur and averaging over several iterations

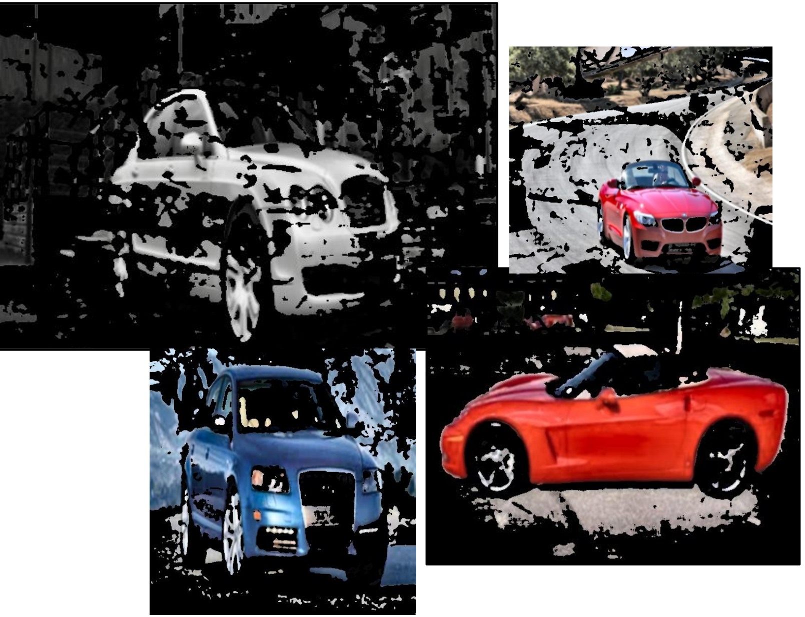
Both combined into a **single vector** to find similar images.



HYBRID MATCHING

integrates the **ORB** and **color-based** results to provide a **combined ranking**

- Filters **top n images** using ORB matcher.
- **Compute** color features of the **filtered list**.
- Calculate a **combined score**
- Display **top results** with metrics and scores.



OTHER EXPERIMENTS

BACKGROUND REMOVAL

Remove the background from images while preserving the foreground

- **Image Standardization**:
- **Background Removal** (BackgroundSubtractorMOG2)
- **Dataset Processing**

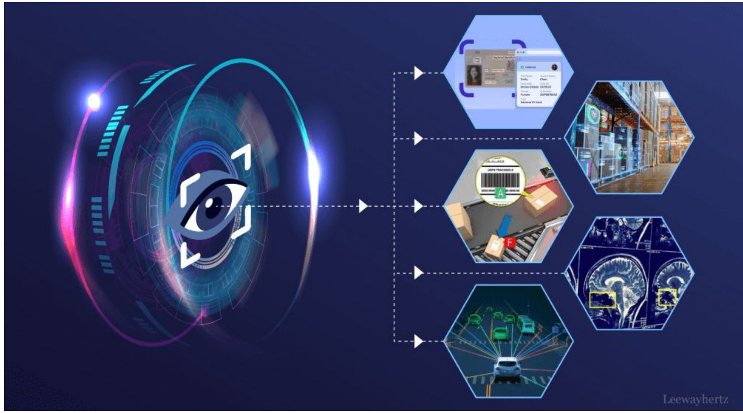
Finally, result didn’t match the required expectations

ORB MATCHER ALTERNATIVES

Experimented with other two feature matching techniques:

- **FLANN** uses Locality Sensitive Hashing (**LSH**) for fast nearest neighbor searches.
- **HNSW** is a graph-based algorithm from **Faiss** that provides efficient similarity search for high-dimensional data.

Both methods didn’t enhance the outputs by **BF Matcher**



Leewayhertz

IMPROVEMENTS

Background removal

Implement **robust segmentation techniques** to isolate subject from surroundings
Evaluate performance of **different algorithms** across varied conditions

Standardize images

Develop **normalization** procedures for lighting variations
Create **position calibration** for consistent vehicle orientation
Implement **bias correction** methods for environmental factors

Experiment ORB matcher alternatives

Evaluate ***SIFT***, ***SURF***, ***AKAZE*** and other feature detection algorithms
Compare **performance metrics**: accuracy, processing time, robustness

Methods beyond color matcher

Investigate **texture-based** recognition approaches
Explore **deep learning-based** feature extraction
Research **hybrid methods** combining multiple recognition strategies