Refrigerator Door Detection and Verification System

# 1. Project Overview

This system is designed to detect refrigerator doors and verify their identity using deep learning techniques.

It comprises two major components:

1. Refrigerator Door Detection Model – Uses the Detectron2 framework retrained in COCO format.

2. Siamese-Based Door Verification Model – Uses a Siamese neural network to verify whether two door images belong to the same refrigerator.

All source code and dataset structure is available on GitHub.

# 2. Image Repository

• Folder: all\_image\_door/

Contains all the refrigerator door images used for both detection and verification.

# 3. Refrigerator Door Detection

• Directory: Detectron\_door\_Detection

This module detects refrigerator doors in images using a custom-trained Detectron2 model.

**• Model Details:**

- Framework: Detectron2

- Dataset Format: COCO

- Scripts:

- coco.py: Converts data into COCO-compliant format.

- train.py: Prepares the training data for Detectron2.

**• Purpose:**

Retrain a refrigerator door detector using your dataset in COCO format.

# 4. Siamese-Based Door Verification

• Directory: Siamease\_Door\_Verification/

This module verifies whether two refrigerator door images are from the same appliance using a Siamese neural network.

**• Image Categories:**

- Positive Images: Different views of the same refrigerator door (simulated via image rotation due to limited real samples).

- Negative Images: Images of different refrigerator doors collected via web scraping.

**• Data Collection:**

- Images were entirely obtained via web scraping.

- Augmentation (e.g., rotation) was used to simulate different angles of the same door.

**• Key Components:**

- augmented\_door/: Contains rotated images of refrigerator doors.

- door\_dataset/: Main dataset folder including positive and negative samples.

- auto\_labels.json: JSON file labeling image pairs as similar (positive) or different (negative).

- auto\_labeling.py: Script that auto-generates dataset pairings and labels.

**• Training Pipeline:**

Dataset is structured via auto-labeling. Siamese model is trained to classify whether two refrigerator doors match.

# 5. Acknowledgements

• Image Sources: All refrigerator door images were collected through automated web scraping.

• Frameworks Used:

- Detectron2 (by Facebook )

- PyTorch / TensorFlow

- COCO dataset tools and format

# 6. Author

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