

Results folder with:

- Sample outputs
- Performance metrics
- Screenshots/videos of system working

Task: Intelligent Object Recognition and Query System for Warehouse Robotics

Part 1: Computer Vision Module (OpenCV)

Objective: Build an object detection and tracking system

Loaded Image: IMG_1682.JPG.rf.13680c043fe5ca84f758db85c0b202c1.jpg



Preprocess Image-

Grayscale Image



Blurred Image (Gaussian Blur)



Perform Canny Edge Detection-

Canny Edge Detection



Find Contours-

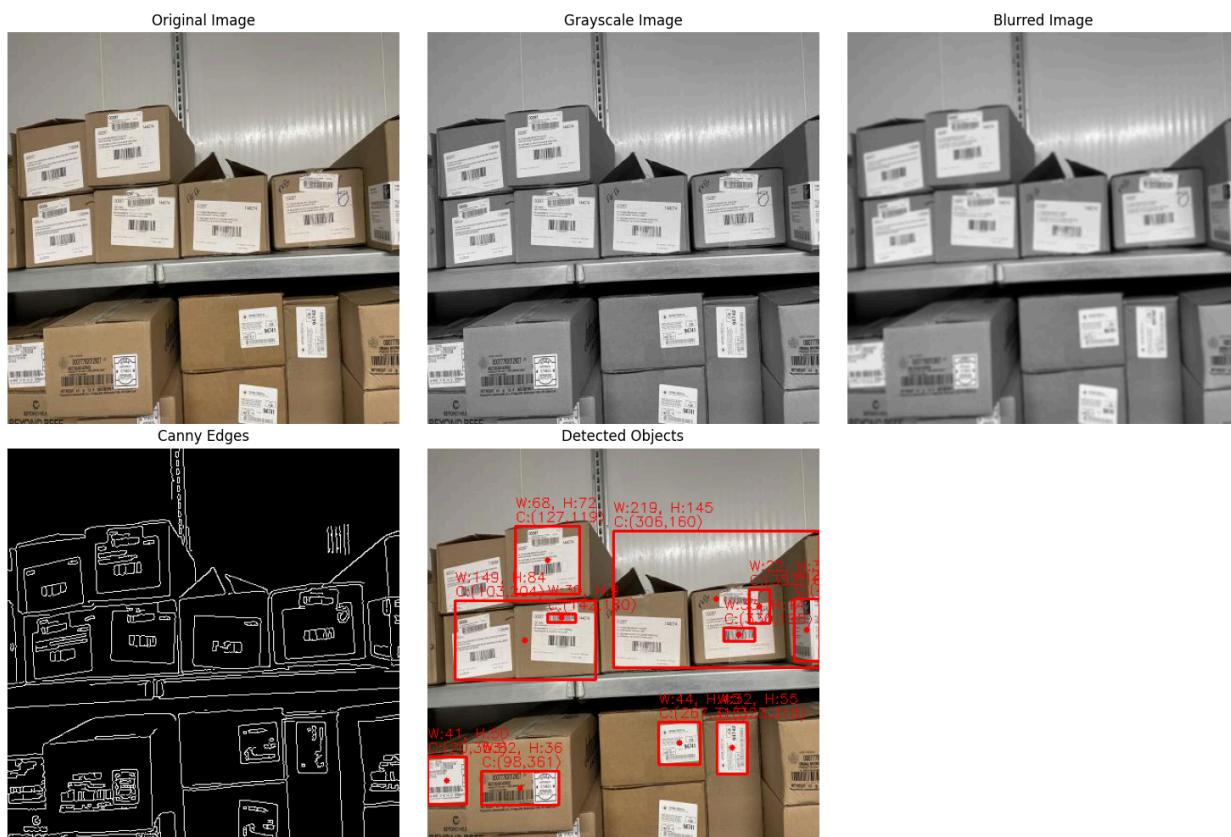
Image with Detected Contours



Objects Detected with Bounding Boxes, Dimensions, and Centers



Displaying Result Output-



Part 2: Machine Learning Model (ML)

Objective: Train a classifier to categorize objects

Dataset-

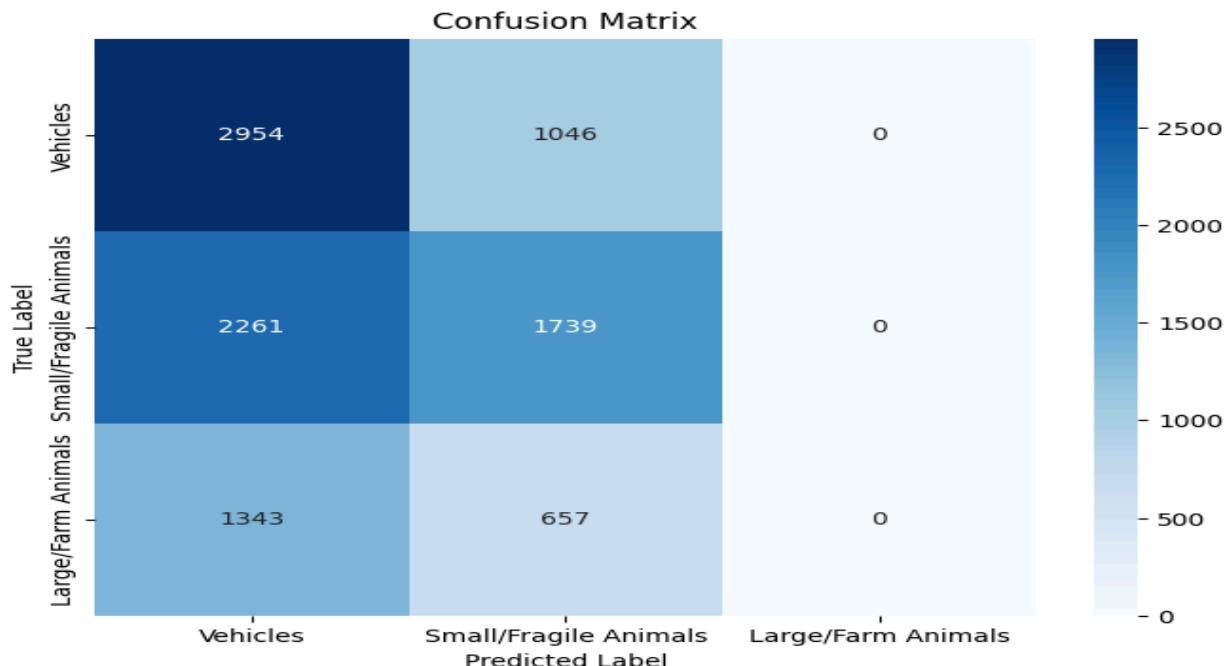
```
import kagglehub
path = kagglehub.dataset_download("pankrzysiu/cifar10-python")
```

Classification Report-

Classification Report:

	precision	recall	f1-score	support
Vehicles	0.45	0.74	0.56	4000
Small/Fragile Animals	0.51	0.43	0.47	4000
Large/Farm Animals	0.00	0.00	0.00	2000
accuracy			0.47	10000
macro avg	0.32	0.39	0.34	10000
weighted avg	0.38	0.47	0.41	10000

Confusion Matrix-



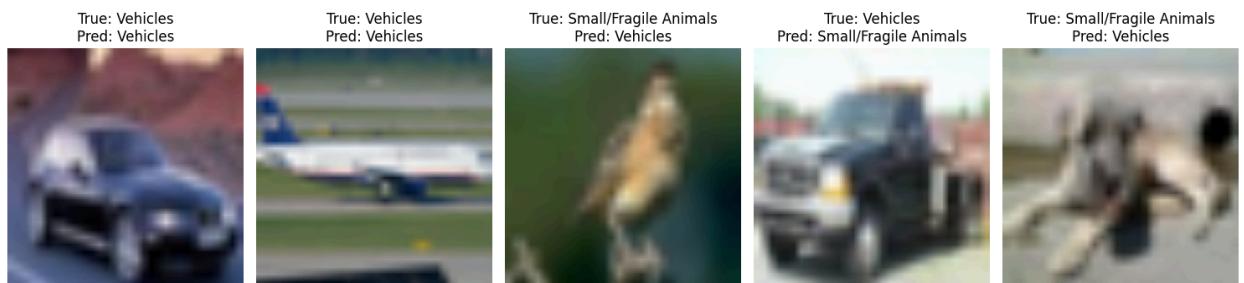
Sample Images with True Labels-

Sample Images with True Labels



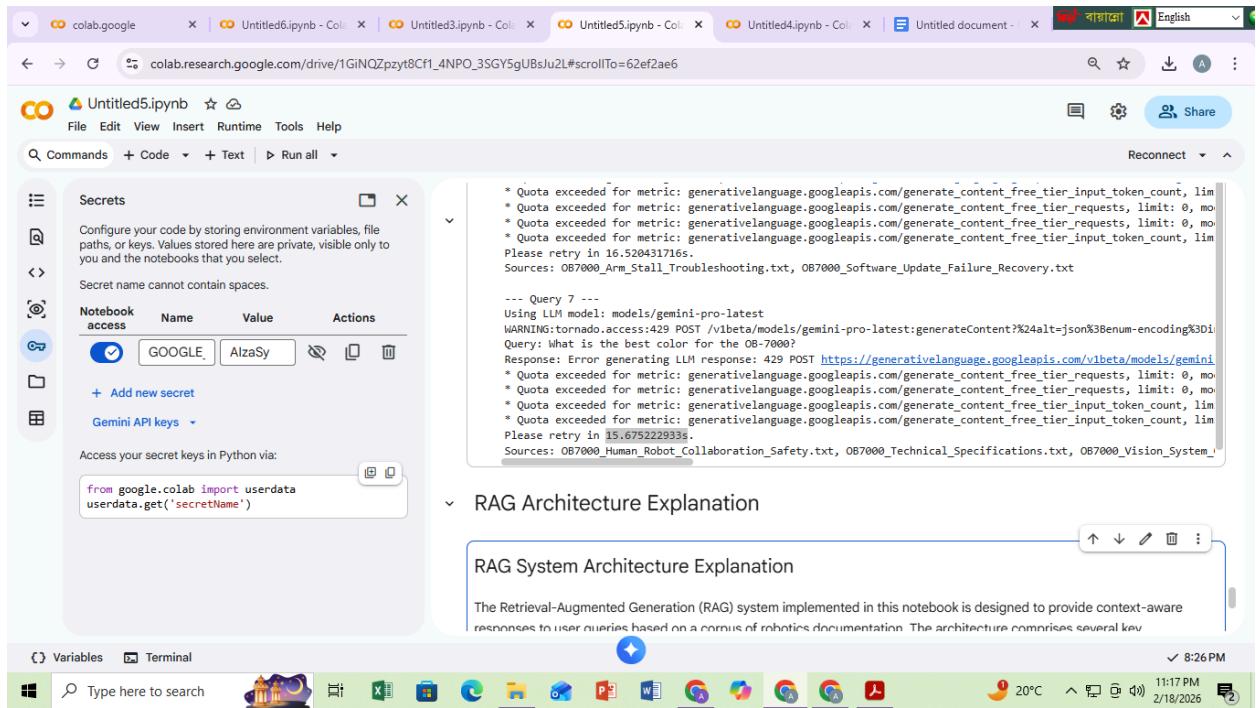
Sample Images with True and Predicted Labels-

Sample Images with True and Predicted Labels



Part 3: RAG System

Objective: Build a retrieval system for robotics documentation



The screenshot shows a Google Colab notebook interface. The left sidebar contains a 'Secrets' section for managing environment variables, a 'Notebook access' table, and a 'Gemini API keys' section. The main content area displays a code cell with a quota exceeded error for generating content using the Gemini model. The code cell contains the following Python code:

```
from google.colab import userdata
userdata.get('secretname')
```

The notebook has tabs for 'colab.google', 'Untitled6.ipynb', 'Untitled3.ipynb', 'Untitled5.ipynb', 'Untitled4.ipynb', and 'Untitled document'. The status bar at the bottom shows the date and time as 2/18/2026 8:26 PM.