RealWaste: AI-Powered Waste Classification System

Application User Guide

AI Assignment Group Project (Group 2)

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1. Introduction

This system is an AI-based waste classification system designed to assist users in identifying the appropriate waste category for a given image. The system utilizes a trained image classification model and provides predictions through a simple and intuitive web interface.

This guide explains how to access and operate the system, upload an image, interpret the results, and troubleshoot common issues.

2. System Requirements

2.1 Hardware Requirements

- Laptop or desktop computer

2.2 Software Requirements

- Any modern web browser (Google Chrome, Mozilla Firefox, Safari, Microsoft Edge)
- Internet connection (for deployed version)
- If running locally:
    - Python 3.8 or above
    - Necessary Python libraries (as specified in the project's requirements.txt file)
    - Model file stored in the correct project directory

3. Accessing the Application

- Open a web browser.
- Enter the following URL:
  https://trio-trashy-realwaste-classification.onrender.com
- The homepage will load automatically and display the main interface for image upload.

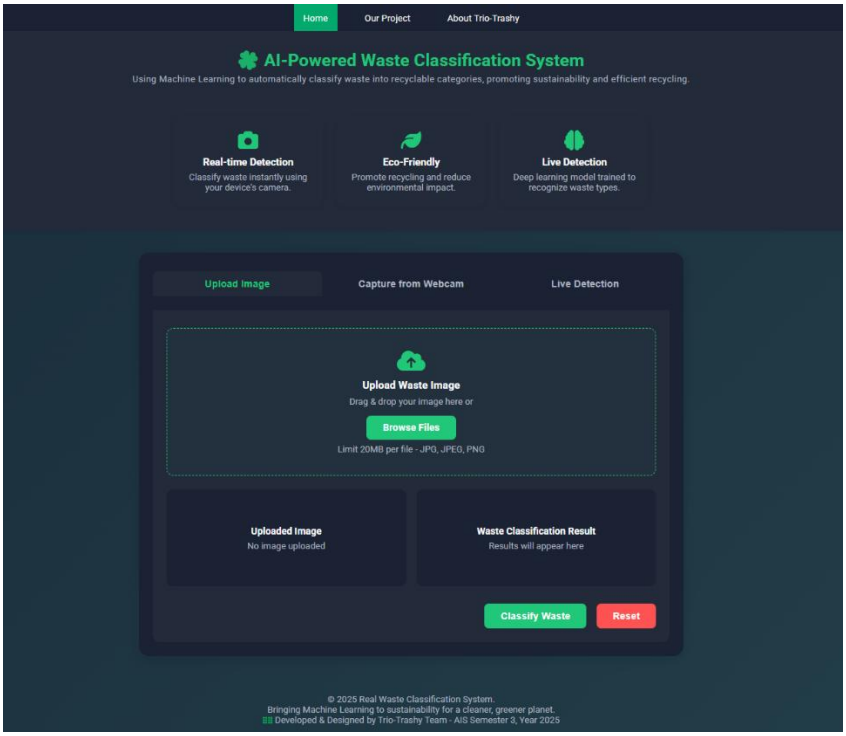
4. Application Features and how to use the application

4.1 Home Page

Upon launching, the user is presented with the home screen, which includes:

- The system name and main features (Real-time and live Detection, Eco-friendly)
- An image upload section
- A display panel for previewing the selected image
- A prediction and bin area

The interface follows a clean and minimalistic layout to ensure ease of use.



4.2 Inputting an Image

This system provides three different methods for inputting waste images into the system. Users may choose to upload an existing image, capture a new photo using a webcam, or utilize real-time live detection for continuous classification. This section explains how each method operates.

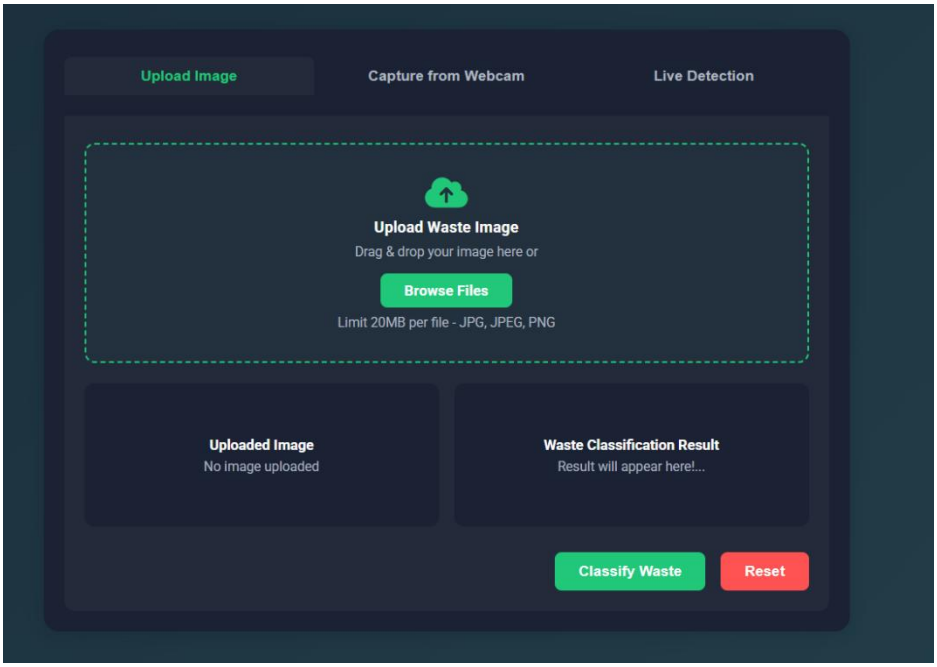
Method 1: Upload Image

The upload feature allows users to select an existing image from their device.

Steps:

1. Click the **"Browse Files"** button or drag and drop an image into the upload area.
2. Supported formats: JPG, JPEG, PNG.
3. Once uploaded, the image preview will appear on the screen.
4. Click in **"Classify Waste"** button to predict the result.

This method is suitable for users who already have images saved or wish to test the system with sample images.



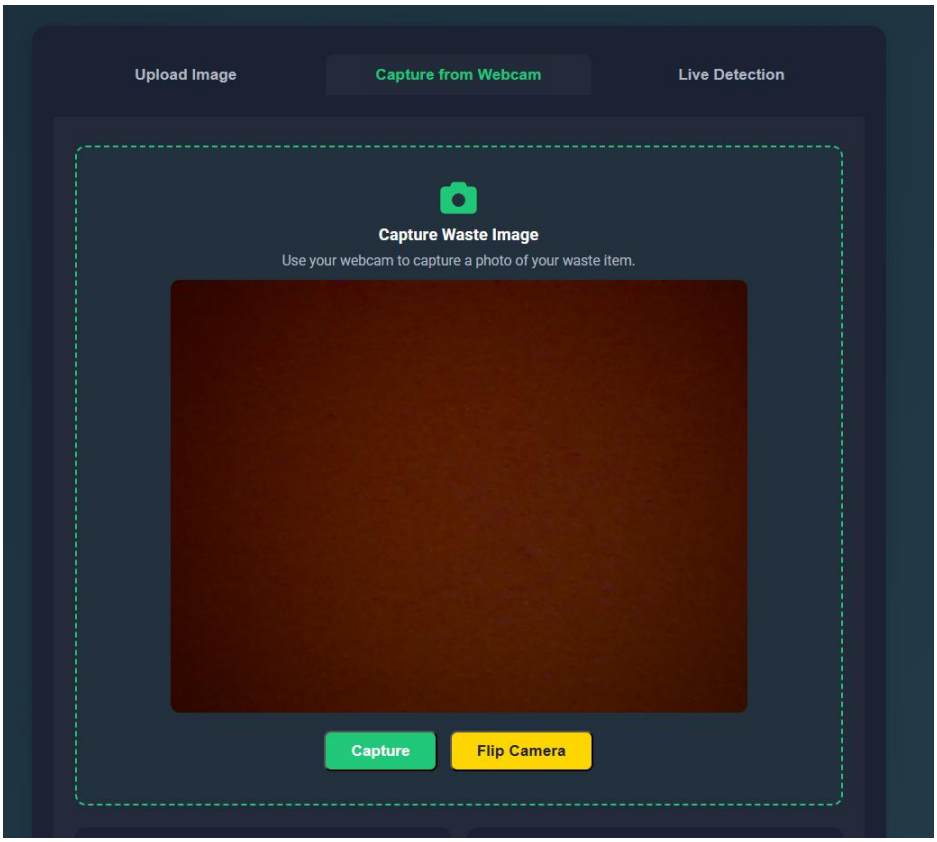
Method 2: Webcam Capture

This feature enables users to take a photo directly using their device's camera.

Steps:

1. Click **"Webcam Capture"**.
2. The browser will request permission to access the camera; click **Allow**.
3. A live camera feed will appear on the screen.
4. Position the waste item in front of the camera.
5. Click **"Capture"** to take a still image.
6. The captured photo will display in the preview area.
7. Click in **"Classify Waste"** button to predict the result.

This method is ideal for quick, real-time photo capture without needing to browse files.



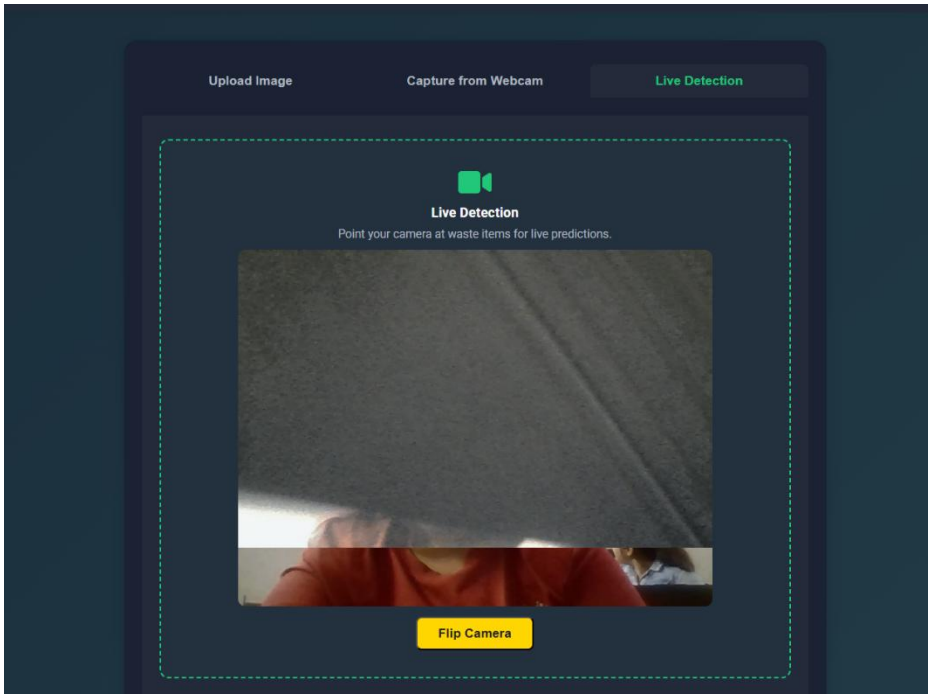
Method 3: Real-Time Live Detection

The live detection mode continuously analyses the video feed and identifies the waste category frame-by-frame.

Steps:

1. Click **"Live Detection"** on the main interface.
2. Allow the browser to access the camera.
3. The system will display a real-time video stream.
4. The AI model will automatically detect and classify objects in the frame.
5. The predicted category and suggested bin will show below.

This feature is especially useful for demonstrations, rapid sorting of multiple waste items and hands-free scanning scenarios.

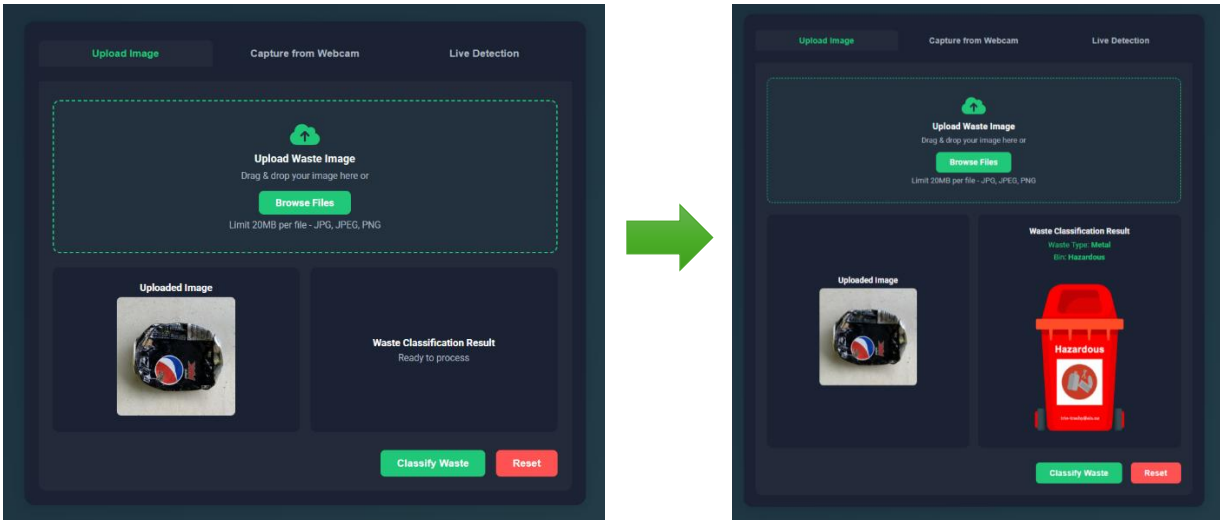


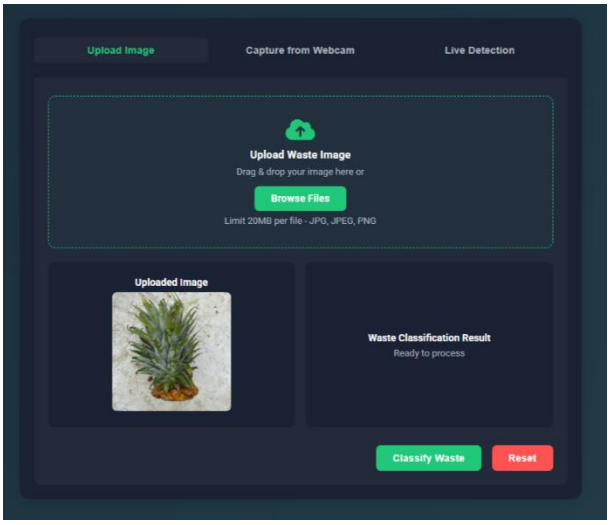
4.3 Interpreting the Results

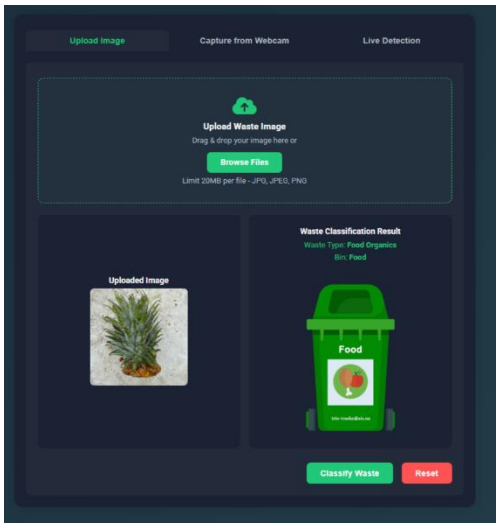
The prediction section provides:

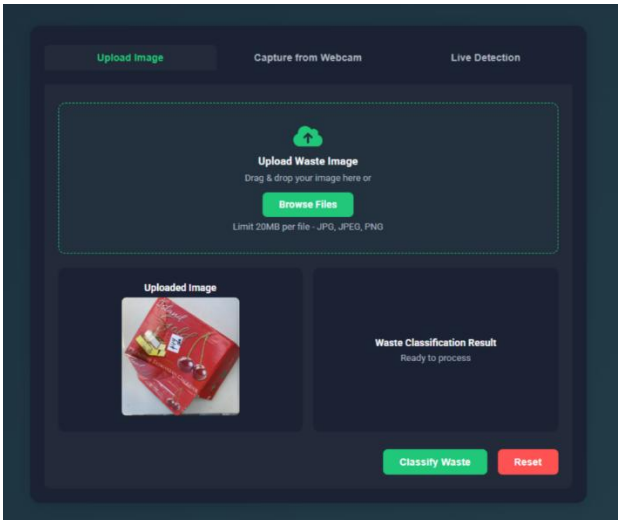
- The waste category identified by the AI model
- Optional disposal recommendations (e.g., “Dispose in Recyclable Bin”)

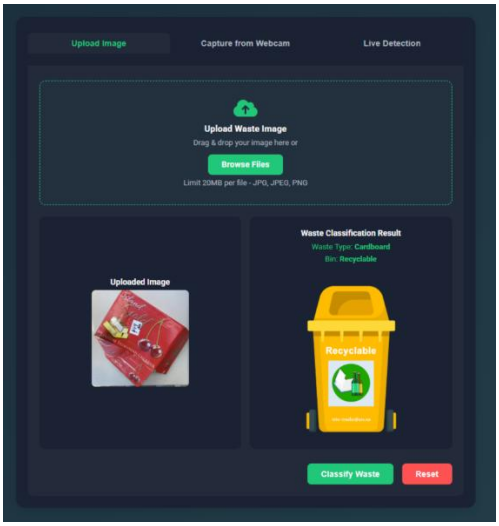
This helps users make informed waste management decisions.

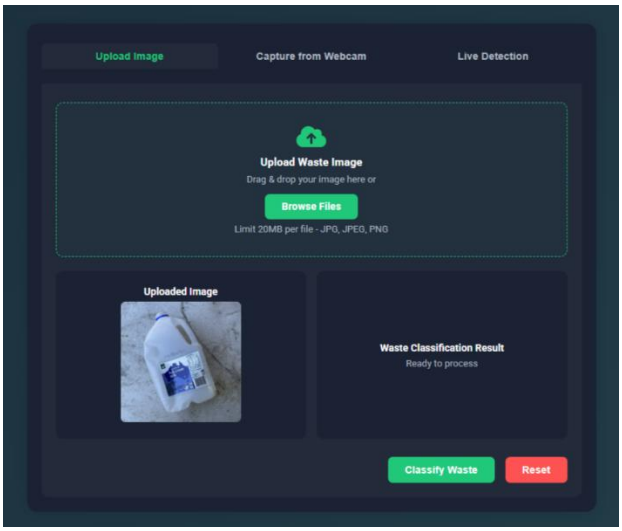


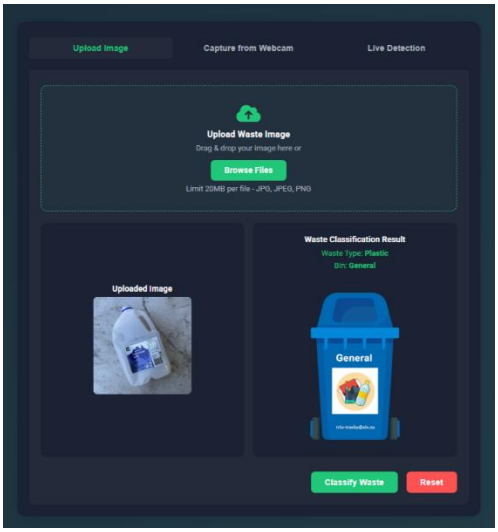

Upload Image
Capture from Webcam
Live Detection
Upload Waste Image
Drag & drop your image here or
Browse Files
Limit 20MB per file - JPG, JPEG, PNG
Uploaded Image
Waste Classification Result
Ready to process
Classify Waste
Reset


Upload Image
Capture from Webcam
Live Detection
Upload Waste Image
Drag & drop your image here or
Browse Files
Limit 20MB per file - JPG, JPEG, PNG
Uploaded Image
Waste Classification Result
Waste Type: Food Organics
Bin: Food
Food
Classify Waste
Reset


Upload Image
Capture from Webcam
Live Detection
Upload Waste Image
Drag & drop your image here or
Browse Files
Limit 20MB per file - JPG, JPEG, PNG
Uploaded Image
Waste Classification Result
Ready to process
Classify Waste
Reset


Upload Image
Capture from Webcam
Live Detection
Upload Waste Image
Drag & drop your image here or
Browse Files
Limit 20MB per file - JPG, JPEG, PNG
Uploaded Image
Waste Classification Result
Waste Type: Cardboard
Bin: Recyclable
Recyclable
Classify Waste
Reset


Upload Image
Capture from Webcam
Live Detection
Upload Waste Image
Drag & drop your image here or
Browse Files
Limit 20MB per file - JPG, JPEG, PNG
Uploaded Image
Waste Classification Result
Ready to process
Classify Waste
Reset


Upload Image
Capture from Webcam
Live Detection
Upload Waste Image
Drag & drop your image here or
Browse Files
Limit 20MB per file - JPG, JPEG, PNG
Uploaded Image
Waste Classification Result
Waste Type: Plastic
Bin: General
General
Classify Waste
Reset

5. Limitations

The current system may have the following limitations:

- Works best with **single object images**
- Does not detect **multiple waste items**
- Accuracy depends on the trained dataset
- Results may vary based on lighting and image quality

6. Troubleshooting

Issue	Possible Cause	Solution
Image does not upload	File too large or unsupported format	Use .jpg/.png and size < 200MB
Page loads slowly	Hosting platform loading time	Refresh, or wait 10–20 seconds
Wrong classification	Poor image quality	Re-take the photo with clear lighting
“App not responding”	Render free tier sleeping	Wait 1–2 minutes, then refresh

7. Contact & Support

For technical issues or improvements, please contact the development team.

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8. Version Information

- Application Version: 1.0
- Model Type: Image Classification (CNN / MobileNet / etc.)
- Deployment: Render Web Service