# iDump Waste Classification System

ENVIRONMENTAL WASTE MANAGEMENT

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# Overview

•Konza City Technopolis is a rapidly growing smart city in Kenya, aiming to be a hub of technology and innovation.

•Environmental sustainability is a core focus for the city.

•iDump has been contracted to develop an advanced waste segregation system to support the city's sustainability goals.

•This system will help maintain cleanliness, reduce environmental impact, and promote recycling practices.

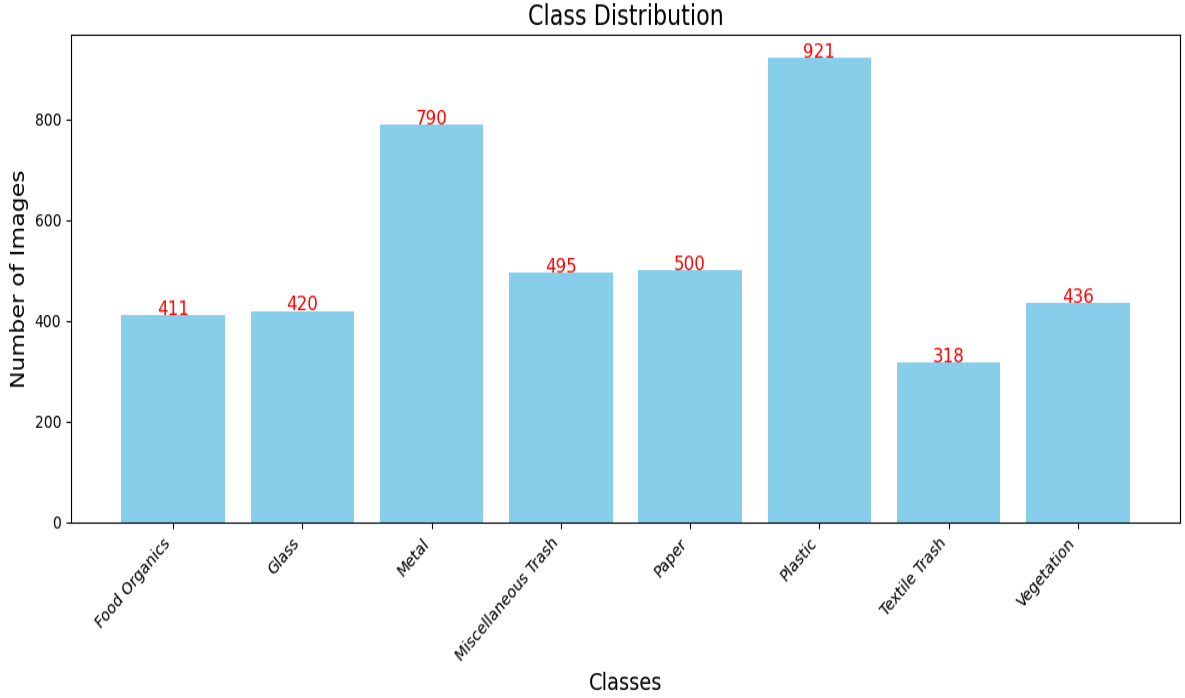
# Problem Statement

Konza City faces significant challenges in managing the increasing volume of waste generated by its residents and businesses. Traditional waste management methods are inefficient and labor-intensive.
There is a pressing need for an accurate and efficient waste classification system.

# Objective

Develop and deploy a robust image recognition system to enhance waste management efficiency in Konza City.

# Data Understanding




DATA PREVIEW

| | Folder Name | Images Count |
|---|---|---|
| 0 | Food Organics | 411 |
| 1 | Glass | 420 |
| 2 | Metal | 790 |
| 3 | Miscellaneous Trash | 495 |
| 4 | Paper | 500 |
| 5 | Plastic | 921 |
| 6 | Textile Trash | 318 |
| 7 | Vegetation | 436 |

# Data Preparation: Augmented Images

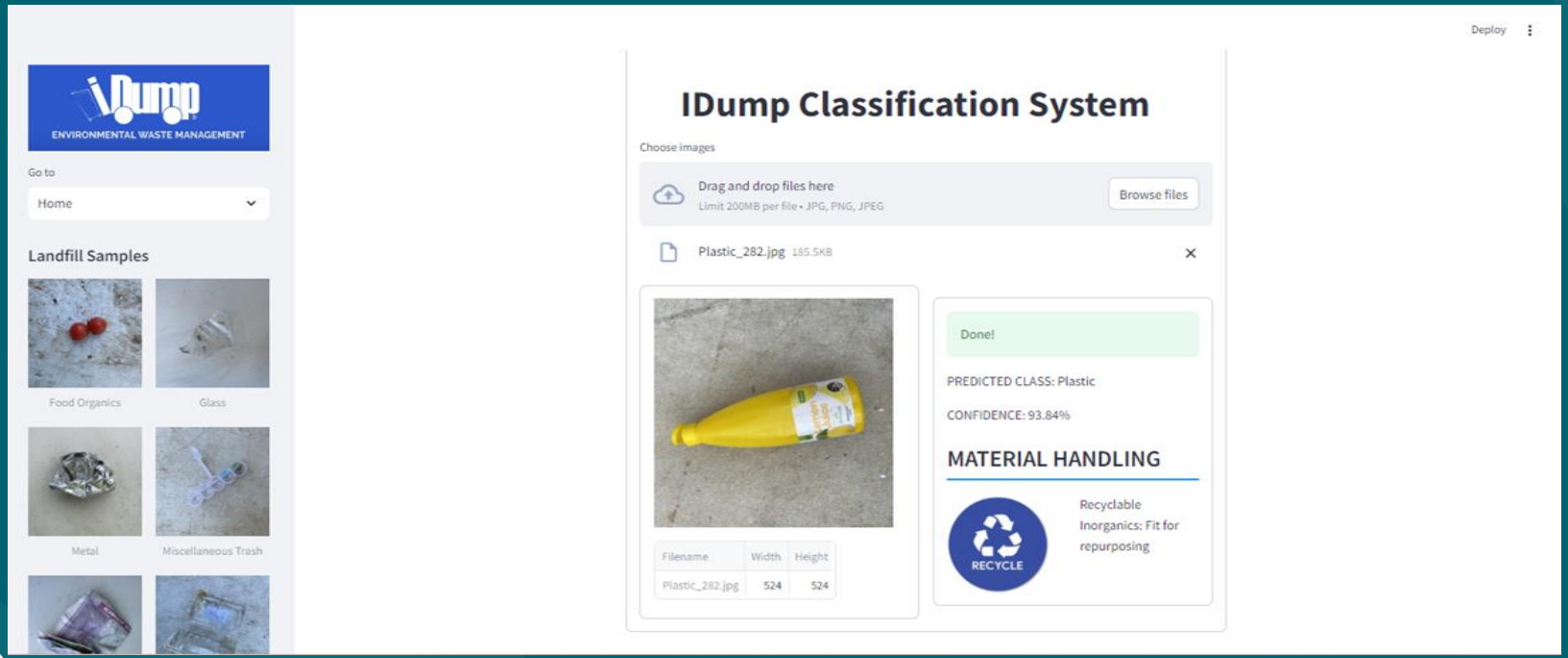
# Modeling

Model Performance Comparison

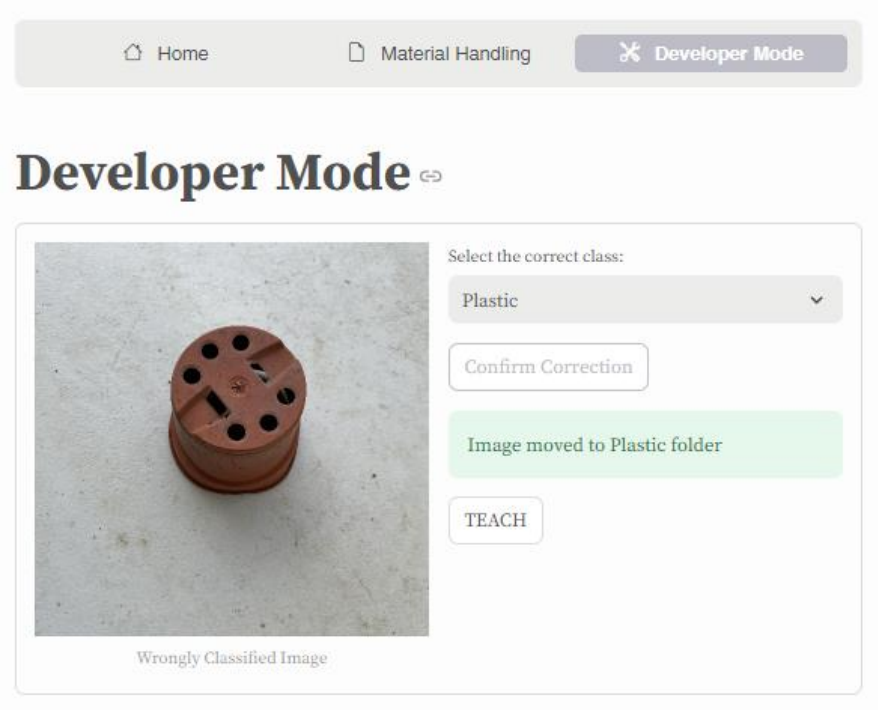
| Model | Test Accuracy | Weighted F1 Score |
|---|---|---|
| Baseline CNN | 0.53 | 0.53 |
| Baseline CNN with Augmentation | 0.57 | 0.57 |
| Inception V3 | 0.76 | 0.74 |
| DenseNet121 | 0.79 | 0.78 |
| EfficientNetV2B0 | 0.83 | 0.83 |
| ResNet50 | 0.85 | 0.85 |

**Final Model:** ResNet50 selected for deployment due to highest accuracy and F1 score

# IDump Classififcation App



# User Feedback




- **Classification Accuracy**: Users can confirm if the classification was correct or incorrect.

- **Developer Mode**: Misclassified images are moved to Developer Mode for further action, allowing continuous improvement of the model.

# Conclusions & Recommendations

**Conclusion:**

•Significant improvements in waste classification accuracy achieved.

•The system effectively provides material handling guidelines based on classification results.

**Recommendations:**

•Outsource compute to cloud servers with GPUs to enhance computational efficiency.

•More data images is needed to train the models .

•Expanding data image Diversity

# Future Works

## Short Term Goals

•Expand dataset diversity to include more representative samples.

•Optimize model architecture for deployment on edge devices.

## Long Term Goals

•Integrate with city-wide waste management systems for real-time tracking and reporting.

•Collaborate with other smart cities for data sharing and model enhancement.

•Develop real-time waste tracking and reporting systems.

# Thanks!

**Do you have any questions?**