# Geo Waste Classification Using Deep Neural Networks

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# Overview

# Introduction

- Deep learning has become an effective tool in waste classification and detection due to its ability to handle complex data and learn patterns from large datasets .

- Rising Waste Generation has been a major concern in present situation. Globally billion tonnes of waste is generated. Such vast amount of waste can have a long-lasting impact on planet.To avoid this proper classification of geological waste is needed.

# Solid Waste Growth
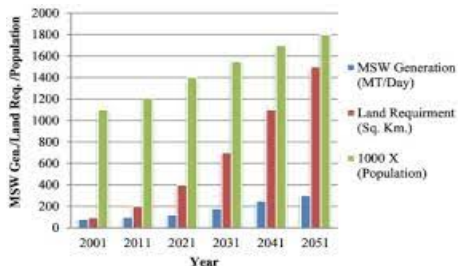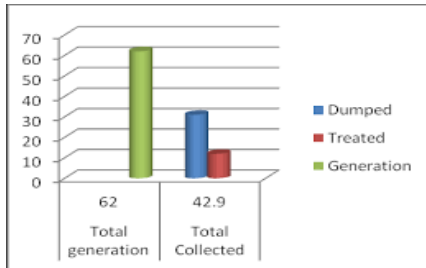
# Problem Statement

- Manual waste sorting is labor-intensive, time-consuming, and prone to errors, leading to inefficient recycling and improper disposal practices.

- Developing an automated Waste Classification System using Deep Learning can address these challenges by Classifying and Advising the possible recycling methods.

# Summary of stage1

- In stage 1 we detected waste objects present in input image.
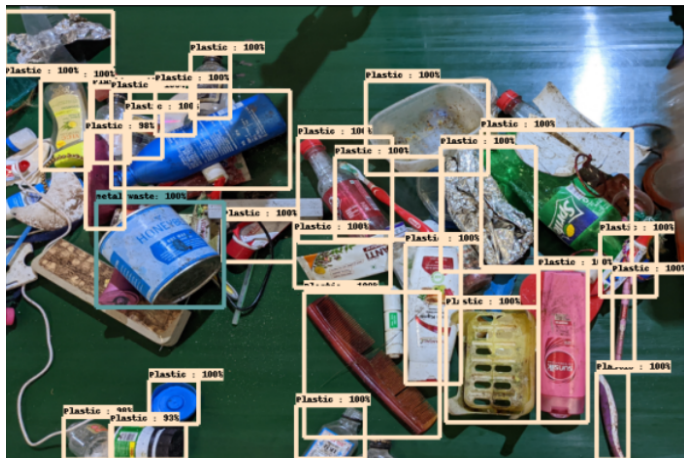- Now we identified major waste object and recommended recycling method.

# Project Architecture
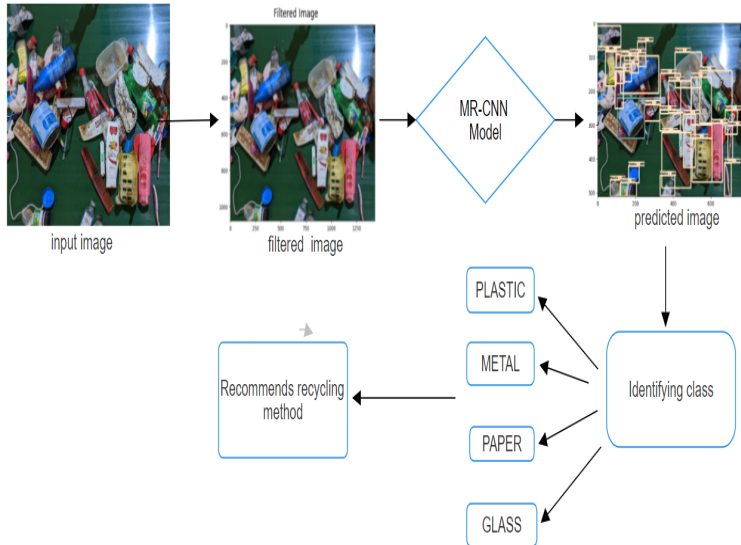
# Modules

- **Image Preprocessing**
- **Object Detection**
- **Classification**
- **Recycling Methods**
- **User Interface Design**

# Results

# Results

Detected category: {'id': 6, 'name': 'Plastic '}

Plastic recycling typically involves sorting, cleaning, shredding, melting, and pelletizing.
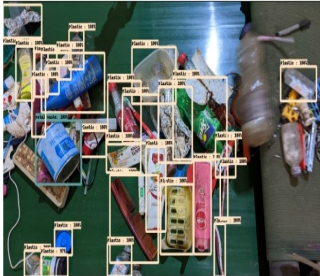
Sorted plastic waste is cleaned to remove contaminants before being shredded into small pieces or melted down.

The melted plastic can then be formed into pellets for manufacturing new plastic products.

Advanced recycling technologies, such as chemical or enzymatic recycling,

are also emerging to break down plastics into their molecular components for reuse.

# Interface result



**Detected Image**

**Recycling Method:**

Plastic recycling typically involves sorting, cleaning, shredding, melting, and pelletizing. Sorted plastic waste is cleaned to remove contaminants before being shredded into small pieces or melted down. The melted plastic can then be formed into pellets for manufacturing new plastic products. Advanced recycling technologies, such as chemical or enzymatic recycling, are also emerging to break down plastics into their molecular components for reuse.

# Results And Discussion

- Explored multiple deep learning models including SVM, CNN, MRCNN, and YOLO for geowaste classification.
- After evaluation, Mask R-CNN (mrcnn) emerged as the most effective model, achieving an accuracy of 86%.
- Chose mrcnn due to its superior performance in accurately identifying and classifying geowaste objects, leveraging its object detection and instance segmentation capabilities
- Developed a Flask-based web application to deploy the mrcnn model, enabling users to interact with the model through a user-friendly interface for real-time geowaste classification.
- Successful implementation of mrcnn holds promising implications for waste management and environmental monitoring.

# Video Demonstration

For project execution video click here.

# Publication Details

## Submission Summary

| | |
|---|---|
| **Conference Name** | 10th International Conference on Electrical Energy Systems 2024 |
| **Paper ID** | 125 |
| **Paper Title** | Geo Waste Classification using deep neural networks |
| **Abstract** | The increasing global waste generation has elevated waste management to critical concern. It is observed that globally solid waste has surged, hitting 2.01 billion tons annually in 2016, with predictions of 3.40 billion tons by 2050. Such vast amounts of waste can lead to severe environmental degradation, loss of bio-diversity and generation of green house gases which have a long-lasting effect on planet. Existing methods, relying on manual sorting and implementation of IOT. Reviewed surveys focused on object detection and on waste detection and classification. But none of them surveyed the benchmarked dataset and the deep learning models. This work proposes deep learning models, specifically convolutional neural networks (CNN's) and Mask regional convolutional neural networks (MRCNN's), to address these challenges and enhance waste management. The proposed method involves training deep learning models on a |

# R & D Showcase Display

# Conclusion

- In conclusion, Geo Waste Classification using Deep Learning detects waste using MRCNN algorithm and recommend innovative and eco-friendly recycling methods for the detected waste and thus maintaining environmental sustainability

# Thank you