

Geo Waste Classification Using Deep Neural Networks

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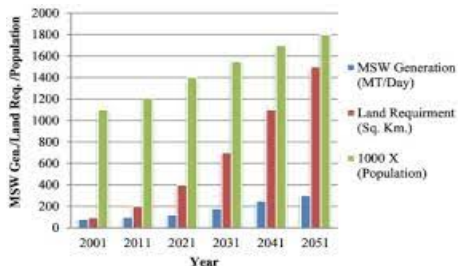
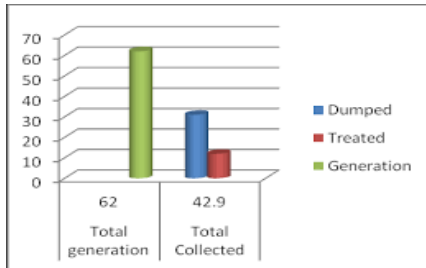
Overview

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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



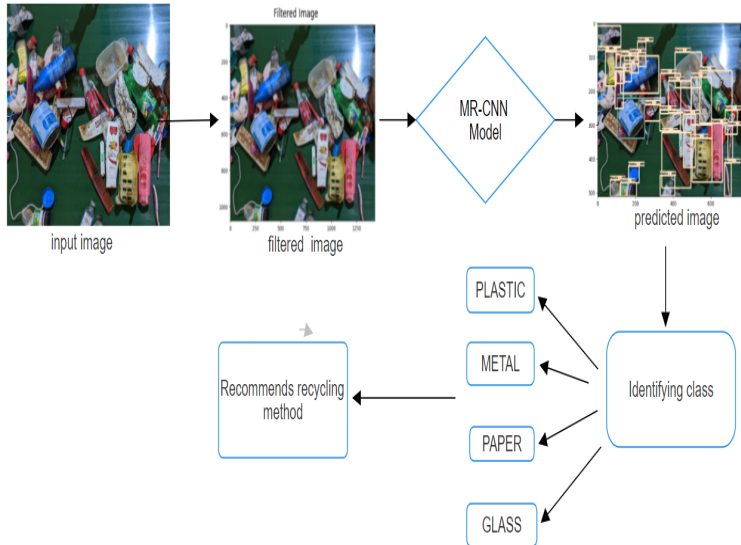
Problem Statement

- 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.

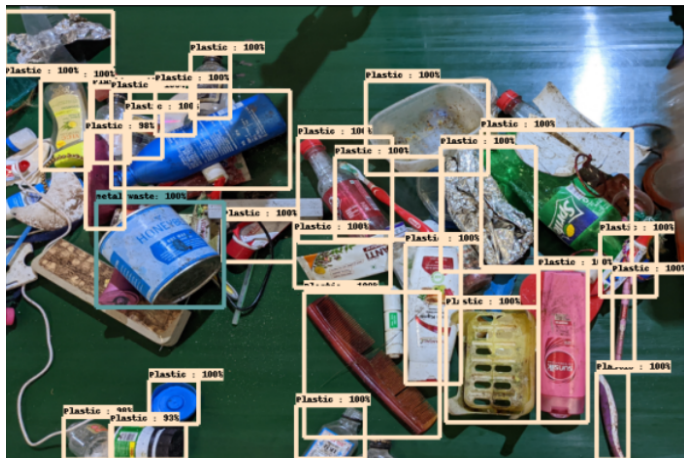
Project Architecture



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.

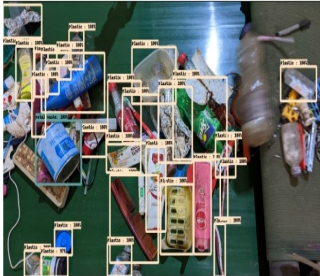
Sorted plastic waste is cleaned to remove contaminants before being shredded into small pieces or melted down.

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	<p>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</p>

R & D Showcase Display



BVRIT HYDERABAD College of Engineering for Women
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R&D SHOWCASE 2024

GEO WASTE CLASSIFICATION USING DEEP NEURAL NETWORKS



ABSTRACT

Geo waste classification implements a real-time waste detection system using deep learning to classify waste into various categories like paper, glass, metal, plastic etc. from images and recommends recycling method. The main objective of the implementation is to bring awareness among people regarding waste management, thereby reducing and recycling of waste accumulated in order to safeguard environmental integrity.

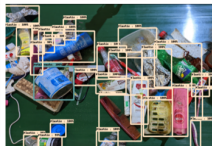
UNIQUENESS

- Waste Detection
- Recycling Method
- User friendly GUI

METHODOLOGY

The methodology utilizes Mask R-CNN for geo waste classification and recycling guidance. Firstly, the model is trained on annotated waste images. Then, for prediction, the MRCNN identifies waste items and assigns them to respective classes. Recycling methods are determined based on the majority class item detected in the image.

Waste Detection



Results & Analysis

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.

SOCIETAL USE

Geo waste classification using deep learning for proper recycling aligns with Sustainable Development Goal (SDG) 12 (Responsible Consumption and Production). By efficiently identifying waste types and recommending suitable recycling methods, this technology promotes sustainable waste management practices, reduces environmental impacts, and fosters resource conservation, advancing societal goals of responsible consumption and production.

CONCLUSION

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

REFERENCES

- H. Abdu and M. H. M. Noor, "A survey on waste detection and classification using deep learning," IEEE Access, vol. 10, pp. 128151-128165, 2022
- N. Sarker, S. Chaki, A. Das, and M. S. A. Forhad, "Illegal trash thrower detection based on hogsvm for a real-time monitoring system," pp. 2021

SDG -12

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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