edunet foundation

AI POWERED WASTE SORTING SYSTEM

PRESENTED BY :
M.P.DHARSHAN

Content

Abstract

- This project aims to develop an AI-powered waste sorting system using computer vision and machine learning techniques.
- The system automatically classifies waste into categories such as plastic, paper, metal, organic, and glass to promote efficient recycling and reduce environmental impact.
- The model is trained on a labeled dataset of waste images and deployed through a camera-enabled interface for real-time sorting.

Problem Statement

- Manual waste segregation is inefficient, time-consuming, and often inaccurate, leading to improper disposal and reduced recycling effectiveness.
- The lack of automation in waste management contributes to environmental pollution, increased landfill usage, and resource loss

Objective

- To develop a machine learning model capable of identifying and classifying different types of waste
- To automate the sorting process using AI to enhance recycling and waste management.
- build a system that is scalable, cost-effective, and suitable for deployment in urban environments.

Data Collection and Preparation

- Dataset: Images of various waste items sourced from public datasets like TrashNet, augmented with custom
- images. Preprocessing: Image resizing, normalization, augmentation (rotation, flipping), and
- labeling.Splitting: Dataset divided into training, validation, and testing sets.

Proposed Solution (Methodology)

- Model Architecture: CNN-based model (e.g., MobileNet, ResNet) for image classification.
- Training: Using TensorFlow or PyTorch with transfer learning to enhance performance with limit. data.
- Deployment: Integrated with a Raspberry Pi + camera setup or a web-based interface for real-time classification.
- Classes: E.g., Plastic, Metal, Glass, Paper, Organic, Others.

Model Performance Evaluation

- Metrics: Accuracy, Precision, Recall, F1 Score, Confusion Matrix.
- Results: Achieved ~90% accuracy on test data.
- Validation: Cross-validation to ensure robustness and generalization.

Screenshots / Demonstration (video)

- Images of the model in action—identifying waste through camera input.
- Optional video showing real-time classification and sorting mechanism.

Future Scope

- Integrate robotic arms or conveyor mechanisms for physical sorting.
- Improve accuracy with more diverse datasets.
- Implement IoT integration for centralized waste monitoring
- Expand to hazardous and medical waste classification.

Conclusion

The AI-powered waste sorting system demonstrates the potential of machine learning in addressing environmental challenges. By automating waste classification, it enhances efficiency and promotes sustainable waste management. With further development, this solution can play a vital role in achieving smarter and greener cities.