

## Project Problem Statement

The increasing waste generation in urban areas poses a serious threat to environmental sustainability.

Improper segregation and disposal of waste contribute to land, air, and water pollution. With growing industrialization and population density, the traditional manual waste sorting process has become inefficient, leading to reduced recycling efficiency and harmful environmental impacts.

There is a pressing need for an automated and intelligent solution that can streamline waste classification and promote sustainable waste management practices.

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## Project Concept

This project focuses on developing a Smart Waste Classification System using Convolutional Neural Networks (CNN), a subset of Deep Learning (AI). The system aims to automatically classify waste images into categories such as plastic, metal, paper, glass, and organic. By accurately identifying the waste type, it can help in automated sorting, thereby improving recycling efficiency and supporting environmental sustainability.

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## Dataset

Dataset Name: Garbage Classification Dataset

Source: <https://www.kaggle.com/datasets/sumn2u/garbage-classification-v2>

About the Dataset:

This dataset contains thousands of labeled garbage images divided into 10 categories. It is specifically designed for computer vision and machine learning applications focused on waste management and recycling. It provides sufficient diversity for training CNN models to distinguish between different waste materials accurately.

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## Next Steps

1. Collect & Prepare Dataset – Download and organize dataset images for training.
2. Train CNN Model – Use Google Teachable Machine or Google Colab to train a

Convolutional Neural Network.

3. Evaluate & Test Model – Measure model accuracy and adjust parameters.
  4. Develop Web Interface – Build a small front-end (Streamlit) to upload and classify images.
  5. Test Complete System – Validate with new sample waste images.
  6. Deploy & Document – Finalize model, write reports, and deploy on GitHub or Streamlit Cloud.
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