■■ Project Problem Statement

The growing amount of solid waste produced by households and industries poses a significant environmental challenge. Improper waste segregation leads to land pollution, increased landfill use, and lower recycling efficiency. With rapid urbanization and consumerism, there is an urgent need for technological solutions that can help classify and recycle waste efficiently.

■ Problem Definition

This project focuses on building an **AI-based Waste Classification System** that uses image classification techniques to automatically identify different types of waste. The model will classify waste into six categories — **Cardboard, Glass, Metal, Paper, Plastic,** and **Trash**. By leveraging Convolutional Neural Networks (CNNs) and Transfer Learning, the system aims to assist in proper waste segregation and recycling.

■ Dataset Information

Dataset Name: Garbage Classification Dataset
Source: Kaggle - Garbage Classification Dataset
Classes: Cardboard, Glass, Metal, Paper, Plastic, Trash
Description: The dataset contains thousands of labeled garbage images categorized into six classes. It is suitable for developing machine learning and deep learning models that promote efficient recycling and sustainable waste management.

■ Project Workflow

Step	Description
1	Collect and preprocess the dataset
2	Train CNN model (ResNet/EfficientNet) using Transfer Learning
3	Evaluate and test the model for accuracy and precision
4	Build an interactive web interface (Flask/Streamlit)
5	Test and deploy the complete application
6	Document and present results

■ Sustainability Impact

Automating waste segregation reduces human error and enhances recycling efficiency. This project supports **UN Sustainable Development Goal (SDG) 12 —**

Responsible Consumption and Production, by promoting better waste management and environmental protection through AI-driven innovation.

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Internship Theme: Sustainability - Waste Classification using AI & ML