Project Proposal: Waste Management System Using Deep Learning

Group:12

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1. Project Overview:

The project aims to develop an automated waste classification system using deep learning. The system will classify waste into categories such as plastic, paper, metal, and organic. By providing an easy-to-use interface, this system will enhance waste segregation and recycling efficiency in urban areas, promoting more sustainable waste management practices.

2. Alignment with Sustainable Development Goals (SDGs):

This project supports:

- **SDG 11: Sustainable Cities and Communities** by promoting efficient waste management and reducing environmental pollution.
- **SDG 12: Responsible Consumption and Production** by encouraging recycling and sustainable waste disposal practices. It contributes to cleaner urban environments and supports global sustainability efforts.

3. Relevant Research:

- **TrashNet: A CNN for Waste Classification** – Used CNN models to classify waste into categories, showing the potential of deep learning in waste management.
- **Automated Waste Sorting Using AI** – Demonstrated image recognition for real-time waste sorting, highlighting AI's role in reducing manual labor in waste management.

4. Dataset Description:

The dataset for this project is the **Garbage Classification v2 Dataset** from Kaggle, consisting of over 15,000 labeled images of various waste items (e.g., plastic, paper). The images will be preprocessed by resizing them to 224x224 pixels, performing data augmentation, and normalizing pixel values to enhance the model's performance.

5. Methodology:

The project will utilize **deep learning**, specifically **Convolutional Neural Networks (CNNs)**, to classify waste. A pretrained model, such as ResNet50 or EfficientNet, will be fine-tuned to adapt to the dataset for optimal classification accuracy. The system will also include a **Tkinter**-based interface for real-time user interaction, allowing users to upload waste images and receive classification results.