Project Initialization and Planning Phase

Date	15 March 2024
Team ID	739675
Project Title	Cleantech: Transforming Waste Management With Transfer Learning
Maximum Marks	3 Marks

Project Proposal (Proposed Solution)

Project Overview	
Objective	To design and implement a transfer learning-based automated waste classification system that enhances the efficiency and accuracy of waste sorting processes, thereby contributing to sustainable waste management practices and supporting the development of smart, environmentally responsible communities
Scope	The scope of this cleantech project involves developing an intelligent waste classification system using transfer learning techniques. By fine-tuning pre-trained convolutional neural networks such as ResNet50 or DenseNet121, the system aims to accurately categorize waste into types like plastic, metal, paper, and organic materials, even with limited training data

Problem Statement	
Description	The problem lies in the inefficiency and inaccuracy of traditional waste sorting methods, which heavily rely on manual labor and are prone to errors.
Impact	Solving this problem for Applying transfer learning in waste management enhances classification accuracy, achieving up to 97.8% F1 scores, thereby improving recycling efficiency and reducing environmental pollution.

Proposed Solution

Approach	The proposed solution involves fine-tuning pre-trained convolutional neural networks, such as EfficientNet-B0 and ResNet50, to accurately classify waste types using transfer learning techniques.
Key Features	- Enhanced Classification Accuracy: Utilizing pre-trained models like ResNet50 and VGG16 - Real-Time Processing - Scalability and Adaptability - User Engagement and Education

Resource Requirements

Resource Type	Description	Specification/Allocation
Hardware		
Computing Resources	CPU/GPU specifications, number of cores	e.g., 2 x NVIDIA V100 GPUs
Memory	RAM specifications	e.g., 8 GB
Storage	Disk space for data, models, and logs	e.g., 1 TB SSD
Software		
Frameworks	Python frameworks	e.g., Flask, TensorFlow
Libraries	Additional libraries	e.g., NumPy, OS
Development Environment	IDE, version control	e.g., Google Colab, VS code
Data		
Data	Source, size, format	e.g., Kaggle dataset, 10,000 images