

EcoPackAI – Project Documentation

1. Architecture Overview

EcoPackAI follows a modular, scalable architecture with separate layers for data ingestion, processing, machine learning inference, recommendation logic, visualization, and deployment.

2. Dataset Description

EcoPackAI uses structured datasets combining material properties, environmental metrics, and product requirements including carbon footprint, recyclability, biodegradability, cost efficiency, durability, and compliance requirements.

3. Machine Learning Model Explanation

The system uses a hybrid recommendation model combining content-based filtering and predictive models such as Random Forest and XGBoost for cost and sustainability prediction.

4. Evaluation Metrics

Evaluation includes Precision@K, Recall@K, NDCG, cost savings percentage, and sustainability impact metrics such as average carbon footprint reduction.

5. BI Dashboard Explanation

The dashboard provides real-time visualization of recommended materials, carbon footprint comparisons, cost analysis, and sustainability KPIs.

6. Deployment Steps

Deployment involves environment setup, model training, backend development, dashboard integration, Docker containerization, cloud hosting, CI/CD setup, and monitoring.

7. Screenshots (To Be Added)

Include screenshots of the user input interface, recommendation results, dashboard, architecture diagram, feature importance plots, and CI/CD pipeline.