# README - Garbage Image Classification using MobileNetV2

## Project Overview

This project builds a convolutional neural network (CNN) based image classifier to detect and classify types of garbage materials such as metal, glass, plastic, paper, cardboard, trash, and white-glass. It leverages MobileNetV2 for transfer learning and performs image preprocessing, data augmentation, model training, and performance evaluation.

## Technologies Used

- Python, Pandas, NumPy  
- OpenCV, Seaborn, Matplotlib  
- TensorFlow / Keras  
- scikit-learn  
- MobileNetV2 (Pre-trained)

## Setup Instructions

1. Clone or download the project.  
2. Install the required packages:  
 pip install tensorflow pandas numpy matplotlib opencv-python scikit-learn tqdm  
3. Ensure the dataset is placed in the following path:  
 /Garbage classification/  
 ├── cardboard/  
 ├── glass/  
 ├── metal/  
 ├── paper/  
 ├── plastic/  
 ├── trash/  
 └── white-glass/

## How to Run

Run the notebook meeee.ipynb step by step. The notebook handles:  
- Data reading and labeling  
- Train/validation split  
- Data augmentation and preprocessing  
- Model training and evaluation

## Results & Performance

Model used: MobileNetV2  
Optimizer: Adam  
Evaluation Metrics: Accuracy, Confusion Matrix, Classification Report  
Results show high accuracy in classifying waste materials, particularly in common categories like plastic and cardboard.

## Sample Input/Output

Input: Garbage image of a crushed soda can  
Output: Predicted class: metal

## Notes

- White-glass is relabeled as 'glass' to simplify classification.  
- Image augmentation techniques improve generalization.

## License

This project is for educational and research purposes only.