

Garbage Classification using Deep Learning

Students in the group:

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Problem statement:

The goal is to classify garbage images into 6 categories using deep learning CNN architectures and feature based models to identify the recyclability status of garbage.

Techniques: Proposed models/architectures for this project: (2-3 models)

1. Pretrained model of ResNet50 (trained on ImageNet-v1)
2. Pretrained model VGG architecture like VGG-13,VGG-16 etc.
3. Custom CNN model - we will try to develop a custom CNN model from scratch.
4. Multiclass SVM classifier on Hog/SIFT features.

Datasets:

The following dataset will be used for the project. The Garbage Classification Dataset contains 6 classifications: cardboard (403), glass (501), metal (410), paper (594), plastic (482) and trash (137).

Total Images: 2527

Link to dataset: <https://github.com/garythung/trashnet>

Computational resources:

The dataset contains 2527 images and we believe that our personal devices and cloud environment should be sufficient for training the machine learning models.

Personal Laptops:

1. Dell Inspiron 16 plus: 16 GB RAM, 4GB RTX 3050.
2. i9 11th Gen 8 cores, Nvidia Geforce RTX 3060 12GB, 32GB RAM, 1TB HD
3. Macbook Air M1, 8 Core CPU, 8 Core GPU

Cloud Environment (if required): Google Colab

Evaluation:

Project will be evaluated on four metrics:

1. Accuracy: It is the most intuitive performance measure, and it is simply the ratio of correctly predicted observation to the total observations.
2. Precision: It is the ratio of the correctly predicted positive observations.
3. Recall: It is the ratio of correctly predicted positive observations to all observations in actual class.
4. F-score: It is the weighted average of precision and recall.

Baseline: Original paper created by the dataset authors achieved 63% accuracy using SIFT features with CNN (AlexNet architecture). We will compare our model's accuracy to this baseline and try to achieve better results.

<https://cs229.stanford.edu/proj2016/poster/ThungYang-ClassificationOfTrashForRecyclabilityStatus-poster.pdf>