

Project Proposal

Description of Project

We chose the pre-approved project “Garbage Classification” because we liked the idea of a system that automatically detects and classifies pieces of garbage. We thought of a unique application, for example: Garbage laying on a conveyer belt, and passing through an automatic sorting system. The system would use cameras to detect which locations on the conveyer belt contain the type of garbage. A robotic arm would then be able to sort the system.

However, this application is better suited for industries. What we hope to accomplish is to build an app, where the user can take a picture of a collection of garbage. A moving window would then capture the locations that contain a specific type of garbage.

The moving window dimensions would have to be of a specific dimension (hyperparameter), to optimize the classification accuracy. The pixels of the fixed windows would then be merged to create a patch of a specific garbage type. This way, we can calculate how much percent the image contains of a garbage class by calculating $\text{patch_pixels/image_pixels} \times 100$.

Choice of dataset

[Garbage Classification Dataset | Kaggle](#)

The reason we chose this dataset, is because there are around 15,000 images, with 12 different classes of garbage. Whereas the other datasets contain just 5 classes. This would help the user classify a wider range of garbage.

Methodology

- a) Data preprocessing
Format all pictures to have the same dimensions and resolution. Properly label (categorize the garbage) the images.
- b) Machine learning model
We decided to go with CNN, since image-based ML algorithms use CNN's often to train the data. CNN's are also highly versatile, and can continuously be trained with new data. The only downside is the long training time.
- c) Evaluation metric
Since our application is to correctly classify the garbage, we picked the (I) Confusion matrix and accuracy/precision-recall/logistic loss (classification problems). $\text{Misclassification Rate} = \frac{\# \text{ incorrect predictions}}{\# \text{ total predictions}}$
 - We would like to predict the class of a picture with 90% accuracy

Application

The user provides an image by uploading it or by taking a picture with a webcam.

The output would be the same picture with boxes surrounding identified garbage along with a title to classify what kind of garbage is present inside the box.

The project would be integrated in a landing-page webapp.