Team 6
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Green Guardians

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Project description

What if you had to pay for every bag of trash you threw away? According to the EPA, “Pay-as-you-throw (PAYT) communities are a different way of paying for waste collection and disposal services. In some communities, it works on a per-container basis: households are charged for each bag or can of waste they generate....the system motivates people to recycle more and to think about ways to generate less waste in the first place.”[1] If your community went to PAYT tomorrow, how would you quickly decide how to lessen your waste and recycle more? The problem we are trying to solve is: **Provide a quick way for customers to reduce their waste by classifying recyclable items from non-recyclable items through a picture.**

Why Image Classification?

We will use image classification for this to introduce a quick, simple way to give customers a way to decide whether an object is recyclable or not based on the type of items in 12 classes: battery, biological, brown-glass, cardboard, clothes, green-glass, metal, paper, plastic, shoes, trash, white-glass.

We believe that there are a few real-world examples that this model could be used for are:

- Automated Sorting
- Reduction of Contamination
- Scalability of handling larger volumes
- Reduction in labor costs through automation
- Increased Recycling Rates

Overview of Project Steps

Data Collection

[1] https://archive.epa.gov/wastes/conserve/tools/payt/web/html/public.html

- Gather Garbage images with classification data
- Ensure size and diversity of data

Data Pre-processing

- Normalization
- Resizing
- Augmentation

Model Selection

- Choose a Model Architecture: Select a convolutional neural network (CNN) architecture suitable for image classification:
    - ResNet
    - VGGNet
    - Inception
    - EfficientNet

Model Training

- Split the Dataset
- Training
- Optimization
- Evaluation

Model testing

- Evaluation

Deployment

- Integrate into a front-end classification

Presentation

- Create data visualizations and conclusions
- Determine roles in presentation
- Practice presentation

Dataset(s) and algorithms to be used

As we selected data, we noted that garbage data needed to also classify objects as recyclable or not so we could set the target without having to convert objects into recyclable or not.

Primary Data Source:

Kaggle - https://www.kaggle.com/datasets/mostafaabla/garbage-classification/data

Secondary Data Sources:

We will add additional data sources after we create the model for optimization

Rough Breakdown of Tasks

Day 1

- [x] ~~Create Github Project Repo - Mary~~
- [x] ~~Create Project Charter - Katie~~
- [x] ~~Identify Data Sets - All~~
- [x] ~~Selected Data Set - Vikram~~
- [x] ~~Submit Project Charter for review by TA - Katie~~

Day 2

- [ ] Determine the notebooks needed for the project
- [ ] Assign out who will work on each part
- [ ] Preprocessing of the data
- [ ] Set next milestones to hit for Day 3

Day 3

- [ ] Model created
- [ ] Coding breakout rooms
- [ ] Set next milestones to hit for Day 4

Day 4

- [ ] Final Coding breakout rooms
- [ ] Front end work completed

- [ ] Set next milestones to hit for Day 5
- [ ] Start presentation

Day 5

- [ ] Presentation final changes
- [ ] Clean up Project Repo
- [ ] Final presentation run-through
- [ ] All project team members submit Project Repo link on Bootcamp spot

Day 6

- [ ] Present final presentation to class
- [ ] Graduation