Can Cameras Be Used to Find Recycling Among Pieces of Trash?

A UVA Data Science Case Study by Lauren Smith, 2023

Topic:
On average, the global population dumps over 2 billion tons of waste each year, and this number continues to grow: we are expected to reach 3.4 billion tons by 2050 [1]. The majority of this waste is compostable or recyclable, though we only recycle about 13%. Detecting recyclable items within a pile of waste is vital, not only for the health of our planet but also for economic reasons [6]. The value of recyclables is immensely high, however we do not have high-efficiency systems to collect and sort trash so this value is not being utilized [8]. AI can be used to help humans separate trash from recyclable materials and therefore help solve this problem.

Deliverable:
Using the dataset provided in the GitHub repository, use a machine learning approach to build a consistently accurate solution for differentiating between trash images and recycling images. The images provided are in folders separated by labels of trash and recycling. A popular approach to this image classification task is building a neural network but any type of algorithm that produces accurate results is acceptable.

Data Source:
The images in the GitHub repo were collected from the following sources:
https://www.kaggle.com/datasets/asdasdasasdas/garbage-classification

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

References:
[1] “29 Recycling Statistics We Need to Be Aware of in 2023,” Dec. 12, 2022. https://comfyliving.net/recycling-statistics/ (accessed Mar. 15, 2023).
[2] “The Ultimate Guide to Smart Waste Management,” Greener and Smarter Waste - Nordsense. https://nordsense.com/the-ultimate-guide-to-smart-waste-management/ (accessed Mar. 15, 2023).

[3] C. Clifford, “Trillions of pounds of trash: New technology tries to solve an old garbage problem,” CNBC, May 29, 2021. https://www.cnbc.com/2021/05/29/can-new-technology-solve-a-trillion-pound-garbage-problem.html (accessed Mar. 15, 2023).