Mean Green Recycling Machine: A Machine Learning Solution to Misrecycling with Mechanical Design

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In the USA, 85% of our landfill content is compostable, recyclable, or otherwise reusable; on a global scale, 91% of plastics aren’t recycled, instead ending up in landfills and harming the environment. Most of these reusables are wasted not due to an inability to recycle, but misconceptions about recyclability and a lack of recycling infrastructure, problems that could easily be solved through automation. To this end, I trained a neural network to automate recycling using Python and Tensorflow with the sorting subcategories of plastic, paper, cardboard, metal, glass, and waste. Building off of Google’s “Inception” model, the neural network was created by using the PyCharm editor and training it for 4000 steps. Its accuracy was gauged by using OpenCV to feed the model live images of objects using my laptop’s webcam and recording the classification and confidence. The model had an average live accuracy of 77.78%, with the highest material accuracy of 8/9 in the categories of metal, plastic, and cardboard. The lowest material accuracy of 5/9 occurred with glass. In conclusion, this engineering project resulted in the creation of a 77.78% accurate waste identification neural network with easily-improvable accuracy.

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