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Project: Classifying trash/recycling

Dataset: https://www.kaggle.com/asdasdasasdas/garbage-classification

Methodology:

- Aim of project: The final web app will allow a user to enter their log-in information for a Japanese metro card system, and then allow the user to upload a picture of an item of trash to determine if it is recyclable. If it is, then the user will be prompted to recycle the item in the correct receptacle and will accrue points on their metro card. If the item cannot be recycled, then an informative message will be displayed to the user regarding recyclable material types and the benefits of recycling.
- Data processing: The large number of photographs represented by each of the six trash types is beneficial because it provides a representative sample of different possible images. To extract information from the image datasets, I will preprocess the datasets by resizing the images to establish a base size for images that will be uploaded to the webapp, converting all colored images to grayscale to reduce computation complexity, removing background noise from the images, augmenting the dataset with altered versions of the existing images, and segmenting the image by separating the trash item from the background image.
- Machine learning model: I aim to use this classification dataset of trash and recycling to accurately categorize images of garbage as non-recyclable or recyclable material. My proposed machine learning model is convolutional neural networks because the networks are able to handle localized feature extraction. The advantage of implementing this model is that feature representations are able to be automatically built up based on given images of each category of trash. However, one downside is that since neural networks are highly dependent on the training data, there is a risk of overfitting and generalization.
- Evaluation metric: I plan to start with an accuracy metric and confusion matrix to summarize the performance of the classification algorithm, in case there are imbalanced classes.