Plastic Amount Classifier

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Overview:

In this project, we want to be able to design and train a model which can recognize the plastic being generated through grocery sales and classify the amount of it. The pictures will be classified into the following classes: “no-plastic”, “some-plastic”, “heavy-plastic”, and “no-image” (not a product). This is a supporting project for the research of Professor Amanda Welsh.

Research Material:

We have a 6k image dataset that has been labeled into no-plastic, some-plastic, heavy-plastic, and no-image (not a product). We will split the set into a “training set” of 4.2k(70%), a “validation set” of 0.9k(15%), and a “test set” of 0.9k(15%). For the computing resource, if needed, we will apply for access to Northeastern’s Discovery cluster system and run our model on it.

Model design:

We will do some literature research to see if there are any similar problems and what models are used. We will choose a pre-trained model or well-studied model as our baseline model.

Model Training:

Experiment 1~2: We will test different model architectures’ effects on the performance of the recognition task. The possible dimensions the model may involve are the number of convolution layers, the number of filters in each layer, and the number of nodes in fully connected layers.

Experiment 3: We will test different hyperparameters’ effects on performance. The possible choice of dimensions includes the learning rate, number of epochs, and batch size.

Model evaluation and metric design:

After training each model, we will evaluate their performance(the accuracy of classifying) on the test set. Considering there will be several levels of plastic amount, we may need to design our own metric to evaluate the predictions and the label. With the result, we will compare different variations and find out which variation is best for improving the performance of the model.

Model analyses:

We will iterate the model with the result of the experiment and then analyze the optimal model. We will visualize the activations and filters to see how this model work.

Possible Exploration:

We may explore how to transform our model and make it possible to recognize and classify the amount of plastic in the situ images. And see how the model performs and suggest the next steps for improvement.