Garbage Classification and Recognition Capture Based on Deep Learning

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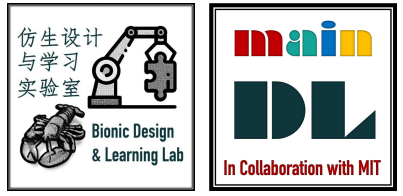
Date 2023/3/5



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Achieved points

Separate garbage effectively

- Dataset:online a base of garbage classification
- Model selection: A widely used model, RseNet50
- Accuracy: After 30 iterations, the classification error on the test set is less enough.

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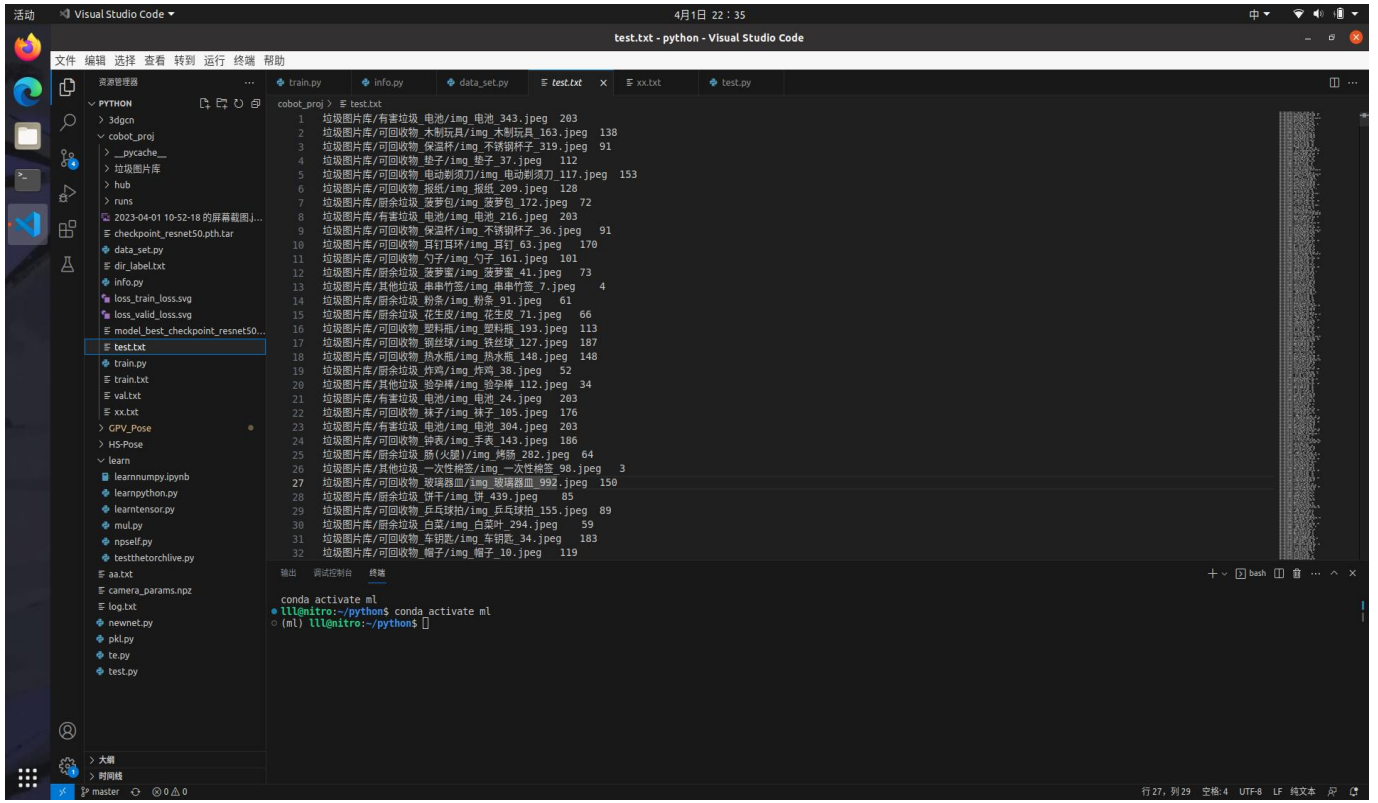
Data processing

There are four optional values for label, which are kitchen waste, recyclables, hazardous waste and other garbage. The input images are processed from matrixs containing RGB information into four-dimensional tensors.



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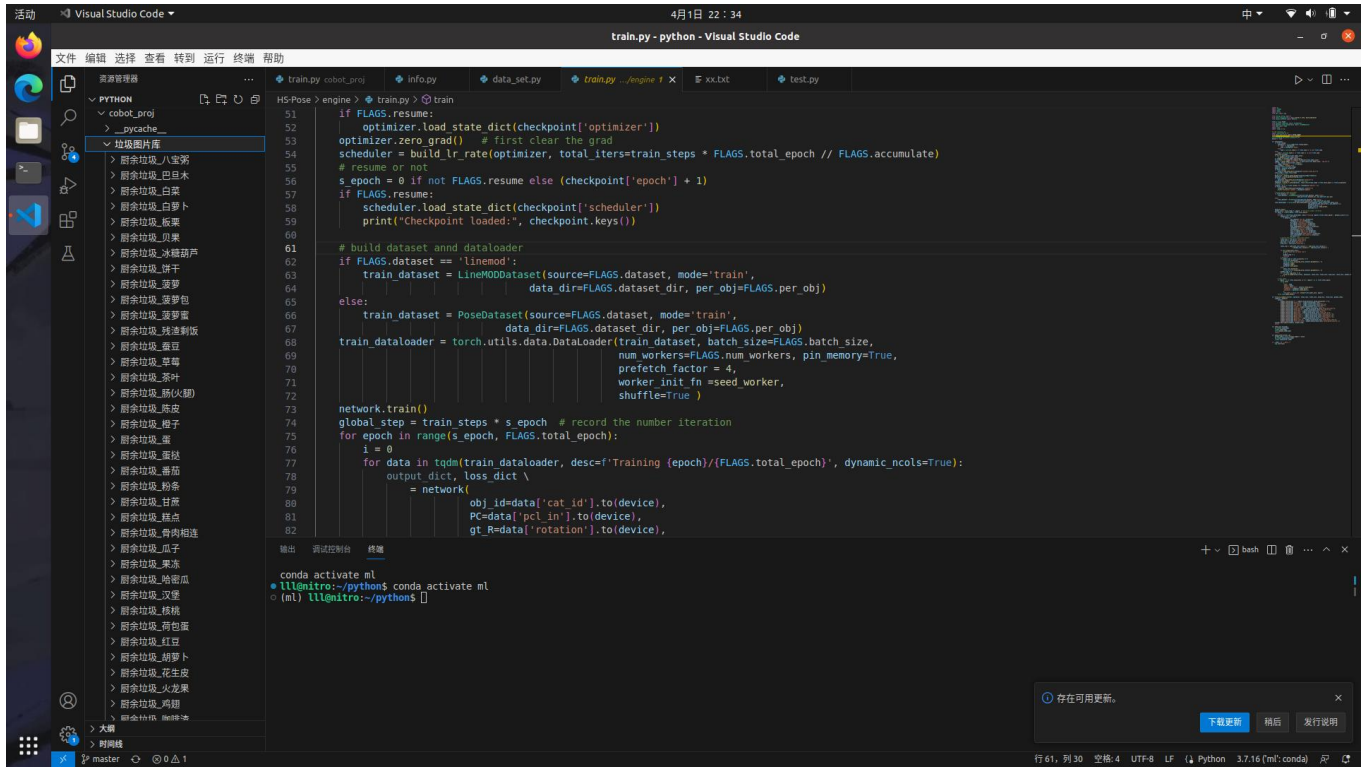
Model training

The model we adopted, ResNet50, is a mature and widely used image classification model, using the CNN network, there are 5 convolutional layers.

During the training, we randomly divided the validation set for each iteration, and each iteration has a different order of learning for the data set. According to the defined loss function, at the end of each iteration we will compare the error of the current model with that of the trained model with the best performance. If the error of the current model is smaller, the current model will be taken as the best model, and the model with the best performance will be output after the completion of iteration.



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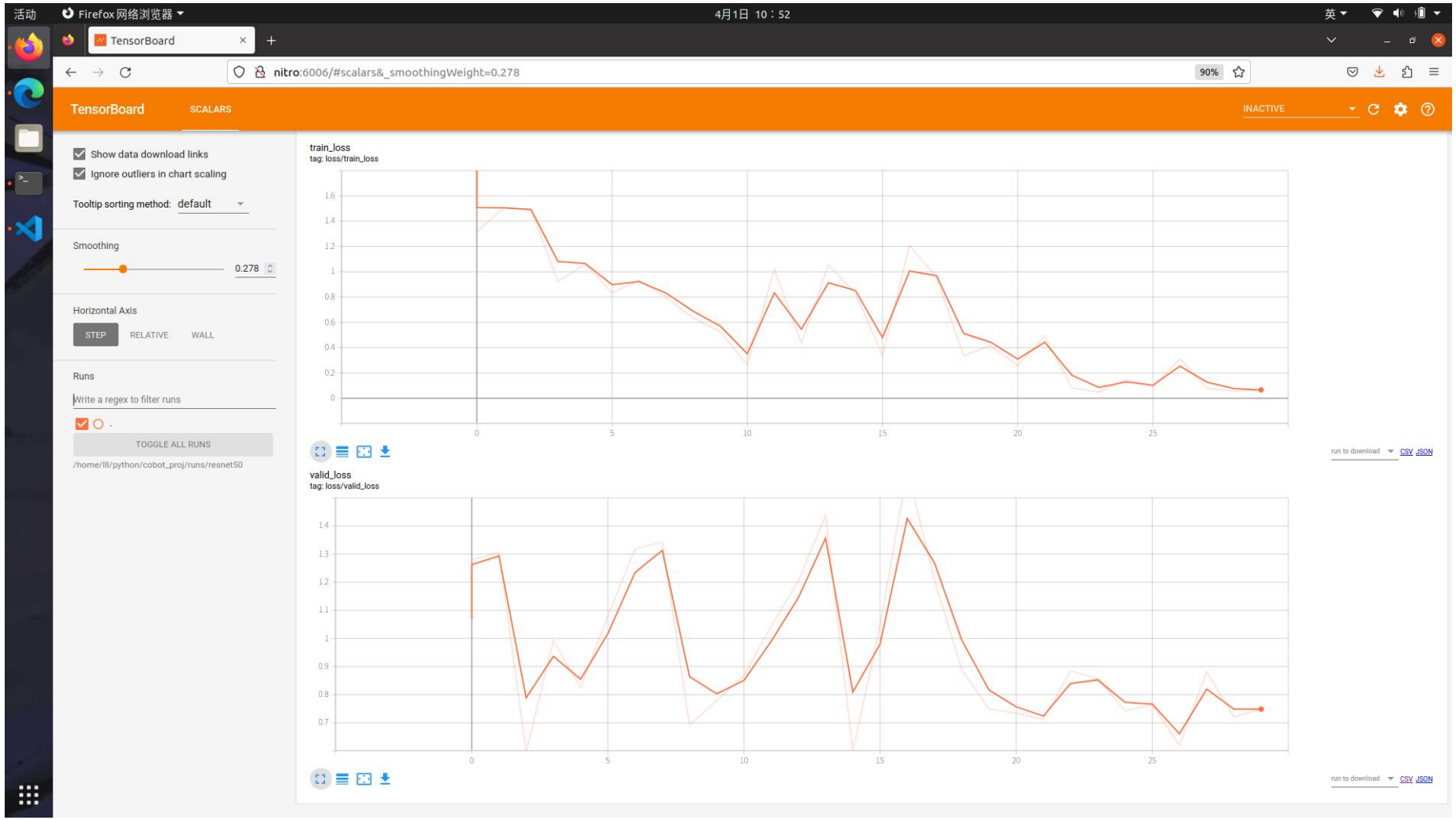
Accuracy



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Analysis

Acceptable accuracy

In order to prevent overfitting of the model, the number of iterations is set at 30, and the performance of the model on the test set tends to be stable.

In our test, for the trained model, the classification given by the model after inputting pictures is relatively reliable.

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Future planning

picture processing

- The realization of their own photos change into the data which can be recognized by learning model and successfully classified into different types of garbage.

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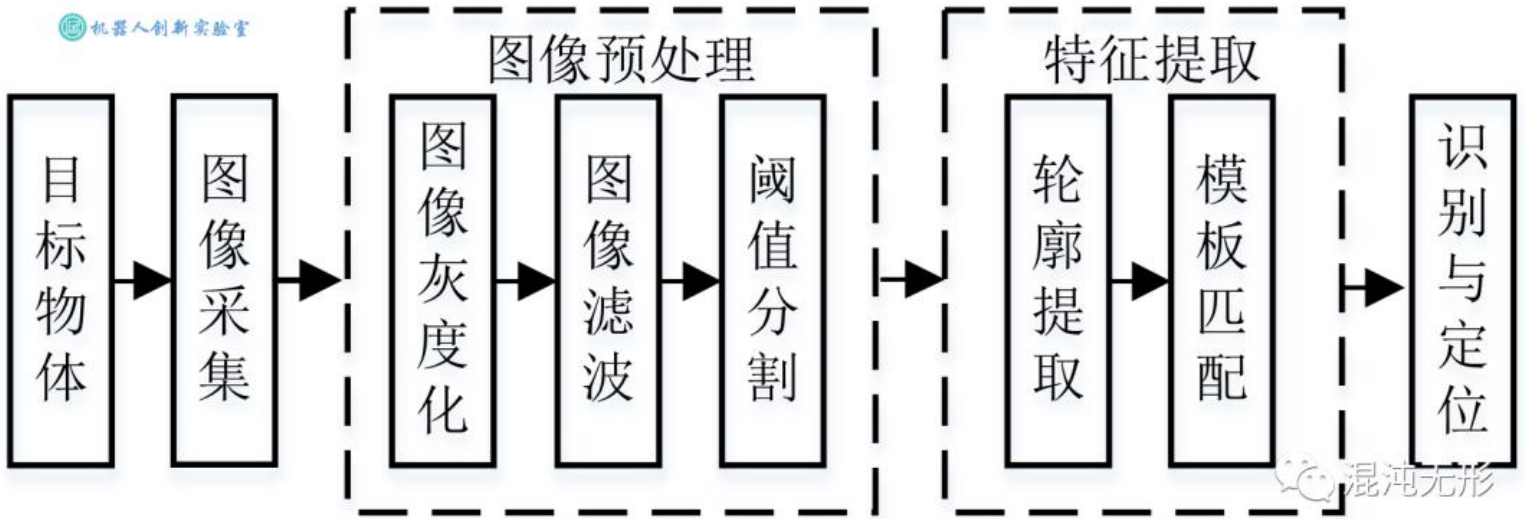
Future planning

Collaborative workflow

- The robotic arm was constructed and a camera was added in the Ubuntu simulation environment. In the simulation environment, the image was captured by the camera and passed into the model for recognition(Model built before). After that, the value of the coordinate center of the target object relative to the base of the robot arm was obtained(’‡2.⊃→∇⊂♀⌢∇§⌢†ᵕא())



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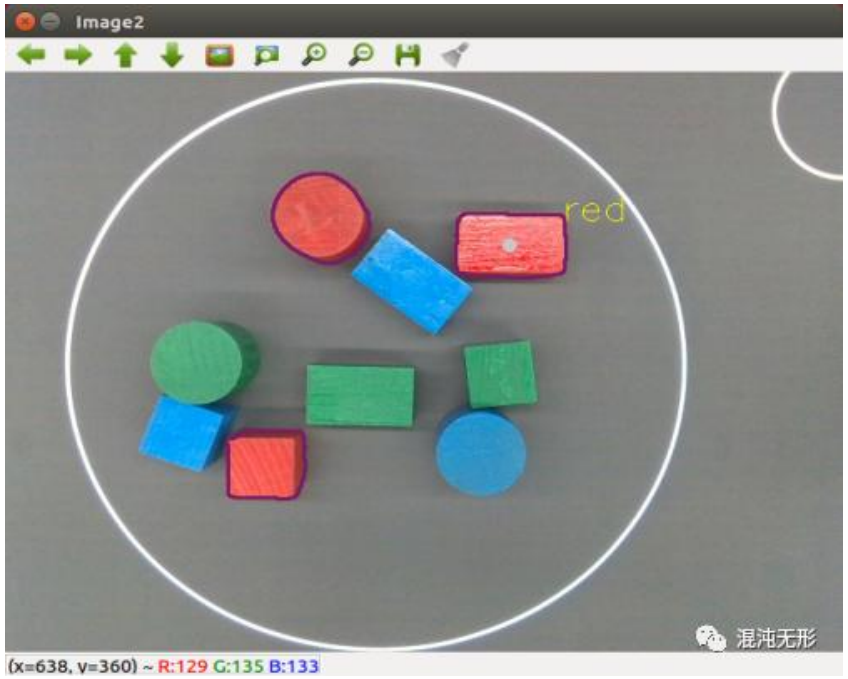
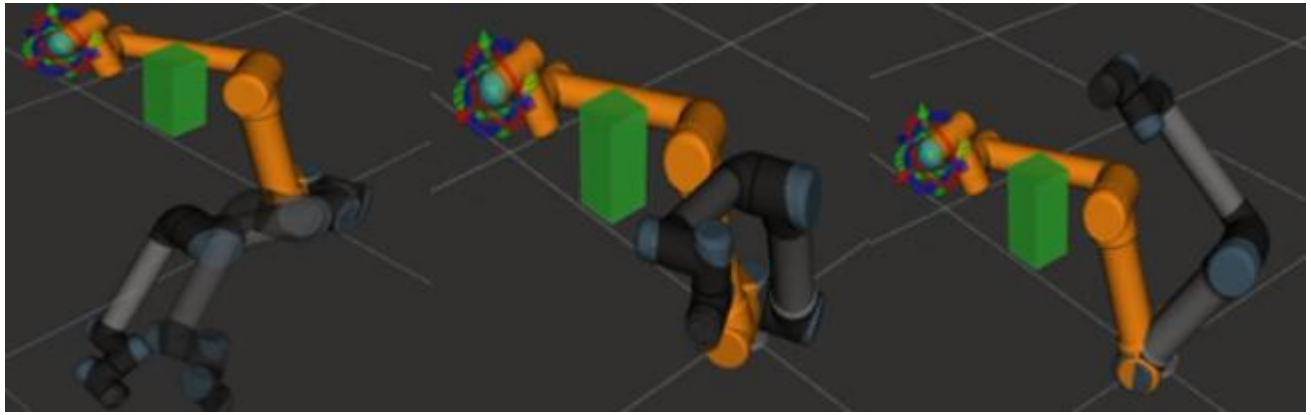
Future planning

Work environment construction

- The robot arm is placed in a variety of garbage tiled environment, and the task is completed by sorting different kinds of garbage into different areas





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