

# AUTOMATED GARBAGE CLASSIFICATION SYSTEM

## INTRODUCTION

The implementation of garbage classification is an important part of ecological civilization and environmental protection. Simple and rough garbage incineration, landfill, garbage dumping, etc. will not only lead to serious environmental pollution but also occupy land resources, and even seriously affect people's health, but the implementation of garbage classification, it can be turned into valuable things. This topic is to enable everyone to quickly and accurately classify garbage to make a garbage classification image recognition.

### I. CLASSIFICATION PATTERNS

The classification recognition mode of garbage is to preprocess images, extract features, and then train a model to identify garbage through big data technology. In image recognition in humans, people react to the information of our senses according to the image, and then the brain automatically processes, screens, recognizes, stores the process of cognition and re-recognition of the image for human image recognition. In the image recognition of artificial intelligence, it is similar to human image recognition, with reference to human brain results, with deep learning algorithms for new input data feature processing, training to form a template, when there is data input, the data image and the existing template match, then the machine can recognize the image, which is called machine image recognition.

### II. DATABASE

The theme of this design is garbage classification image recognition based on deep learning algorithms, so the original data that needs to be prepared is various types of garbage pictures, according to the random garbage pictures downloaded on the Internet, and a small part of the garbage picture data is collected from self-photography. All the collected data is collected together for classification, mainly divided into six types, including: cardboard, glass, metal, paper, plastic, trash, and locally create a folder named after these six types, label all the picture data, and then classify and store it in the corresponding type of folder.

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## III. CLASSIFICATION METHOD

The classification method is mainly a method of calculating one by one and matching one by one. During model training, a large number of garbage pictures with known classification are entered, and the computer stores the characteristics of each picture and the corresponding classification in the library as a template. In the identification process, through the extraction and calculation of the characteristics of the input garbage picture, all the known categories are matched, and the classification with the highest similarity is used as the classification result of the picture.

### IV. PRE-PROCESSING

Before the model is trained, we need to crop the data so that the size of all images is the same when the data is fed into the neural network. This design uses the Python language and tensorflow environment, and we can convert the data image into a binary tfrecords file. This kind of file is run using tensorflow, python to make the code. And tfrecords has a very big advantage in tensorflow, whether it is copying, transferring, reading or storing.

### SUMMARY

This topic uses convolutional neural network deep learning algorithm technology to design a classification model application for garbage image recognition. In the theme of the project, picture data is an important factor of the project, but in the project data is difficult to find, the amount of picture data collected through a variety of ways is still not enough, and in the convolutional neural network training, the machine imitates the human brain to learn, the greater the amount of learning, the more proficient the mastery of knowledge. Relatively in the machine, the picture is his learning amount, the picture is not sufficient, resulting in the training of the model recognition rate is relatively low.

### References

1. Krizhevsky A, Sutskever I, Hinton G E. ImageNet classification with deep convolutional neural networks[C]. Advances in neural information processing systems. 2012:1097-1105.