Metis Project 6

Trash Classification With Neural Networks

Help people in Shanghai, China sort their household waste properly

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Background

Some cities in China start to promote strict and complex trash sorting rules, which create challenges for people to classify different types of trash properly.

Objective:

Work with image data to create a convolutional neural networks to classify trash, to help Shanghai residents better follow the new rash sorting rules.

Business Opportunity:

Create an AI camera app to detect trash types

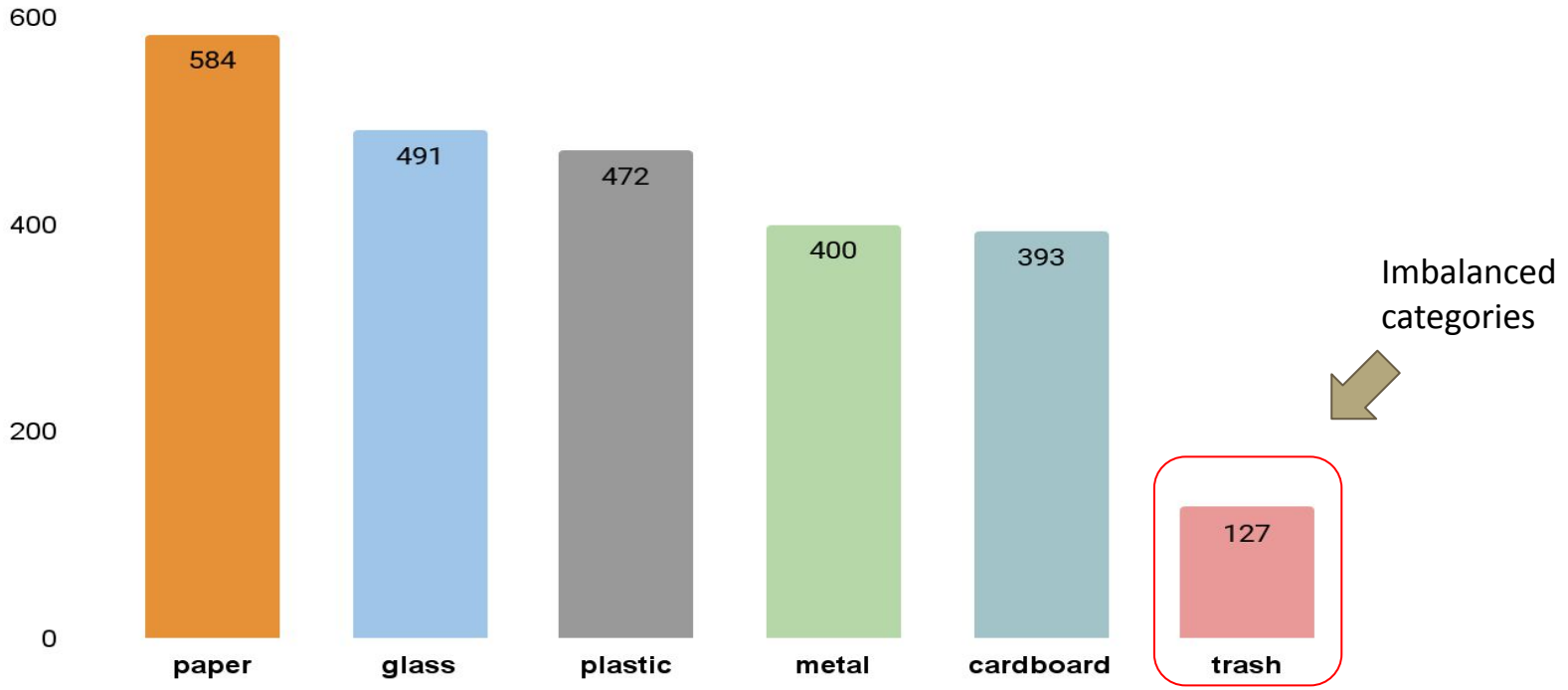
Data Overview

kaggle

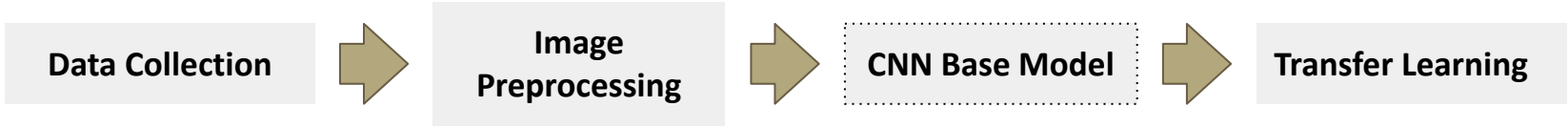
Trash classification Dataset 2,600 samples and 6 categories of trash:

- Cardboard
- Glass
- Metal
- Paper
- Plastic
- Trash

Data Overview



Analytic Workflow



Train/Test/Validation

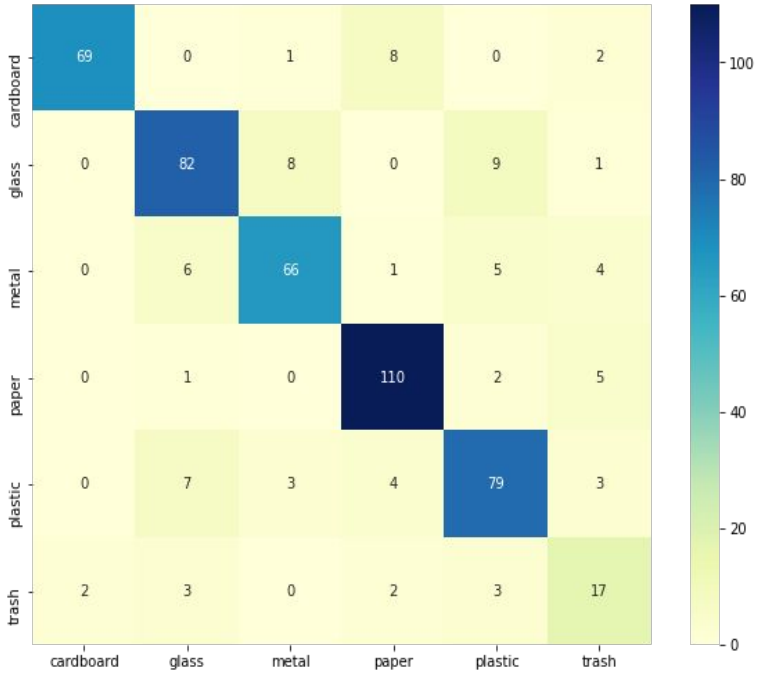
- ImageDataGenerator
- Keras
- Tensorflow

(poor accuracy)

- MobileNet
- Inception
- **VGG16**

Final Model

Validation Confusion Matrix



VGG16

Test Accuracy: 83.7%

Top 1 Validation Accuracy: 84.1%

Top 3 Validation Accuracy: 98%

Model Details:

- Convolutional layers were fixed
- 2 hidden layers built on top of convolutional layers
  - Dense Layer 1: 200 nodes
  - Dense Layer 2: 30 nodes
- Layer outputs were normalized by BatchNormalization
- Weights Dropout
  - Dense Layer 1: 0.3
  - Dense Layer 2: 0.2

Findings

- Lower accuracy on Trash class
- Likely to mix up:
  - Glass & metal & plastic
  - Cardboard & paper

Actual: Metal Predict: Glass

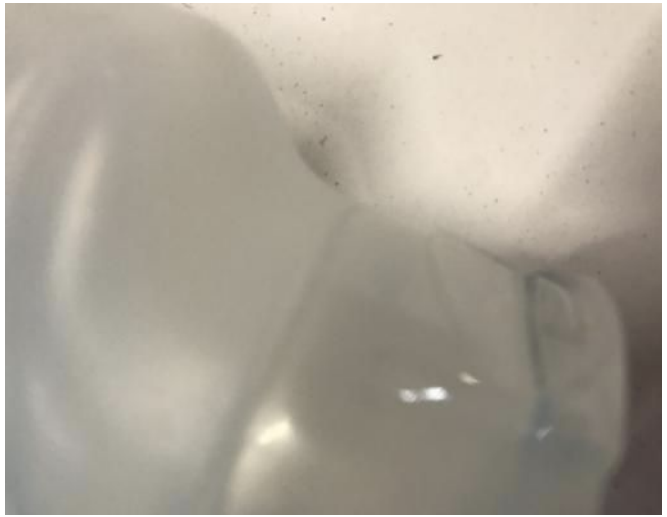
Actual: plastic Predict: glass

Actual: Paper Predict: cardboard

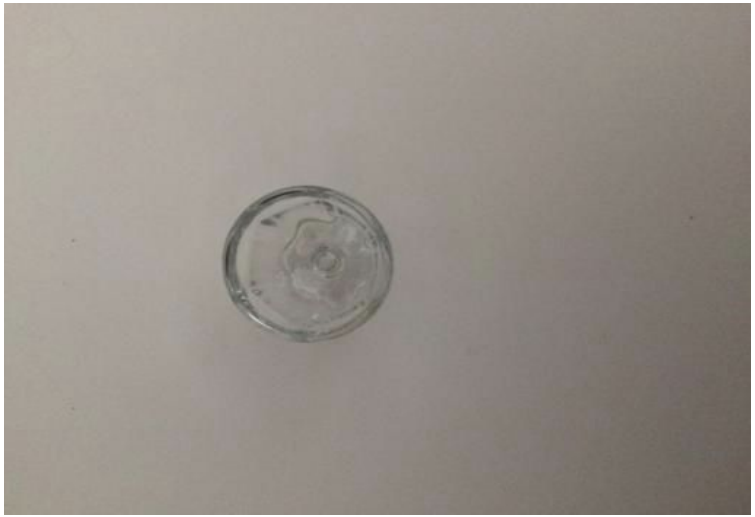
Findings

- Low quality images need to be further adjusted

Actual: plastic Predict: paper



Actual: glass Predict: metal



Future Word

- Enlarge trash photos
- Adjust/ remove low quality photos and re-train the model