Selected Topics in Visual Recognition using Deep Learning

HW1 - Bird Images Classification

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Project: https://github.com/axde954e6/NYCU_VRDL/tree/main/HW1

Introduction

The challenge is to classify bird image to their species. Using data provided by TA, which include 3000 training images and 3033 testing images. In this work, we need to use CNN model to catch bird's feature and classify to one of 200 bird's species.

Methodology

Data Pre-processing

In this homework, I resize image to 256*256 first, then center crop to 224*224, which can make model focuses on bird's feature because most of birds are in the middle of the images. Secondly, I normalize image with mean equal [0.485, 0.456, 0.406] and std equal [0.229, 0.224, 0.225]. Finally, I use RandomHorizontalFlip for each training image.

Model Architecture

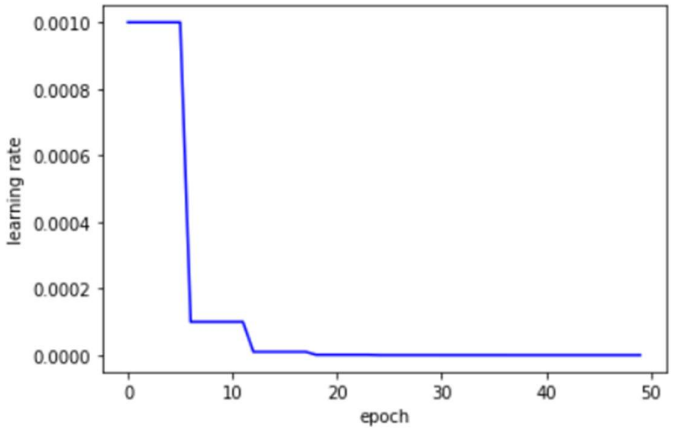
I use resnet50 as our bird images model. It is because bird images classification is widely used in ImageNet, I use the pre-trained model. Besides, I use SGD as model's optimizer.

Transfer Learning

I redefined the last layer to output 200 classes for pre-trained model.

Learn Rate Scheduling

We use lr_scheduler.StepLR to learn rate scheduling because avoid overfitting in training data. Initially, we set learning rate to 0.001. We set step size to 6 and gamma to 0.1, so the learning rate will be multiplied by 0.1 after every 6 epochs.

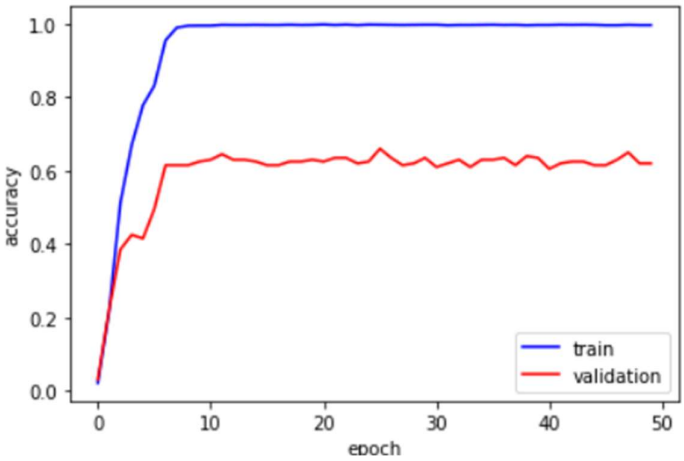


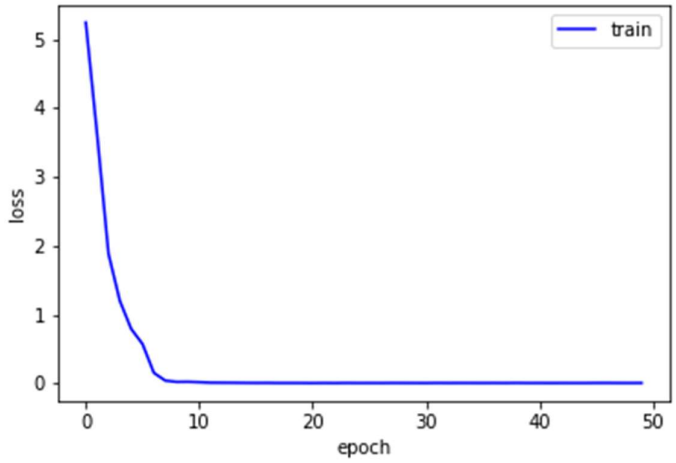
Model Ensemble

In this project, I use 4 models to vote the highest possible class.

Summary

In order to evaluate model, I split training dataset to 2800 for training data, 200 for validation data. Below figures are accuracy to each epoch and loss to each epoch respectively.





In this work, it will get about 55% if we only normalize the training image and do transfer learning. If we resize the image and do center crop in data preprocessing, and set learning rate scheduling, the accuracy will increase to about 63%, which is a little lower then baseline. By using 4 models to model ensemble, the accuracy will beat the baseline.

Reference

https://blog.jovian.ai/cnn-and-transfer-learning-with-pytorch-200-bird-species-image-classification-7e1f2e958a78
https://pytorch.org/hub/pytorch_vision_resnet/