Assignment 7 Report
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Methods Description:

Model:

We make use of EfficientNet (Tan and Le, 2019). In contrast to traditional CNN based networks, the authors show that scaling up one dimension of the model (depth) is not enough to drastically increase model's accuracy, since going deeper saturates the marginal gain. Through extensive hyperparameter search, they discovered the optimal formula to scale up depth, width, and resolution. In this assignment, we use EfficientNet-B2 implementation from github (Kyriazi) which has 9.2M parameters and is easy to train for this assignment. We stack a simple multilayer perceptron on top of the EfficientNet-B2 to make the output dimension 43.

Data Preprocessing:

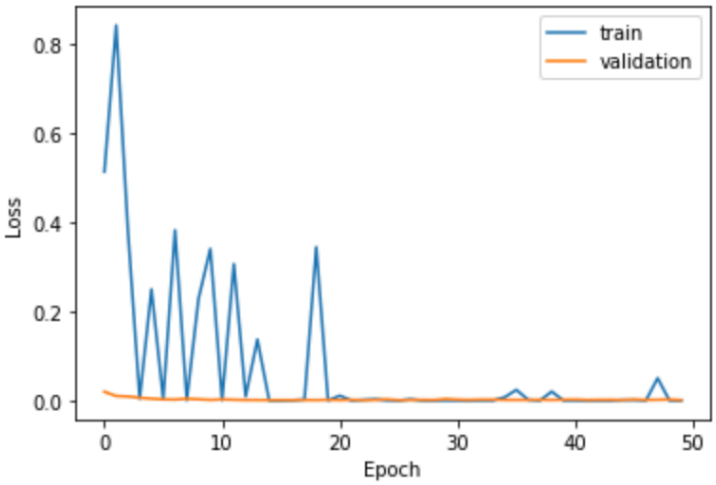
We perform stratified sampling to split the original training set into training and validation set, with 20% of the original training set as the validation set. In order to augment the training set, we apply 3 data augmentation techniques: Random Rotation, Grayscale (with ouput_channels=3), and Color Jitter. The resulting augmented training set has 125,468 images. We resize all images to (128, 128) and normalize using the ImageNet normalization mean and std.

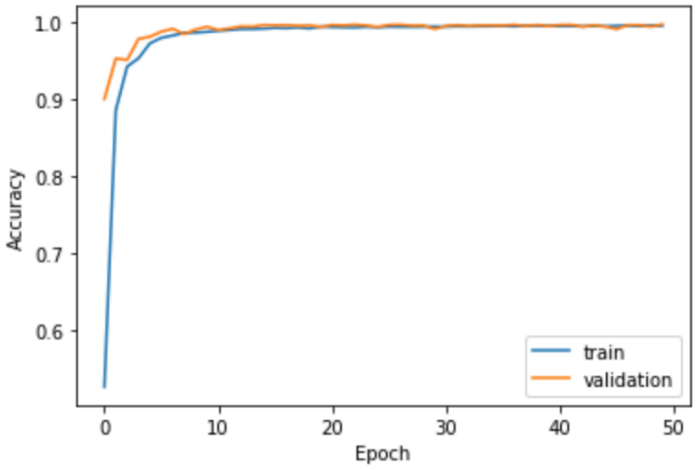
Training:

We train the model using Adam optimizer (Kingma and Ba, 2015) with a 1e-3 learning rate for 50 epoches. We use Pytorch cross-entropy as the loss function to optimize. In each epoch, we keep track of training/validation accuracy and loss, and save the model with best validation accuracy.

Results

The best model achieves 99.770% accuracy on the validation set.





References

Mingxing Tan, Quoc V. Le, EfficientNet: Rethinking Model Scaling for Convolutional Neural Networks. In *ICML* 2019

Luke Melas-Kyriazi, EfficientNet-Pytorch, (2020), GitHub repository, https://github.com/lukemelas/EfficientNet-PyTorch

Diederik P. Kingma, Jimmy Ba, Adam: A Method for Stochastic Optimization. In *ICLR* 2015