HW 5 Report

William Chen

1. Neural Network

Model	Trainable Parameters	Best Training Accuracy	Best Validation Accuracy
NN	346373	75.768 %	76.28 %

The training and validation accuracies of the NN model are both improving through the 10 epochs. And the best accuracies are relatively close. The NN model is not likely to overfit the training data.

2. Simple Convolution Neural Network

Model	Trainable Parameters	Best Training Accuracy	Best Validation Accuracy
CNN	8069	83.328 %	82.68 %

The simple CNN model has fewer trainable parameters than the NN model. Yet, the validations accuracy is better. Since the CNN can learn from raw pixel data and reduce the number of units in the network. This will also prevent overfitting. Furthermore, because the accuracies of both training and validation are relatively close, the CNN model is not likely to overfit.

3. Color Normalization

Model	Trainable Parameters	Best Training Accuracy	Best Validation Accuracy
ColorCNN	8069	89.064 %	85.84 %

The color normalization CNN model has increased its validation accuracy by about 3% with the same number of trainable parameters as the CNN model. The difference between training and validation accuracy has increased, but it is still relatively close. The color normalization CNN model is not likely to overfit.

4. Deep Convolutional Neural Network

Model	Trainable Parameters	Best Training Accuracy	Best Validation Accuracy
DeepCNN	29077	89.480 %	86.80 %

The Deep Convolutional Neural Network uses a three-convolution network and maximum pooling. The validation accuracy has increased by 1% to the color normalization CNN model. Besides, the accuracies of both training and validation are relatively close, so the Deep CNN model is not likely to overfit.

5. Data Augmentation

Model	Trainable Parameters	Best Training Accuracy	Best Validation Accuracy
Data Aug	29077	86.864 %	87.44 %

The data augmentation of random affine transformation, random horizontal flip, and color normalization perform the best validation accuracy of all models. It has increased by about 0.5% to the Deep CNN. As for the overfit, the accuracies of both training and validation are relatively close, so the data augmentation model is not likely to overfit.