CIFAR-10 Image Classification with Convolutional Neural Networks

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Abstract: *In this project, we work on image classification of the CIFAR-10 dataset using supervised machine learning techniques. The dataset consists of 60,000 32x32RGB images containing one of 10 object classes, with 6000 images per class. We experiment with various learning algorithms including nearest neighbor classifier, one-vs-all classification, Softmax classifier, two-layer fully connected artificial neural network (ANN), deep convolutional neural network (CNN), and deep residual networks (ResNet). We use cross validation by splitting the 50,000training data into49,000 training samples and 1,000 validation samples to select the optimized hyper parameters for each parametric classifier. Among all methods, the 56-layer deep residual network yields the best performance with a training accuracy above 99% and validation accuracy of 93.6%.*

Keywords: Image Classification; CIFAR-10; Supervised Machine Learning Algorithm; Deep Convolutional Neural Network (CNN); Deep Residual Network (ResNet).

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