CoreML report

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1 Introduction

Robustness to label noise is essential in real-world machine learning tasks, where incorrect labels can degrade model performance. Vanilla loss functions like Cross-Entropy and Focal Loss tend to overfit to noisy labels due to their strong emphasis on the predicted class probability.

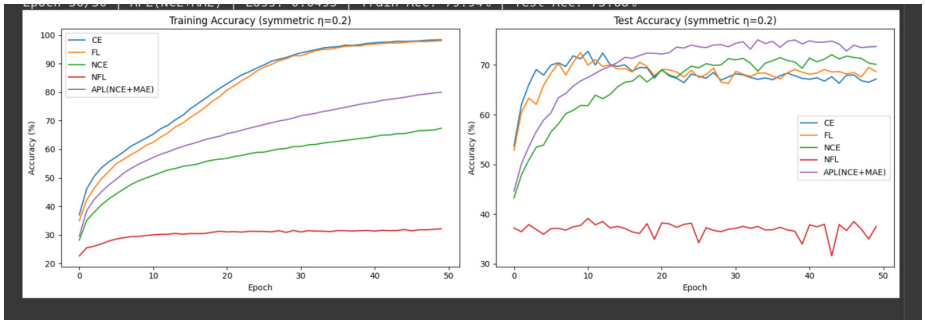
Normalized loss functions, such as Normalized Cross-Entropy (NCE) and Normalized Focal Loss (NFL), address this by bounding the loss values, improving robustness. However, this normalization often weakens the learning signal, leading to underfitting and reduced performance on clean data.

The Active-Passive Loss (APL) framework addresses this trade-off by combining active losses (which promote correct class confidence) with passive losses (which suppress incorrect class confidence). This pairing helps maintain robustness to noise while preserving strong performance on clean data.

2 Thought process

Most of the code for this assignment was written with the help of LLMs. Firstly the CIFAR-10 dataset was loaded and split into train and test sets. The functions to add symmetric and asymmetric noise to the dataset as well as vanilla loss functions, normalized losses and APL framework were implemented according to the literature in "Normalized Loss functions for Deep Learning with noisy Labels" paper. The model chosen was a simple 4 layer CNN rather than a 8 layer or Resnet due to the computational cost and time it takes to run. The optimizer used was SGD and the hyperparameters chosen were eye-balled and no tuning was performed.

3 Results



4 Note

I know that this is a very poor and minimal submission from my side. This assignment was completed in a very short period of time and my inability to write code/debug had me spending a lot of time in the wrong place. It was cool learning about robust loss functions and I'm willing to improve putting more time and effort from my side.