Going beyond the Final Linear Layer: Enhancing Decision Boundaries

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Abstract

Semi-Supervised image classification has become a playground for exploring new ideas in extracting signal from unannotated image datasets. This paper presents a novel extension to any image classification architecture which improves accuracy in low-label regimes. We extend the FixMatch [1] training scheme with our novel last layers and demonstrate test accuracy improvement. The novelty consists of 2 elements, first we replace the last linear layer with a GMM trained via backprop, and impose class-wise constraints on the embedding space the GMM operates on. These methods match published SOTA 250 label Cifar10 [2] results and come close to matching SOTA in the 40 label regime without the significant model complexity of methods like SimMatchV2 [3]. Our method achieves 94.8% and 94.2% accuracy with 250 and 40 Cifar10 labels respectively.

1 Introduction

Semi-Supervised learning attempts to leverage the abundance of unlabeled image data to improve deep learning based model performance under limited training data regimes [4, 5].

2 Related Work

2.1 Pseudo-Labeling

2.2 Consistency Regularization

2.3 Contrastive Learning

3 Methodology

4 Experiments

4.1 Ablation Study

5 Conclusions

References

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