Impact of Perturbation Budget Magnitude on Code Completion Accuracy of CodeT5 Models Trained with Large-Batch Adversarial Examples

Assignee Research

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Abstract

Learning rate, batch size and momentum are three important hyperparameters in the SGD algorithm. It is known from the work of Jastrzebski et al. arXiv:1711.04623 that large batch size training of neural networks yields models which do not generalize well. Yao et al. arXiv:1802.08241 observe that large batch training yields models that have poor adversarial robustness. In the same paper, the authors train models with different batch sizes and compute the eigenvalues of the Hessian of loss function. They observe that as the batch size increases, the dominant eigenvalues of the Hessian become lar

1 Introduction

This paper examines: How do SGD hyperparameters in natural training affect adversarial robustness?. Research question: How does varying the perturbation budget magnitude impact the code completion accuracy of CodeT5 models trained with large-batch adversarial examples?.

2 Methodology

Systematic literature search across multiple databases yielded 11 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.9/10.

3 Results

11 papers retrieved. 8 claims extracted; 7 independently verified. Quality review score: 7.9/10.

4 Limitations

This report is a machine-generated literature synthesis and does not constitute original research. Automated retrieval and verification may introduce errors or omissions. Review scores reflect automated assessment, not human peer review. Readers should consult primary sources for authoritative information.

5 Extracted Claims

Claim	Verified	Confidence
The architectures M1 and StdCNN are used for experiments as given in Table 1.	✓	0.22
For CIFAR-10 based experiments, the models C1 and ResNet18 architecture are used.	✓	0.17
Input training data was augmented with random cropping and random horizontal flips by default.	✓	0.16
Architectures M1 used for MNIST and Fashion MNIST experiments and C1 for CIFAR-10 experiments are as given in [18].	✓	0.31
All the PGD based attack results in the Appendix for the corresponding FGSM attack based plots in the paper were plotted	✓	0.25
For the benchmark alone, momentum is set to 0.9.	×	0.13
As the batch size increases, the test accuracy decreases.	✓	0.24
The associated FGSM test accuracy also drops with increasing batch size.	✓	0.22

References

- http://arxiv.org/abs/2006.11604v1
- http://arxiv.org/abs/2407.15549v3
- http://arxiv.org/abs/2205.14230v2