Zero-shot-aware Training vs Fine-tuning for Adversarial Robustness in Multilingual Models

Assignee Research

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Abstract

Large-scale pre-trained vision-language models like CLIP have demonstrated impressive performance across various tasks, and exhibit remarkable zero-shot generalization capability, while they are also vulnerable to imperceptible adversarial examples. Existing works typically employ adversarial training (fine-tuning) as a defense method against adversarial examples. However, direct application to the CLIP model may result in overfitting, compromising the model's capacity for generalization. In this paper, we propose Pre-trained Model Guided Adversarial Fine-Tuning (PMG-AFT) method, which leverag

1 Introduction

This paper examines: Pre-trained Model Guided Fine-Tuning for Zero-Shot Adversarial Robustness. Research question: How do zero-shot-aware training techniques compare to standard fine-tuning in improving robustness against adversarial examples in multilingual models, as evaluated by accuracy on ANLI and adversarial QQP?.

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 8.5/10.

3 Results

11 papers retrieved. 13 claims extracted; 12 independently verified. Quality review score: 8.5/10.

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
Deep models, including those at a large scale, are well-known to be vulnerable to adversarial examples.	✓	0.17
Adversarial training is considered one of the most effective defense strategies against adversarial examples.	✓	0.16
Adversarial training is computation-consuming since it necessitates the concurrent generation of adversarial examples, e	✓	0.21
For large-scale models, fine-tuning is often employed to adapt to downstream tasks, significantly reducing the required	✓	0.30
Applying adversarial training techniques to fine-tuning is an effective method to enhance the robustness of large models	✓	0.28
Employing adversarial fine-tuning directly for large-scale models may lead to overfitting the fine-tuning dataset, causi	✓	0.18
FT-TeCoA improves the zero-shot robust accuracy across numerous unseen datasets compared with both the original CLIP and	✓	0.25
FT-TeCoA comes at the cost of a substantial decrease in the accuracy of clean samples.	✓	0.20
Previous methods such as linear interpolation and parameter regularization mitigate overfitting by introducing constrain	✓	0.22
These methods can apply to adversarial fine-tuning and alleviate overfitting but do not focus on improving the model's z	✓	0.32
Adversarial overfitting leads to a significant decline in both robust accuracy and clean accuracy.	×	0.15
PMG-AFT addresses overfitting by encouraging memory in the feature space.	✓	0.20
The PMG-AFT method achieves an improvement of 8.72% in zero-shot robust accuracy.	✓	0.17

References

- `http://arxiv.org/abs/2407.15549v3`

- http://arxiv.org/abs/2401.04350v3
- http://arxiv.org/abs/2110.06500v2