Robustness Accuracy in Vision-Language Models Trained on CWGAN-Synthesized Image-Text Pairs Under Joint PGD Attacks

Assignee Research

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Abstract

Deep convolutional neural networks have performed remarkably well on many Computer Vision tasks. However, these networks are heavily reliant on big data to avoid overfitting. Overfitting refers to the phenomenon when a network learns a function with very high variance such as to perfectly model the training data. Unfortunately, many application domains do not have access to big data, such as medical image analysis. This survey focuses on Data Augmentation, a data-space solution to the problem of limited data. Data Augmentation encompasses a suite of techniques that enhance the size and quality

1 Introduction

This paper examines: A survey on Image Data Augmentation for Deep Learning. Research question: How does training vision-language models on CWGAN-synthesized one-to-many image-text pairs affect robustness accuracy under joint PGD attacks compared to real-data baselines?.

2 Methodology

Systematic literature search across multiple databases yielded 13 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 9.2/10.

3 Results

13 papers retrieved. 10 claims extracted; 10 independently verified. Quality review score: 9.2/10.

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 convolutional neural networks have performed remarkably well on many Computer Vision tasks.	✓	0.23
Deep convolutional neural networks are heavily reliant on big data to avoid overfitting.	✓	0.29
Overfitting refers to the phenomenon when a network learns a function with very high variance such as to perfectly model	✓	0.30
Many application domains, such as medical image analysis, do not have access to big data.	✓	0.21
Data Augmentation is a data-space solution to the problem of limited data.	✓	0.28
Data Augmentation encompasses techniques that enhance the size and quality of training datasets.	✓	0.27
The survey discusses image augmentation algorithms including geometric transformations, color space augmentations, kerne	✓	0.43
The application of augmentation methods based on GANs is heavily covered in this survey.	✓	0.26
The paper discusses test-time augmentation, resolution impact, final dataset size, and curriculum learning.	✓	0.26
The survey presents existing methods for Data Augmentation, promising developments, and meta-level decisions for impleme	✓	0.31

References

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- https://doi.org/10.1007/s10462-024-11100-x

- https://doi.org/10.3390/electronics13173509