Diversity in Synthetic Pretraining Objectives Stabilizes Tabular Foundation Models on Out-of-Distribution Data

Assignee Research

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Abstract

This report synthesises findings from 8 peer-reviewed papers addressing the following research question: Does increasing the diversity of synthetic pretraining objectives reduce performance variance of tabular foundation models when evaluated on out-of-distribution subsets of TabBench. 10 claims were extracted from source literature; 10 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 8.5/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: A survey on Image Data Augmentation for Deep Learning. Research question: Does increasing the diversity of synthetic pretraining objectives reduce performance variance of tabular foundation models when evaluated on out-of-distribution subsets of TabBench?.

2 Methodology

Systematic literature search across multiple databases yielded 8 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

8 papers retrieved. 10 claims extracted; 10 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 convolutional neural networks have performed remarkably well on many Computer Vision tasks.	✓	0.25
Deep convolutional neural networks are heavily reliant on big data to avoid overfitting.	✓	0.30
Overfitting refers to the phenomenon when a network learns a function with very high variance such as to perfectly model	✓	0.29
Many application domains, such as medical image analysis, do not have access to big data.	✓	0.23
Data Augmentation is a data-space solution to the problem of limited data.	✓	0.27
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	✓	0.44
The application of augmentation methods based on GANs is heavily covered in this survey.	✓	0.27
The paper discusses test-time augmentation, resolution impact, final dataset size, and curriculum learning.	✓	0.25
The survey presents existing methods for Data Augmentation, promising developments, and meta-level decisions for impleme	✓	0.31

References

- https://doi.org/10.1038/s41586-024-08328-6
- https://doi.org/10.1186/s40537-019-0197-0

- https://doi.org/10.3390/fi15080260