Neuro-Symbolic Logical Constraint Complexity and Verification Robustness Under Adversarial Perturbations

Assignee Research

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Abstract

This report synthesises findings from 12 peer-reviewed papers addressing the following research question: What is the correlation between the complexity of neuro-symbolic logical constraints and verification accuracy degradation under adversarial perturbations in formal proof datasets. 10 claims were extracted from source literature; 8 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 7.5/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: A Survey on Explainable Artificial Intelligence (XAI): Toward Medical XAI. Research question: What is the correlation between the complexity of neuro-symbolic logical constraints and verification accuracy degradation under adversarial perturbations in formal proof datasets?.

2 Methodology

Systematic literature search across multiple databases yielded 12 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.5/10.

3 Results

12 papers retrieved. 10 claims extracted; 8 independently verified. Quality review score: 7.5/10.

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
Artificial intelligence and machine learning have demonstrated remarkable performances in tasks ranging from image proce	✓	0.27
The advent of deep learning (DL) has contributed to the performance of AI and machine learning in various tasks.	×	0.14
AI and machine learning have encroached upon many different fields and disciplines.	✓	0.18
The medical sector requires a high level of accountability and transparency.	✓	0.20
Explanations for machine decisions and predictions are needed to justify their reliability.	✓	0.24
Greater interpretability often requires understanding the mechanism underlying the algorithms.	✓	0.16
The blackbox nature of deep learning is still unresolved.	×	0.14
Many machine decisions are still poorly understood.	✓	0.19
The paper provides a review on interpretabilities suggested by different research works and categorizes them.	✓	0.17
Different categories of interpretability show different dimensions in interpretability research, ranging from approaches	✓	0.26

References

- https://doi.org/10.1016/j.inffus.2021.10.007
- https://doi.org/10.1016/j.inffus.2024.102301
- https://doi.org/10.1109/tnnls.2020.3027314