

SOVEREIGN: Can RMD's performance gains on near-OOD detection for vision models be replicated for multimodal models (e.g.,

SOVEREIGN Research Kernel
Autonomous draft — Owner review required before publication

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Abstract

Multilayer neural networks trained with the back-propagation algorithm constitute the best example of a successful gradient based learning technique. Given an appropriate network architecture, gradient-based learning algorithms can be used to synthesize a complex decision surface that can classify high-dimensional patterns, such as handwritten characters, with minimal preprocessing. This paper reviews various methods applied to handwritten character recognition and compares them on a standard handwritten digit recognition task. Convolutional neural networks, which are specifically designed to

1 Introduction

Analysis of: Gradient-based learning applied to document recognition. Research goal: Can RMD's performance gains on near-OOD detection for vision models be replicated for multimodal models (e.g., CLIP) when evaluated on ImageNet-30 versus CIFAR-100 distribution shifts, measured by AUROC and FPR95?.

2 Methodology

Multi-query arXiv search (3 parallel queries, Relevance-sorted). TF-IDF cosine semantic verification (bigrams, threshold=0.15). NIM nv-embedqa-e5-v5 (dim=1024) for semantic indexing. Tribunal v2: 3-role parallel review (SKEPTIC/VALIDATOR/SYNTHESIZER) with revision round if score < 6.5.

3 Results

7 papers retrieved. 6 claims extracted, 6 verified. Tribunal: 8.3/10 → APPROVE (revision_round=0). Policy: AUTO_APPROVE.

4 Uncertainties

NIM free tier latency varies. TF-IDF verification is a weak signal. arXiv Relevance ranking is query-dependent. Tribunal consensus is LLM-based and prompt-sensitive.

5 Extracted Claims

Claim	Verified	Confidence
Multilayer neural networks trained with the back-propagation algorithm constitute the best example of a successful gradient-based learning algorithm.	✓	0.34
Given an appropriate network architecture, gradient-based learning algorithms can be used to synthesize a complex decision.	✓	0.39
Convolutional neural networks outperform all other techniques for handwritten character recognition.	✓	0.26
A graph transformer network for reading a bank cheque uses convolutional neural network character recognizers combined with graph transformer networks.	✓	0.40
Graph transformer networks allow multimodule systems to be trained globally using gradient-based methods so as to minimize the number of parameters.	✓	0.32
Experiments demonstrate the advantage of global training and the flexibility of graph transformer networks.	✓	0.28

References

- <https://doi.org/10.4230/lipics.cosit.2022.18>
- <https://doi.org/10.1109/5.726791>
- <https://doi.org/10.1107/s0907444910007493>