

Spike-Synchrony-Dependent Plasticity Enhances Out-of-Distribution Detection in Multimodal Spiking Transformers

Assignee Research

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Abstract

This report synthesises findings from 14 peer-reviewed papers addressing the following research question: Can spike-synchrony-dependent plasticity improve out-of-distribution detection accuracy in multimodal spiking transformers compared to standard STDP rules on vision-language benchmarks. 7 claims were extracted from source literature; 0 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 3.1/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Learning with Spike Synchrony in Spiking Neural Networks. Research question: Can spike-synchrony-dependent plasticity improve out-of-distribution detection accuracy in multimodal spiking transformers compared to standard STDP rules on vision-language benchmarks?.

2 Methodology

Systematic literature search across multiple databases yielded 14 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 3.1/10.

3 Results

14 papers retrieved. 7 claims extracted; 0 independently verified. Quality review score: 3.1/10.

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
SSDP scales across multiple benchmark datasets and network architectures, including static image datasets (Fashion-MNIST	×	0.06
Classification accuracy (Top-1) on ImageNet-1K for SpikingResformer-L is 79.35 ± 0.36 .	×	0.02
Classification accuracy on SHD for DHSRNN+SSDP is 89.1 ± 0.21 .	×	0.03
Classification accuracy on SSC for DHSNN+SSDP is 82.86 ± 0.26 .	×	0.02
Classification accuracy on CIFAR-10 for SpikingResformer-Cifar is 96.24 ± 0.29 .	×	0.04
Classification accuracy on CIFAR-100 for SpikingResformer-Cifar is 79.48 ± 0.27 .	×	0.02
The synchrony gate $\lambda_{b,j,i}$ equals 1 if and only if both neurons emit at least one spike within the same sample, and 0 oth	×	0.08

References

- <http://arxiv.org/abs/1912.08785v2>
- <http://arxiv.org/abs/2001.10696v5>
- <http://arxiv.org/abs/2505.14841v2>