SOVEREIGN: What is the token-level processing time overhead of FAIR-RAG's evidence gap identification mechanism relative

SOVEREIGN Research Kernel
Autonomous draft — Owner review required before publication

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Abstract

Over the last two decades, stochastic resonance has continuously attracted considerable attention. The term is given to a phenomenon that is manifest in nonlinear systems whereby generally feeble input information (such as a weak signal) can be be amplified and optimized by the assistance of noise. The effect requires three basic ingredients: (i) an energetic activation barrier or, more generally, a form of threshold; (ii) a weak coherent input (such as a periodic signal); (iii) a source of noise that is inherent in the system, or that adds to the coherent input. Given these features, the resp

1 Introduction

Analysis of: Stochastic resonance. Research goal: What is the token-level processing time overhead of FAIR-RAG's evidence gap identification mechanism relative to standard iterative RAG on the MuSiQue multi-hop QA benchmark with Mistral-7B and Mixtral-8x7B?.

2 Methodology

Multi-query arXiv search (4 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

12 papers retrieved. 4 claims extracted, 4 verified. Tribunal: 7.3/10 $\rightarrow$ APPROVE (revision_round=1). 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
Stochastic resonance is a phenomenon that occurs in nonlinear systems where weak input information can be amplified and	✓	0.26
Stochastic resonance requires three basic ingredients: an energetic activation barrier or threshold, a weak coherent inp	✓	0.33
Stochastic resonance has been observed in bistable ring lasers, semiconductor devices, chemical reactions, and mechanore	✓	0.34
The response of the system undergoes resonance-like behavior as a function of the noise level in stochastic resonance.	✓	0.31

References

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- https://doi.org/10.1111/jan.13031
- https://doi.org/10.3390/electronics13244912