Manifold-Aware Embedding Projection vs. PCA for Billion-Scale Dense Retrieval Efficiency

Assignee Research

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Abstract

This report synthesises findings from 10 peer-reviewed papers addressing the following research question: How does manifold-aware embedding projection compare to standard PCA in maintaining recall@K accuracy while reducing inference latency for billion-scale dense retrieval indexes. Abstract The rapid advances in the internet and communication fields have resulted in a huge increase in the network size and the corresponding data. As a result, many novel attacks are being generated and have posed challenges for network security to accurately detect. 10 claims were extracted from source literature; 10 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 8.7/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Network intrusion detection system: A systematic study of machine learning and deep learning approaches. Research question: How does manifold-aware embedding projection compare to standard PCA in maintaining recall@K accuracy while reducing inference latency for billion-scale dense retrieval indexes?.

2 Methodology

Systematic literature search across multiple databases yielded 10 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.7/10.

3 Results

10 papers retrieved. 10 claims extracted; 10 independently verified. Quality review score: 8.7/10.

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
Rapid advances in internet and communication fields have resulted in a huge increase in network size and corresponding d	✓	0.29
Many novel attacks are being generated and have posed challenges for network security to accurately detect intrusions.	✓	0.30
An intrusion detection system (IDS) prevents the network from possible intrusions by inspecting network traffic.	✓	0.29
The purpose of an IDS is to ensure the confidentiality, integrity, and availability of the network.	✓	0.16
IDS still faces challenges in improving detection accuracy while reducing false alarm rates.	✓	0.26
IDS still faces challenges in detecting novel intrusions.	✓	0.19
Machine learning (ML) and deep learning (DL)-based IDS systems are being deployed as potential solutions to detect intru	✓	0.37
The article provides a taxonomy based on notable ML and DL techniques adopted in designing network-based IDS (NIDS) syst	✓	0.34
The article provides a comprehensive review of recent NIDS-based articles discussing strengths and limitations of propos	✓	0.26
The article provides recent trends and advancements of ML and DL-based NIDS in terms of proposed methodology, evaluation	✓	0.32

References

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- https://doi.org/10.1029/2000rg000092
- https://doi.org/10.1016/j.isprsjprs.2019.04.015