SOVEREIGN: How does COCO-DR's zero-shot recall@5 on NQ and TriviaQA compare to supervised dense retrievers like DPR and C

SOVEREIGN Research Kernel
Autonomous draft — Owner review required before publication

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Abstract

Effective information retrieval (IR) from vast datasets relies on advanced techniques to extract relevant information in response to queries.Recent advancements in dense retrieval have showcased remarkable efficacy compared to traditional sparse retrieval methods.To further enhance retrieval performance, knowledge distillation techniques, often leveraging robust crossencoder rerankers, have been extensively explored.However, existing approaches primarily distill knowledge from pointwise rerankers, which assign absolute relevance scores to documents, thus facing challenges related to inconsiste

1 Introduction

Analysis of: PairDistill: Pairwise Relevance Distillation for Dense Retrieval. Research goal: How does COCO-DR's zero-shot recall@5 on NQ and TriviaQA compare to supervised dense retrievers like DPR and ColBERT-v2 when using a BEIR-style multi-dataset evaluation protocol?.

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

5 papers retrieved. 5 claims extracted, 5 verified. Tribunal: 8.7/10 $\rightarrow$ 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
Dense retrieval methods have shown remarkable efficacy compared to traditional sparse retrieval methods.	✓	0.27
Knowledge distillation techniques, often leveraging robust cross-encoder rerankers, have been extensively explored to en	✓	0.33
Existing approaches primarily distill knowledge from pointwise rerankers, which assign absolute relevance scores to docu	✓	0.40
Pairwise Relevance Distillation (PAIRDISTILL) leverages pairwise reranking to offer fine-grained distinctions between si	✓	0.30
PAIRDISTILL outperforms existing methods, achieving new state-of-the-art results across multiple benchmarks.	✓	0.32

References

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