

SOVEREIGN: How does the sample efficiency of multi-turn RL for long-horizon VLN-CE tasks compare to imitation learning baselines?

SOVEREIGN Research Kernel

Autonomous draft — Owner review required before publication

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Abstract

The rapid evolution of large language models (LLMs) has driven a transformative shift in artificial intelligence (AI), reshaping both research paradigms and practical applications. Distinguished from their predecessors by unprecedented scale and advanced capabilities, LLMs necessitate new frameworks for understanding their development, behavior, and societal impact. This survey systematically reviews recent advancements in LLM techniques across four key dimensions: (1) pre-training methodologies, which establish core model capabilities through large-scale self-supervised training, arc

1 Introduction

Analysis of: A Survey of Large Language Models. Research goal: How does the sample efficiency of multi-turn RL for long-horizon VLN-CE tasks compare to imitation learning baselines when evaluated on the R2R and RxR datasets under different horizon constraints?.

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

8 papers retrieved. 11 claims extracted, 9 verified. Tribunal: 7.8/10 \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
The rapid evolution of large language models (LLMs) has driven a transformative shift in artificial intelligence (AI), r	✓	0.36
LLMs are distinguished from their predecessors by unprecedented scale and advanced capabilities.	✓	0.21
LLMs necessitate new frameworks for understanding their development, behavior, and societal impact.	✓	0.25
This survey systematically reviews recent advancements in LLM techniques across four key dimensions: (1) pre-training me	✓	0.33
Pre-training methodologies establish core model capabilities through large-scale self-supervised training, architectural	✓	0.38
Post-training techniques include supervised fine-tuning and reinforcement learning, which adapt foundational models to d	✓	0.34
Utilization strategies such as in-context learning, prompt engineering, and agentic reasoning optimize real-world deploy	✓	0.35
Evaluation methods encompass benchmarks for key ability dimensions such as core language capabilities, reasoning, and sa	✓	0.34
Critical research issues include those concerning theoretical foundations, efficient scaling, alignment, and agentic cap	✓	0.25
The survey highlights the open challenges presented by these critical research issues.	×	0.11
The survey synthesizes state-of-the-art insights and emphasizes the importance of these advancements.	×	0.09

References

- <https://doi.org/10.1613/jair.1.13646>
- <https://doi.org/10.1007/s11704-026-60308-3>
- <https://doi.org/10.1561/22000000071>