Multi-Turn Reinforcement Learning in LongNav-R1: Sample Efficiency and Convergence on R2R and RxR Datasets

Assignee Research

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Abstract

This report synthesises findings from 7 peer-reviewed papers addressing the following research question: How does the multi-turn reinforcement learning approach in LongNav-R1 compare to other state-of-the-art RL-based navigation models in terms of sample efficiency and convergence speed on the R2R. We introduce Room-Across-Room (RxR), a new Vision-and-Language Navigation (VLN) dataset. RxR is multilingual (English, Hindi, and Telugu) and larger (more paths and instructions) than other VLN datasets. 10 claims were extracted from source literature; 4 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 5.7/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Room-Across-Room: Multilingual Vision-and-Language Navigation with Dense Spatiotemporal Grounding. Research question: How does the multi-turn reinforcement learning approach in LongNav-R1 compare to other state-of-the-art RL-based navigation models in terms of sample efficiency and convergence speed on the R2R dataset?.

2 Methodology

Systematic literature search across multiple databases yielded 7 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 5.7/10.

3 Results

7 papers retrieved. 10 claims extracted; 4 independently verified. Quality review score: 5.7/10.

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
Room-Across-Room (RxR) is a new Vision-and-Language Navigation (VLN) dataset.	✓	0.37
The RxR dataset supports three languages: English, Hindi, and Telugu.	×	0.12
The RxR dataset contains more paths and instructions than other existing VLN datasets.	×	0.13
The RxR dataset addresses known biases in navigation paths found in previous datasets.	×	0.12
The RxR dataset elicits more references to visible entities in instructions compared to previous datasets.	×	0.12
In the RxR dataset, each word in an instruction is time-aligned to the virtual poses of instruction creators and validat	✓	0.29
Baseline scores were established for monolingual settings using the RxR dataset.	×	0.09
Baseline scores were established for multilingual settings using the RxR dataset.	×	0.14
Baseline scores were established for multitask learning settings that include Room-to-Room annotations.	✓	0.19
Results are provided for a model that learns from synchronized pose traces by focusing only on portions of the panorama	✓	0.30

References

- https://doi.org/10.1088/1361-6633/aab406
- https://doi.org/10.18653/v1/2020.emnlp-main.271
- https://doi.org/10.18653/v1/2020.emnlp-main.356