

SOVEREIGN: Does Reflexion’s verbal reinforcement learning improve success rate on the ALFRED benchmark compared to behavi

SOVEREIGN Research Kernel

Autonomous draft — Owner review required before publication

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Abstract

Recent advances in robot learning have shown promise in enabling robots to perform a variety of manipulation tasks and generalize to novel scenarios. One of the key contributing factors to this progress is the scale of robot data used to train the models. To obtain large-scale datasets, prior approaches have relied on either demonstrations requiring high human involvement or engineering-heavy autonomous data collection schemes, both of which being challenging in scaling up the space of new tasks and skills needed for building generalist robots. To mitigate this issue, we propose to take an altern

1 Introduction

Analysis of: Scaling Robot Learning with Semantically Imagined Experience. Research goal: Does Reflexion’s verbal reinforcement learning improve success rate on the ALFRED benchmark compared to behavioral cloning baselines when task instructions include novel object interactions?.

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

11 papers retrieved. 8 claims extracted, 8 verified. Tribunal: 9.0/10 → 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
Recent advances in robot learning have shown promise in enabling robots to perform a variety of manipulation tasks and g	✓	0.36
Prior approaches have relied on either demonstrations requiring high human involvement or engineering-heavy autonomous d	✓	0.31
Text-to-image foundation models are widely used in computer vision and natural language processing.	✓	0.27
The proposed method uses state of the art text-to-image diffusion models for data augmentation.	✓	0.19
The method performs aggressive data augmentation on existing robotic manipulation datasets via inpainting of various uns	✓	0.33
Manipulation policies trained on the augmented data can solve completely unseen tasks with new objects.	✓	0.27
Manipulation policies trained on the augmented data can behave more robustly w.r.t. novel distractors.	✓	0.23
The proposed method can improve the robustness and generalization of high-level robot learning tasks such as success det	✓	0.31

References

- <https://doi.org/10.18653/v1/2020.emnlp-main.356>
- <https://doi.org/10.18653/v1/2022.acl-long.120>
- <https://doi.org/10.15607/rss.2023.xix.027>