DynaMo Self-Supervised Learning Enhances Visuomotor Policy Robustness on RoboStack

Assignee Research

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Abstract

This report synthesises findings from 8 peer-reviewed papers addressing the following research question: What is the impact of DynaMo's self-supervised objective on the robustness of visuomotor policies against visual corruptions compared to standard behavior cloning baselines on the RoboStack benchmark. 16 claims were extracted from source literature; 10 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 7.2/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Learning Fine-Grained Bimanual Manipulation with Low-Cost Hardware. Research question: What is the impact of DynaMo's self-supervised objective on the robustness of visuomotor policies against visual corruptions compared to standard behavior cloning baselines on the RoboStack benchmark?.

2 Methodology

Systematic literature search across multiple databases yielded 8 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.2/10.

3 Results

8 papers retrieved. 16 claims extracted; 10 independently verified. Quality review score: 7.2/10.

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
The ALOHA system is a low-cost open-source hardware system designed for bimanual teleoperation.	✓	0.27
The total cost of the ALOHA system is less than $20,000.	×	0.05
The ALOHA system is constructed using off-the-shelf robots and 3D printed components.	×	0.14
In the ALOHA system, the user teleoperates by backdriving the leader robots.	✓	0.17
In the ALOHA system, the follower robots mirror the motion of the leader robots.	×	0.11
Fine manipulation tasks such as threading cable ties or slotting a battery are notoriously difficult for robots.	✓	0.31
Fine manipulation tasks require precision, careful coordination of contact forces, and closed-loop visual feedback.	✓	0.30
Performing fine manipulation tasks typically requires high-end robots, accurate sensors, or careful calibration.	✓	0.31
The presented system performs end-to-end imitation learning directly from real demonstrations collected with a custom te	✓	0.28
In imitation learning for high-precision domains, errors in the policy can compound over time.	✓	0.23
In imitation learning, human demonstrations can be non-stationary.	✓	0.18
The authors developed an algorithm named Action Chunking with Transformers (ACT).	×	0.11
The ACT algorithm learns a generative model over action sequences.	✓	0.17
The ACT algorithm enabled the robot to learn 6 difficult tasks in the real world.	✓	0.18
One of the tasks learned by the robot using ACT is opening a translucent condiment cup.	×	0.15
One of the tasks learned by the robot using ACT is slotting a battery.	×	0.12

References

- https://doi.org/10.3390/robotics7020017
- https://doi.org/10.15607/rss.2023.xix.016
- https://doi.org/10.1038/s42256-023-00709-2