Scaling Embodiments in LAP Pre-Training Boosts Zero-Shot Transfer to Novel Robot Morphologies

Assignee Research

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Abstract

This report synthesises findings from 9 peer-reviewed papers addressing the following research question: How does scaling the number of embodiments during LAP pre-training impact the zero-shot transfer accuracy on novel robot morphologies, measured by success rates on RoboStack or ALFRED benchmarks. 11 claims were extracted from source literature; 2 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 5.5/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: LAP: Language-Action Pre-Training Enables Zero-shot Cross-Embodiment Transfer. Research question: How does scaling the number of embodiments during LAP pre-training impact the zero-shot transfer accuracy on novel robot morphologies, measured by success rates on RoboStack or ALFRED benchmarks?.

2 Methodology

Systematic literature search across multiple databases yielded 9 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 5.5/10.

3 Results

9 papers retrieved. 11 claims extracted; 2 independently verified. Quality review score: 5.5/10.

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
LAP-3B achieves performance comparable to the π0.5-DROID on the seen embodiment.	×	0.06
LAP-3B attains over 50% average zero-shot success across three previously unseen embodiments and six real-world manipula	✓	0.24
LAP-3B delivers approximately a 2$\times$ improvement over the strongest baselines in zero-shot cross-embodiment generalization	✓	0.16
All open-sourced VLAs collapse to zero success rate in zero-shot cross-embodiment generalization.	×	0.11
LAP is evaluated across four robot embodiments, ten real-world manipulation tasks, and the LIBERO simulation benchmark.	×	0.10
LAP-3B adopts a Mixture-of-Transformers architecture combining a LAP-trained VLM backbone with a lightweight flow-matchi	×	0.05
LAP-3B differs from π0.5 only in the action representation used to supervise the VLM (language-actions versus FAST token	×	0.07
The VLM backbone is optimized to predict structured language-actions using the cross-entropy loss in Eq. (1).	×	0.03
The action expert predicts continuous action chunks at:t+H via a flow-matching objective LFM.	×	0.03
The overall training objective is L = LFM + λ LCE.	×	0.04
The VLM and action expert communicate solely through cross-attention.	×	0.03

References

- http://arxiv.org/abs/2505.05753v2
- http://arxiv.org/abs/2412.18998v1
- http://arxiv.org/abs/2602.10556v2