Vision-Language Model Decomposition Enhances Diffusion Policies in Cross-Domain Manipulation Tasks

Assignee Research

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Abstract

This report synthesises findings from 15 peer-reviewed papers addressing the following research question: To what extent does leveraging vision-language model decomposition improve the success rate of diffusion policies in cross-domain long-horizon manipulation tasks relative to baseline adapter methods. 12 claims were extracted from source literature; 1 was independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 4.5/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: DiAReL: Reinforcement Learning with Disturbance Awareness for Robust Sim2Real Policy Transfer in Robot Control. Research question: To what extent does leveraging vision-language model decomposition improve the success rate of diffusion policies in cross-domain long-horizon manipulation tasks relative to baseline adapter methods?.

2 Methodology

Systematic literature search across multiple databases yielded 15 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 4.5/10.

3 Results

15 papers retrieved. 12 claims extracted; 1 independently verified. Quality review score: 4.5/10.

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
Domain randomization and dynamics randomization have been predominantly reported as successful in robot control tasks.	×	0.06
The performance of disturbance-aware agents is compared with agents using vanilla representation and delay-resolved agen	×	0.09
The delay-resolved agents have the augmented state space of +aS = S $\times$ Am.	×	0.13
The Kuka LBR iiwa 14 robot is used for the reaching task and the box pushing task.	×	0.03
An ArUco board is used to estimate the box pose in the pushing task.	×	0.02
PPO (StableBaselines PyTorch implementation) with a modified feature extractor is used for all three representations.	×	0.03
The network architecture of the augmented models represents mid-fusion to a shared layer, followed by separate heads for	×	0.03
Incorporating dynamic uncertainties into the simulation allows the algorithm to experience a range of possible scenarios	×	0.04
Randomizing the physical effects of a simulated robotic environment affects the behavior of the control system.	×	0.06
The utilization of disturbance estimation in training robust policies with randomized simulation has been less discussed	×	0.08
The disturbance-augmented Markov decision process (DAMDP) is proposed as a new representation to incorporate delay-resol	✓	0.25
The proposed method is validated by learning two distinct manipulation tasks: target-reaching and box-pushing.	×	0.09

References

- http://arxiv.org/abs/2306.09010v2
- http://arxiv.org/abs/2602.03973v1
- http://arxiv.org/abs/2509.24579v1