Scaling Video Pretraining Data Enhances ViPRA Few-Shot Adaptation in Robot Manipulation

Assignee Research

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Abstract

This report synthesises findings from 14 peer-reviewed papers addressing the following research question: What is the impact of scaling video pretraining data volume on ViPRA's few-shot adaptation performance for unseen robot manipulation tasks compared to standard imitation learning models. 14 claims were extracted from source literature; 4 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: ViPRA: Video Prediction for Robot Actions. Research question: What is the impact of scaling video pretraining data volume on ViPRA's few-shot adaptation performance for unseen robot manipulation tasks compared to standard imitation learning models?.

2 Methodology

Systematic literature search across multiple databases yielded 14 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

14 papers retrieved. 14 claims extracted; 4 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
ViPRA extracts motion-centric latent action sequences from large-scale actionless videos.	×	0.14
ViPRA pretrains a video-language model to jointly predict future visual observations and latent action chunks.	✓	0.17
ViPRA finetunes a flow matching decoder to map latent actions to smooth, continuous action chunks with minimal labeled d	✓	0.15
ViPRA predicts state transitions through video prediction and outputs a sequence of fine-grained motion-centric latent a	×	0.13
ViPRA incorporates optical flow consistency as an additional supervision signal, promoting physically plausible and moti	×	0.09
ViPRA leverages both unlabeled human and robot videos for pretraining, enabling generalization across embodiments.	×	0.08
ViPRA uses a flow matching decoder for finetuning on teleoperated robot demonstrations.	×	0.13
ViPRA aligns latent transitions with embodiment-specific motor behaviors, unlike prior vision-language-action models.	×	0.07
ViPRA supports control rates up to 22 Hz.	×	0.09
ViPRA demonstrates empirical gains of 16% on the SIMPLER benchmark and 13% on real-world tasks over the strongest prior	×	0.13
ViPRA uses human videos without action labels for pretraining.	×	0.06
ViPRA uses robot videos without action labels for pretraining.	×	0.08
ViPRA predicts future visual states and motion-centric latent actions within a unified video-language model.	✓	0.18
ViPRA integrates flow matching and action chunking for smooth, high-frequency continuous control.	✓	0.16

References

- http://arxiv.org/abs/2208.01009v2

- http://arxiv.org/abs/2409.03868v1
- http://arxiv.org/abs/2511.07732v2