

What is the impact of unsupervised latent action discovery on cross-domain transfer performance in continuous control tasks

Assignee Research

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Abstract

The rise of deep learning has caused a paradigm shift in robotics research, favoring methods that require large amounts of data. Unfortunately, it is prohibitively expensive to generate such data sets on a physical platform. Therefore, state-of-the-art approaches learn in simulation where data generation is fast as well as inexpensive and subsequently transfer the knowledge to the real robot (sim-to-real). Despite becoming increasingly realistic, all simulators are by construction based on models, hence inevitably imperfect. This raises the question of how simulators can be modified to facilitate

1 Introduction

This paper examines: Robot Learning From Randomized Simulations: A Review. Research question: What is the impact of unsupervised latent action discovery on cross-domain transfer performance in continuous control tasks evaluated on standard robotic suites?.

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 6.7/10.

3 Results

8 papers retrieved. 8 claims extracted; 6 independently verified. Quality review score: 6.7/10.

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 rise of deep learning has caused a paradigm shift in robotics research toward methods requiring large amounts of data	✓	0.30
Generating large datasets on a physical robotic platform is prohibitively expensive.	×	0.10
State-of-the-art robotics approaches learn in simulation because data generation there is fast and inexpensive.	✓	0.27
State-of-the-art robotics approaches transfer knowledge learned in simulation to real robots (sim-to-real).	✓	0.19
All simulators are based on models by construction.	×	0.13
All simulators are inevitably imperfect because they are based on models.	✓	0.16
The mismatch between simulation and reality is often called the 'reality gap'.	✓	0.25
Domain randomization is a method for learning from randomized simulations.	✓	0.30

References

- <https://doi.org/10.3390/make4010009>
- <https://doi.org/10.3389/frobt.2022.799893>
- <https://doi.org/10.3390/make3030029>