

Advanced topics in Reinforcement Learning

Unsupervised Domain Adaptation with Dynamics-Aware Rewards in Reinforcement Learning (2021)

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- Sometimes extensive interactions with target environment impossible
- Unsupervised RL can discover skills without predefined goals, but skill transfer to different dynamics can be challenging
- **DARS** (Dynamics-Aware Rewards for Skill Acquisition)
 - enables transfer of skills learned in one environment to another with different dynamics
 - Uses KL-regularized rewards to align behaviors across multiple environments
 - significantly reduces the need for extensive interactions in target environments, making it practical for real-world applications where interactions can be costly or limited

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- Outperforms baselines
- KL-regularized rewards ensure smoother deployment in target environments with varying dynamics
- Minimizes need for interactions in target environment while maintaining high performance and adaptability
- However, high-dimensional state spaces not covered, regularization coefficient needed, computational overhead difficult to compare

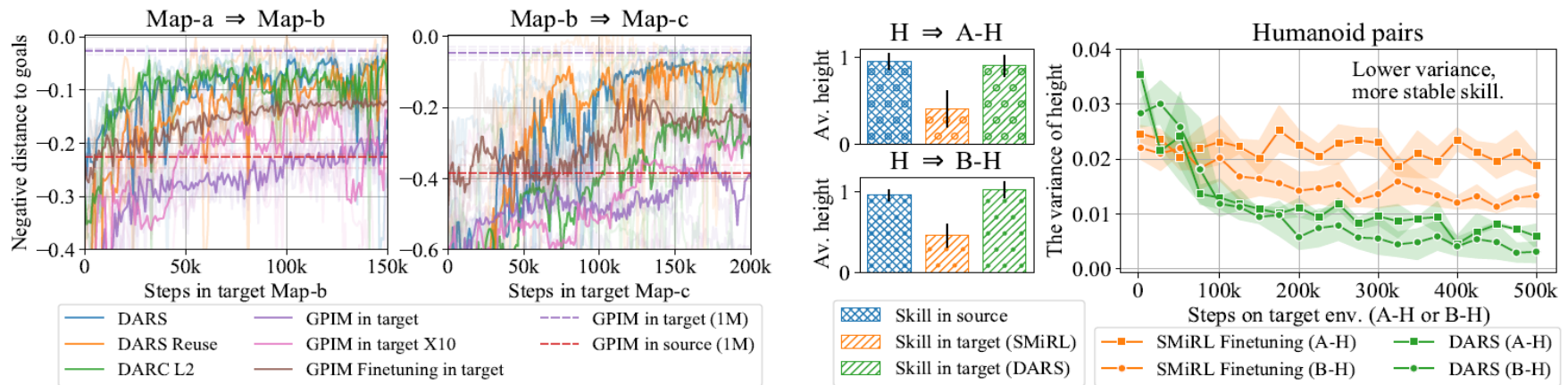


Fig.1 and Fig.2: Comparison of DARS with alternative methods, showing training processes and skill visualization, where transparent lines represent individual random seeds, solid lines show averages, dashed lines denote trained policies, and stable humanoid skills are indicated by maintaining an average height around 1 with reduced variance over time.