PRESTO: Fast Motion Planning Using Diffusion Models Based on Key-Configuration Environment Representation

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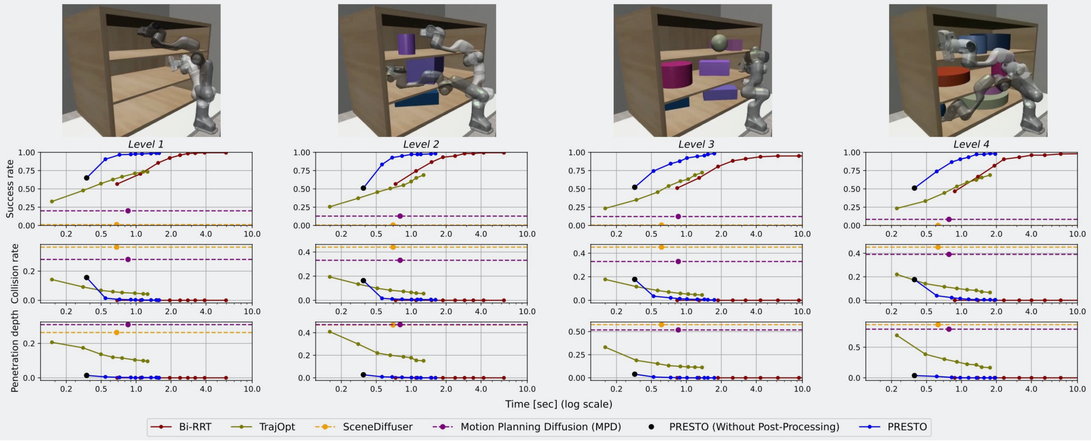
Challenges

- Sample-based methods: High computational costs
- Optimization-based methods: Sensitivity to initialization
- Generative models: Poor generalization to unseen problems

Research Questions

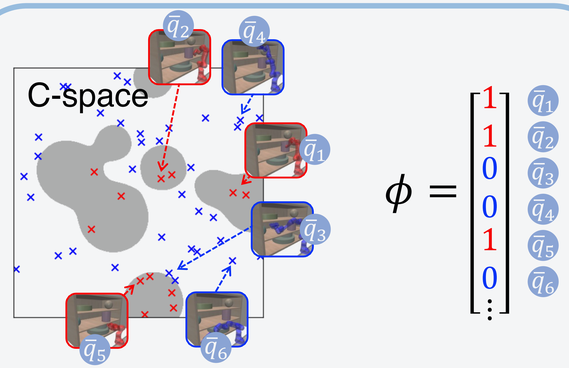
- What are good representations for **generalizing to unseen environments**?
- How can generative models learn **task constraints like collision avoidance**?

Results

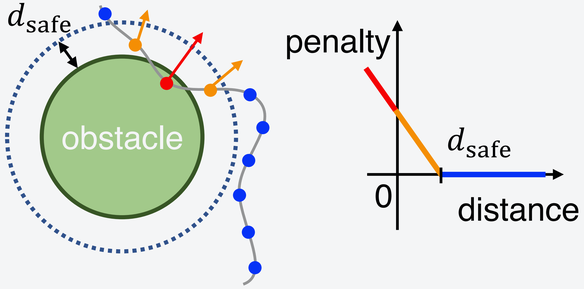


PRESTO:

Planning with Environment Representation, Sampling, and Trajectory Optimization



colliding/collision-free **key-configuration** environment representation



TrajOpt-based **motion planning loss**

environment-conditioned diffusion model trained with **motion planning loss**