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STITCH-OPE

Trajectory Stitching with Guided Diffusion for Off-Policy Evaluation

NeurIPS 2025 Spotlight

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How to evaluate a policy without actually executing it?

Costly

Dangerous

robotics

healthcare

embodied AI

Off-Policy Evaluation (OPE)

Estimate expected return of target policy π from data of behavior policy β

Logged data (β)

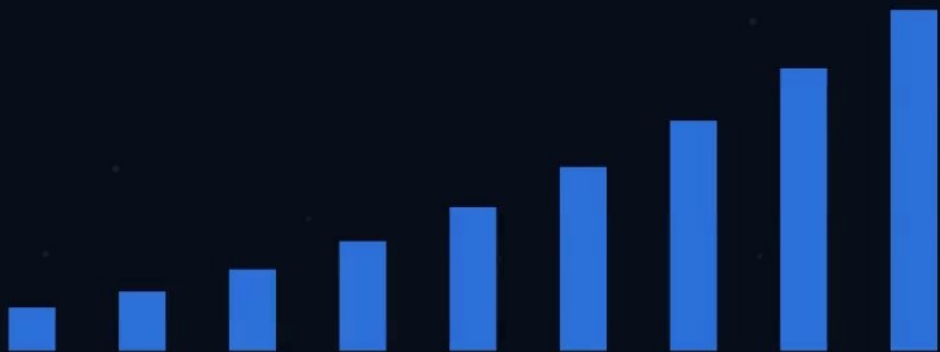
(no new rollouts)

Target policy (π)

High-dimensional, long-horizon OPE

Curse of horizon

$$\frac{\pi_0}{\beta_0} \times \frac{\pi_1}{\beta_1} \times \cdots \times \frac{\pi_T}{\beta_T}$$



Model compounding error

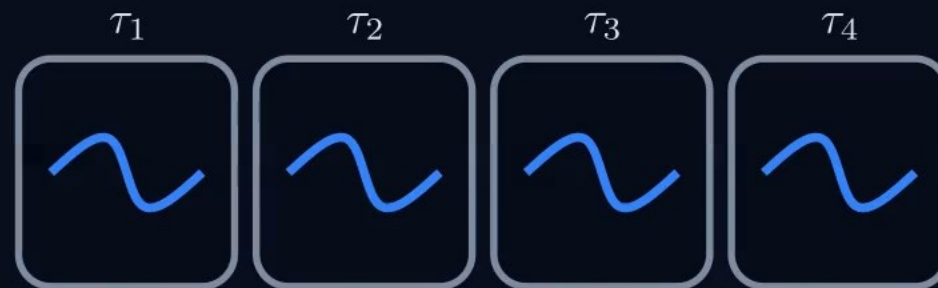


Main contributions — STITCH-OPE

Positive and Negative Guidance Chunked trajectory (stitching)

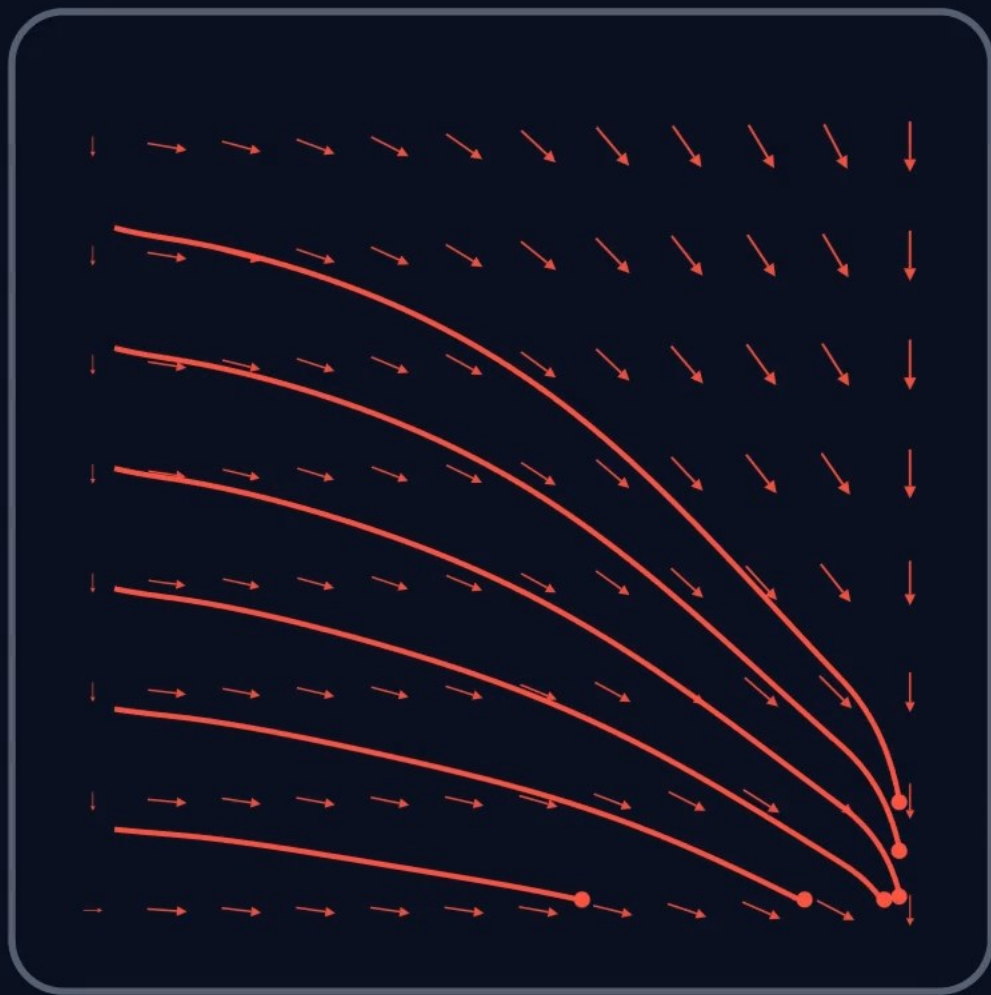
$$\nabla_x \log \pi(x_t) \quad - \quad \nabla_x \log \beta(x_t)$$

score guidance: keep π 's direction, avoid β

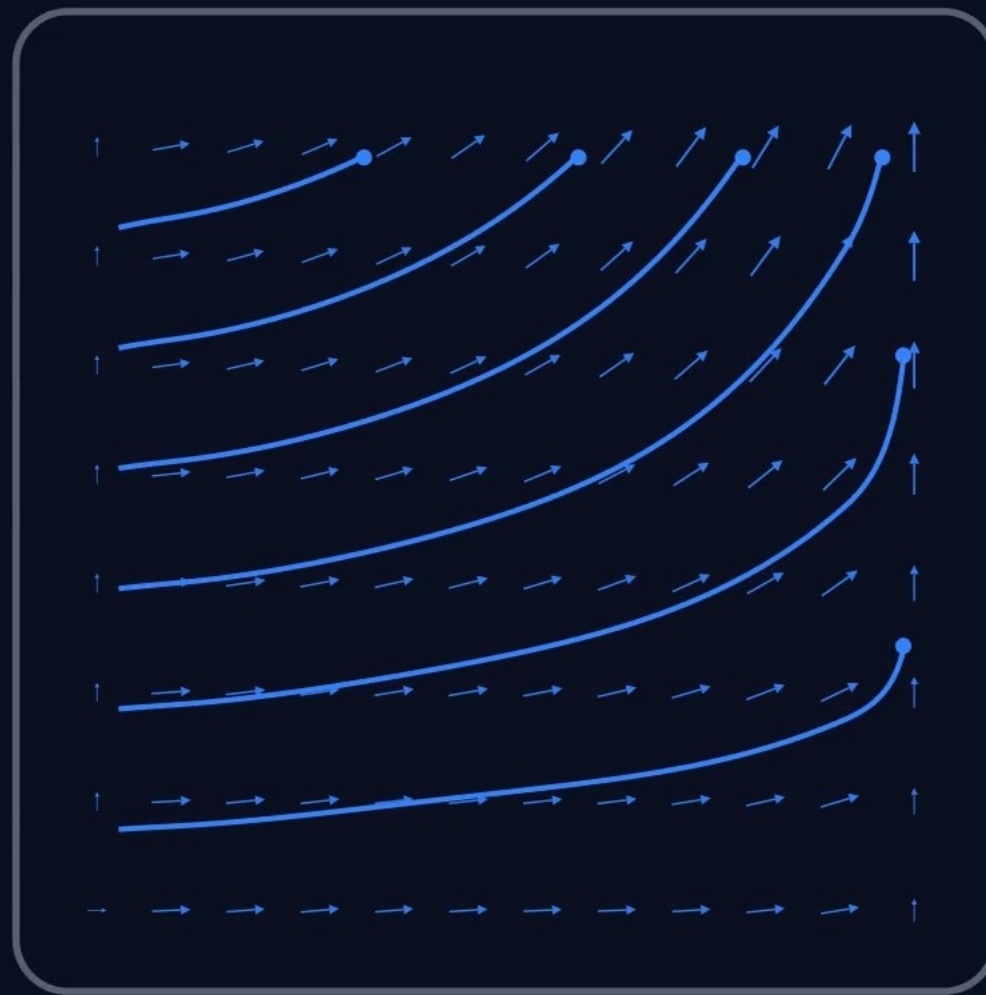


$$\tau = [\tau_1 \parallel \tau_2 \parallel \cdots \parallel \tau_K]$$

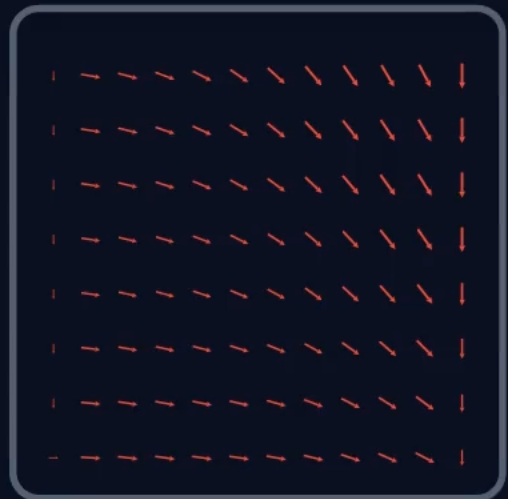
Behavior policy



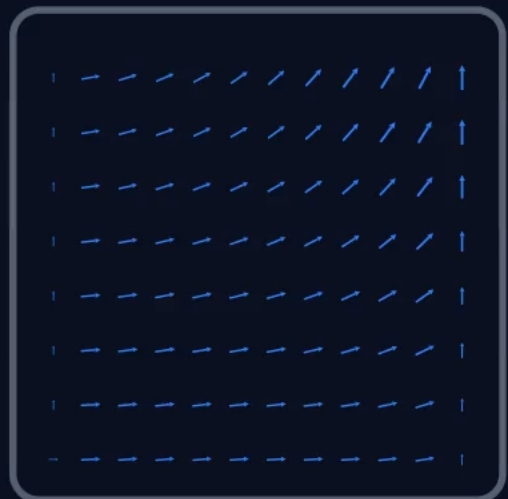
Target policy



Behavior policy



Target policy



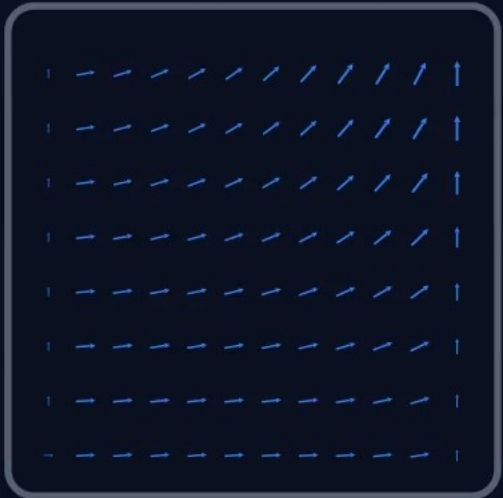
Naive guidance



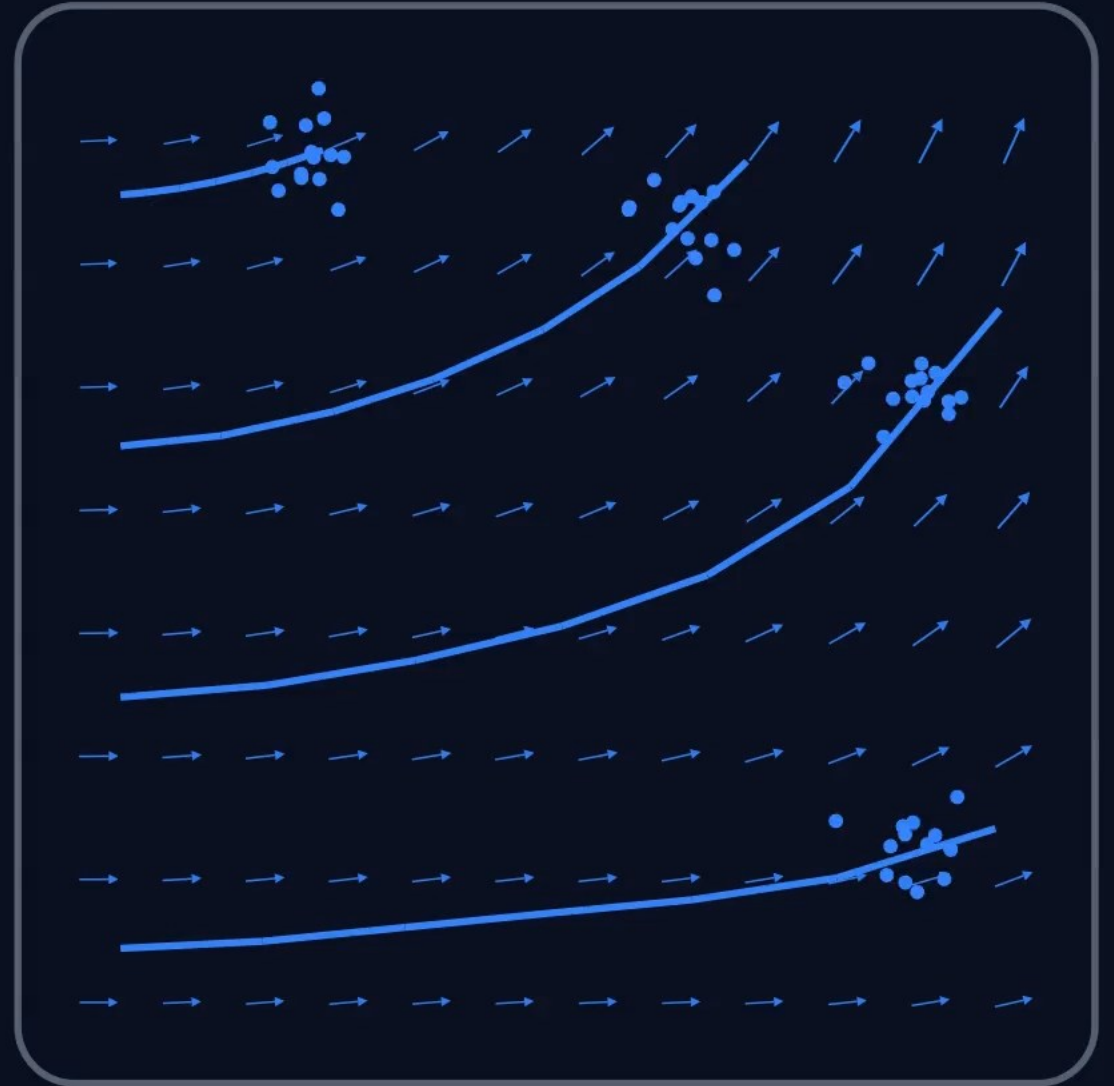
Behavior policy



Target policy



Positive and Negative guidance



Chunked Diffusion Improves Compositionality

Behavior data

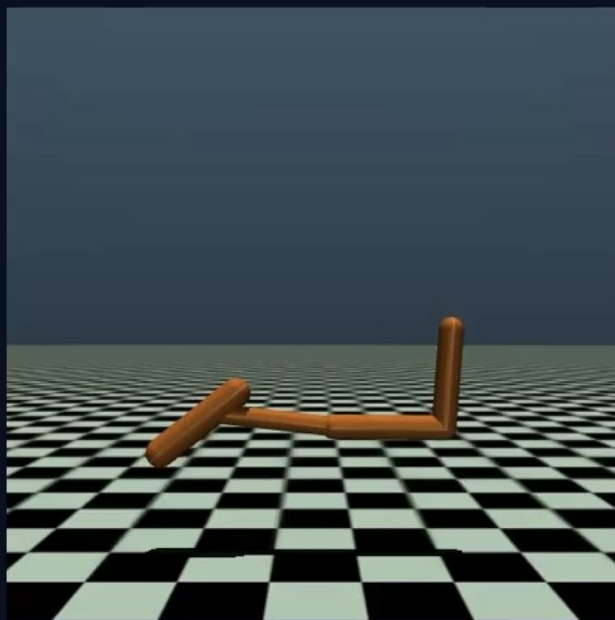


Chunked generation

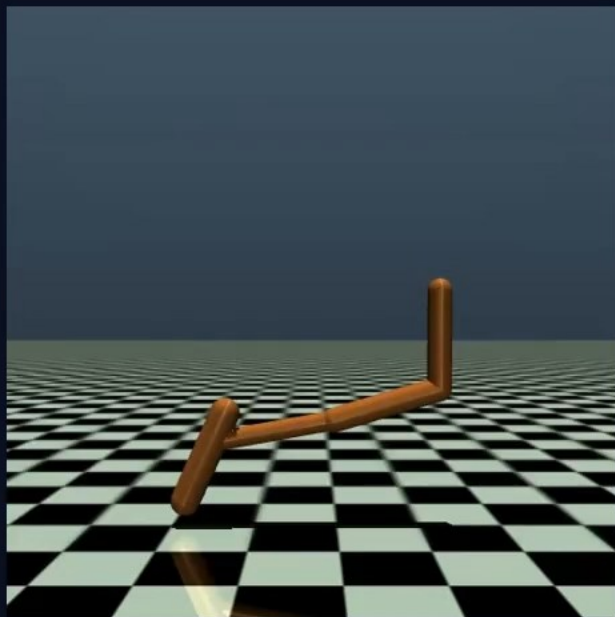


Let's see some simulator results from STITCH

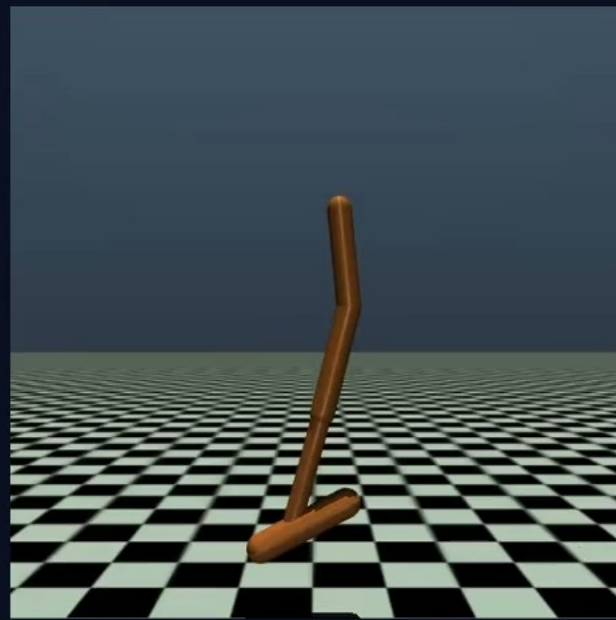
Target policy



STITCH

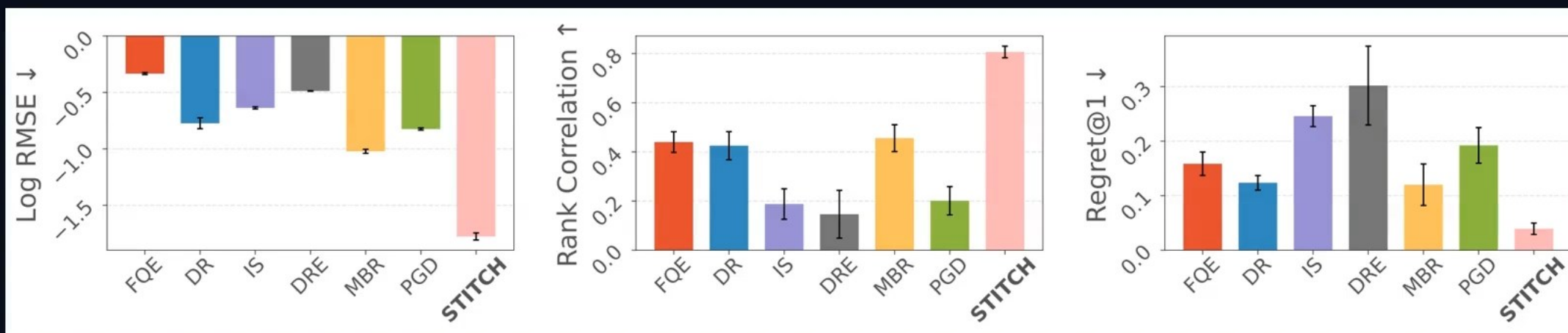


Full-seq diffusion



STITCH mimics the target policy

Results



STITCH-OPE outperforms baselines across multiple metrics

Conclusion — Main takeaways

- ✓ STITCH for OPE and beyond.
- ✓ Chunking is an effective way to reduce autoregressive bottlenecks and improve compositionality.
- ✓ Smaller chunks enable easier guidance.
- ✓ Accurate guidance requires negative guidance.
- ✓ See paper for theory, analysis, and experiments.

Project website & code

stitch-ope.github.io

Try out our fully dockerized codebase.