

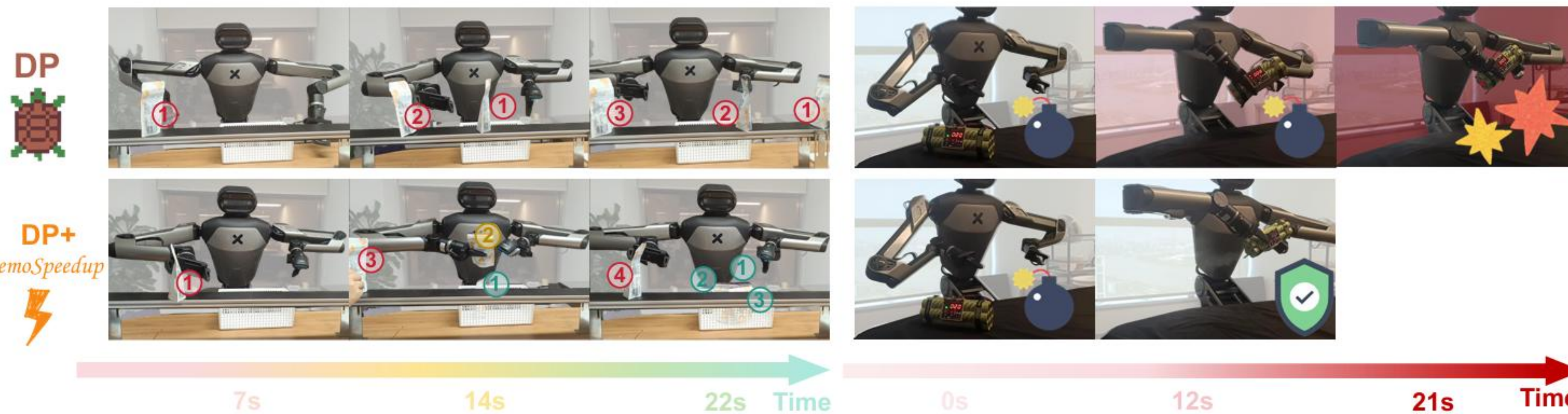


# DemoSpeedup: Accelerating Visuomotor Policies via Entropy-Guided Demonstration Acceleration

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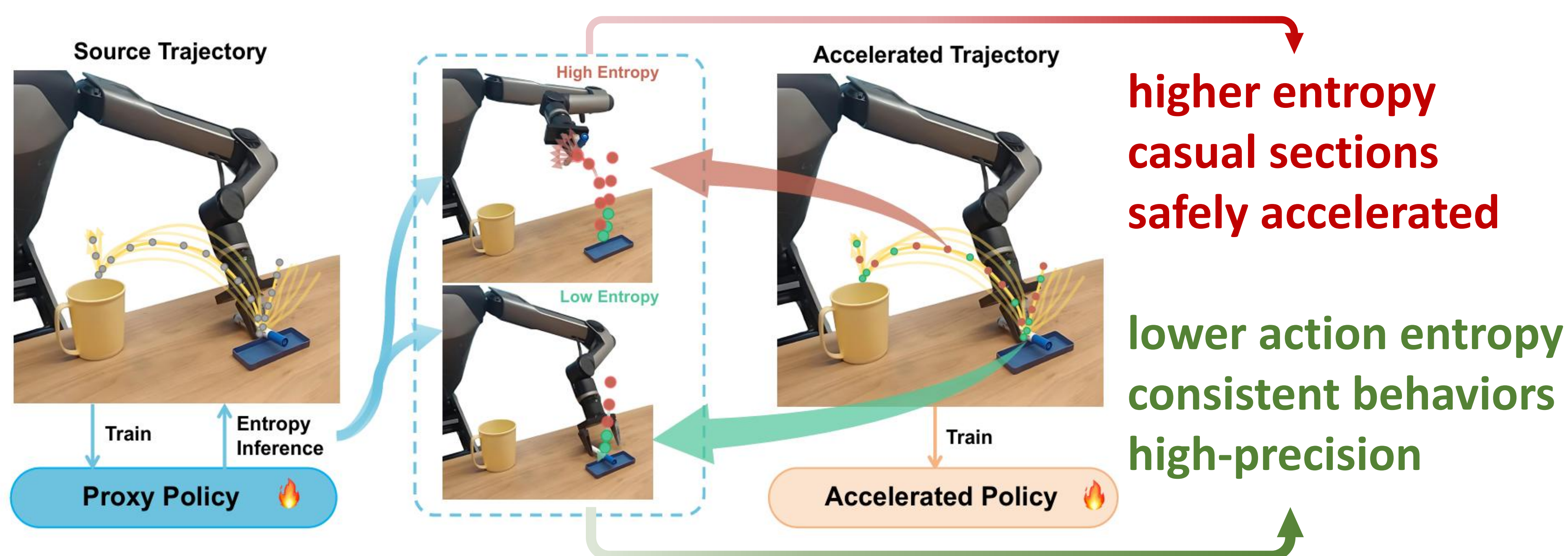


## Motivation



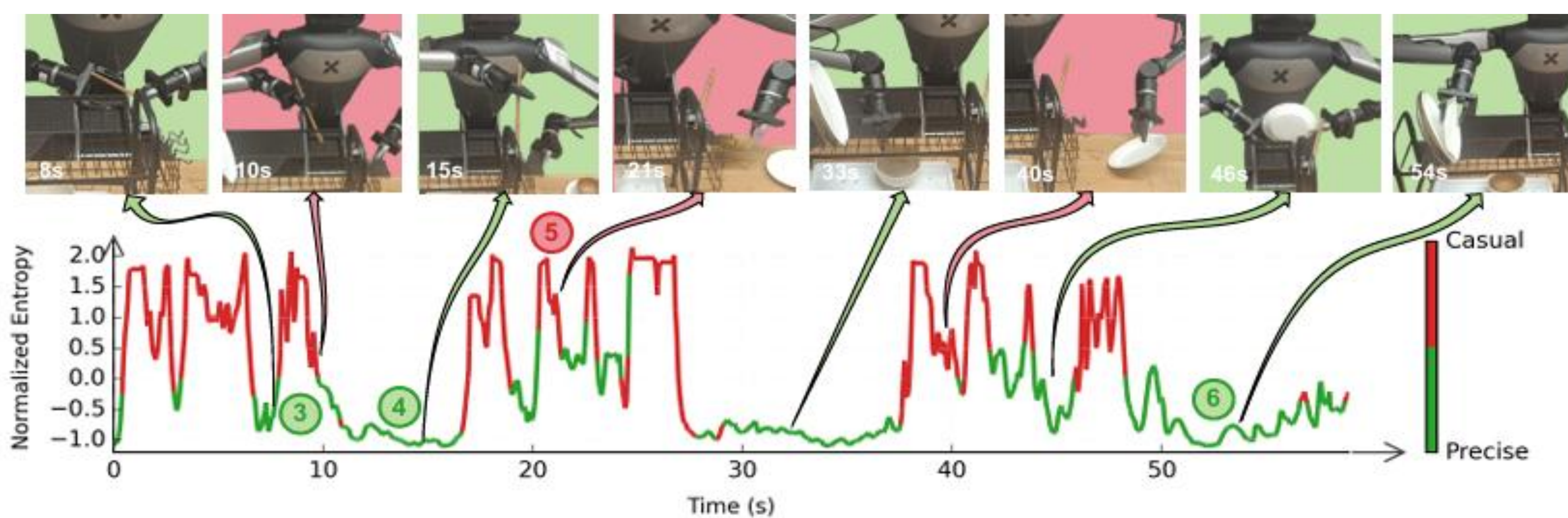
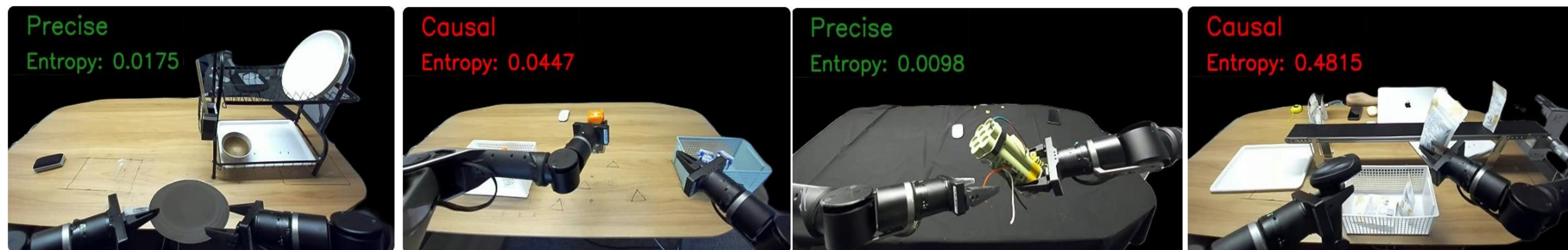
- **Manipulation speed** is crucial for improving the productivity and ensuring the success of time-sensitive tasks.
- policy's execution is often slow due to commonly tardy demonstrations

## Overview



## Entropy Estimation & Segmentation

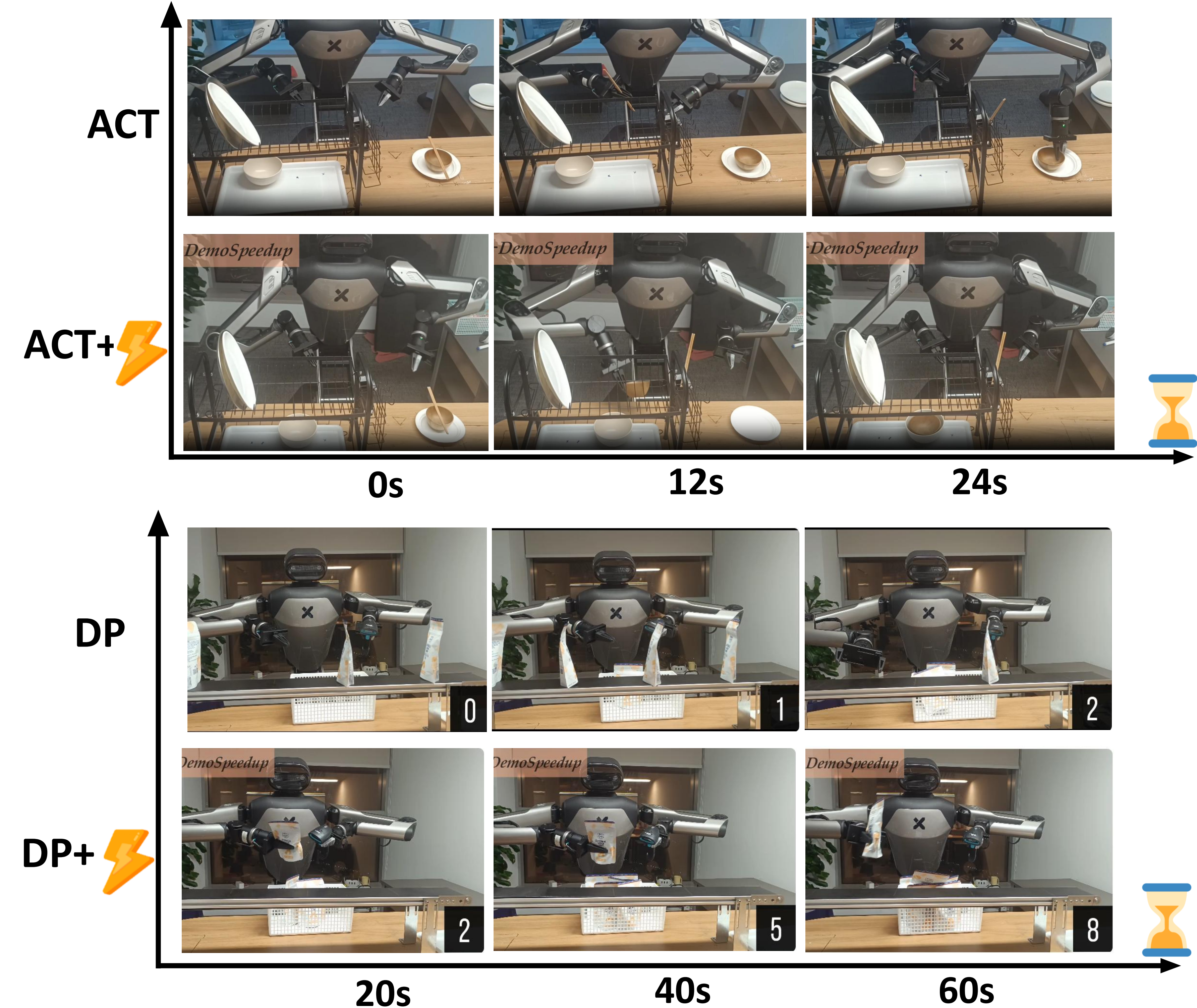
- Train generative policy on demos
- Perform KDE on action chunk samples to estimate action entropy
- Density-based cluster method for segmentation into **Precise/Casual**



## Acceleration Strategies

- ☐ Piecewise Downsample
- ☐ Geometrical consistency
- ☐ Replicate-before-downsample
- ☐ High gain controller

## Real Experiments



Method	Pen in Cup		Sort		Bomb Deposal		Kitchenware		Conveyer		Conveyer Fast	
	success rate (↑)	cost time (↓)	success rate (↑)	cost time (↓)	success rate (↑)	cost time (↓)	success rate (↑)	cost time (↓)	success rate (↑)	cost time (↓)	success rate (↑)	cost time (↓)
ACT	16/30	19.45s	29/40	56.78s	7/27	42.13s	6/33	66.32s	18/30	13.14s	2/30	12.68s
ACT+Ours	24/30	8.28s	31/40	20.38s	6/27	26.31s	7/33	27.26s	21/30	6.57s	16/30	6.28s
DP	15/30	15.69s	32/40	39.29s	6/27	35.69s	19/33	61.12s	28/30	13.39s	7/30	12.96s
DP+Ours	23/30	7.52s	38/40	18.32s	11/27	19.18s	17/33	39.23s	25/30	6.24s	27/30	6.03s

## Simulation Experiments

Method	Averaged	
	success rate (↑)	speedup (↑)
ACT	77%	1.0×
ACT-2x	69%	1.7×
ACT+DemoSpeedup	82%	2.1×
DP	55%	1.0×
DP-2x	45%	1.6×
DP+DemoSpeedup	59%	1.9×