Open X-Embodiment

Robotic Learning Datasets and RT-X Models

Open X-Embodiment Collaboration · ICRA 2024 · arXiv:2310.08864

The problem

- One model per robot, task and place
- Datasets often cover few settings
- Vision and NLP adapt one big model

so

The dataset

60 existing datasets, 34 labs

↓

Converted to one format (RLDS)

↓

22 robot types, arms to quadrupeds

↓

1M+ trajectories

22

robot types in the dataset

9

robots (12 datasets) train RT-X

Two existing models

RT-1-X · 35M

- Built for robots
- 15-image history
- Robot data only
- Runs locally

vs

RT-2-X · 55B

- VLA on PaLI-X
- Actions as text
- + web data, 1:1
- Runs in the cloud

One coarse action

- x, y, z, roll, pitch, yaw, gripper
- Normalized per dataset, 256 bins
- One camera view per dataset
- Frames not aligned across robots

+50%

RT-1-X mean success vs each lab's own method (5 small-data domains)

Bridge skills on Google Robot

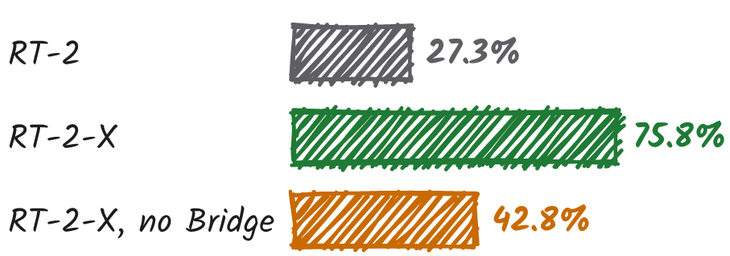


Table II, emergent skills, 55B

Large-data domains

- Bridge (WidowX), RT-1 (Google Robot)
- RT-1-X (35M) falls below RT-1 alone
- RT-2-X vs RT-1: +10, 0, −1 points
- No RT-2 trained on one dataset

Takeaway

- Pooling lifts RT-1-X on small domains
- RT-2-X keeps up on large domains
- No test on robots outside the mix

Active listening · Open X-Embodiment

Write while you listen. One line per box is enough.

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Date _____ Presenter _____ Role _____

Their main claim, in my words

The evidence they show

What I would push on

My question for the room

How it connects to my work

Listen for

- ☐ What "22 embodiments" counts; which 9 robots train RT-X
- ☐ What the action format aligns, and what it does not
- ☐ Baselines: Original Method, RT-1 alone, RT-2
- ☐ Which tests isolate model size, and which change more
- ☐ Which tests use RT-1-X, which use RT-2-X

Ask the room

1. No robot input, frames unaligned: would a robot ID help?
2. Bridge (WidowX) to Google Robot: how to test other pairs?
3. What would predict whether transfer helps a new robot?

Page, video and FAQ:
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