VIRTUAL HOME: SIMULATING HOUSEHOLD ACTIVITIES VIA PROGRAMS

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1. Introduction

2. Data collection

3. Simulator

4. Conclusion





Three components:

- Agents
- Environments
- Programs (Interactions)





Multiagents









- Static
- Interactable
- Grabbable



Data collection

Crowdsourcing

<u>First part</u>

Amazon Mechanical Turk

Living room

Action name:

Throw away newspaper

Description:

Take the newspaper on the living room table and toss it.

- Kitchen
- Dining room
- Bedroom
- Kids bedroom
- Bathroom
- Entrance hall
- Home office

Second part

Descriptions Programs Scratch blocks

[Find] <toothbrush>

DATASET ANALYSIS

- 1257 valid descriptions provided by AMT members
- 1257 programs corresponding to the descriptions
- 1564 additional programs (For some particular tasks)
- **2821** resulting programs in the <u>activity programs</u> dataset.
- **5193** <u>synthetic programs</u> made by RNN

DATASET MEMBER STRUCTURE



50 most common actions in dataset

50 most common objects in dataset



Analyzing diversity in Programs

Action	# Prog.	LCS	Norm. LCS
Make coffee	69	4.56	0.26
Fold laundry	11	1.29	0.08
Watch TV	128	3.65	0.40
Clean	42	0.76	0.04

Action: Action that we are analyzing. **#Prog.** : Number of programs referred to the activity. **LCS:** Lowest Common Subsequences.

Norm. LCS: LCS normalized.

From Descriptions to Programs

RNNs trained with Reinforcement Learning

2 steps Training

Encoder RNN



Input Sequence \rightarrow Hidden vector representation

Decoder RNN



Hidden vector \rightarrow Step of the program at a time





















Recordings





