Programming by Demonstration with Situated Semantic Parsing

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Programming by Demonstration

- Teaching the robot new skills
- Kinesthetic demonstrations
- Natural language interface

[Cakmak and Takayama 2014]
at the chair, move forward three steps past the sofa

\[ \lambda a. \text{pre}(a, \forall x. \text{chair}(x)) \land \text{move}(a) \land \text{len}(a, 3) \land \text{dir}(a, \text{forward}) \land \text{past}(a, \forall y. \text{sofa}(y)) \]
Situated Semantic Parsing

\[ \lambda a. \text{close}(a) \land \text{patient}(a, A(\lambda x. \text{hand}(x) \land \text{left}(x))) \]

“close left hand”

close-left-hand
Situated Semantic Parsing

\[ \lambda a. \text{close}(a) \]

close-right-arm
close-right-hand
close-action
close-left-hand
...

“close”
Situated Semantic Parsing

“close”

\( \lambda a. close(a) \)

close-right-arm
close-right-hand
close-action
close-left-hand
...

Use the system state to disambiguate
Situated Semantic Parsing

\[ \lambda a. \text{close}(a) \]

- The close action can only be applied to hand objects

Use the system state to disambiguate
Situated Semantic Parsing

Use the system state to disambiguate

- The close action can only be applied to hand objects
- Infer salient objects from recent actions
Situated Semantic Parsing

“close”

\[ \lambda a. \text{close}(a) \]

close-right-arm

close-right-hand

close-action

close-left-hand

...