

# Sokoban and reasoning

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# Overview

- Why
  - Motivation
- What
  - I have done
  - am I doing now

# Motivation

- Basic smart theorem prover components
  - Logic system
  - Search
  - Reinforcement learning

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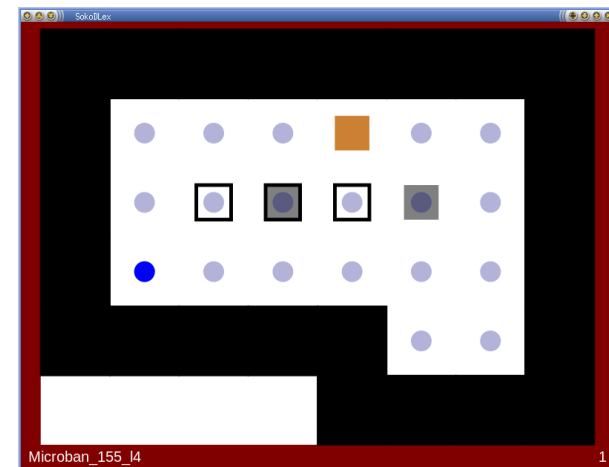
- Basic smart problem solver components
  - Logic system
  - Search
  - Reinforcement learning
- Let's try first specific domains first
  - Geometry
  - While loops
  - Puzzle games
  - ...

# Puzzle game environments

- Tests for human problem solving
  - No superhuman AI for many of them
- What do “they” do to solve them?
  - Learning across levels
  - Learning on a single level
  - Reasoning

# Sokoban deadlocks

- Deadlock = “Set of sokoban positions that we can prove is unsolvable”
- Logic system:
  - GUI in Python to prove deadlocks
  - Deadlocks can be verified in Lean
  - (done, richer logic could be added)



# Two player game

- Player 0: Playing sokoban
- Player 1: Can abstract boxes away
  - Motivated to abstract away as many boxes as possible as long as the position is unsolvable



# Alphazero+

- Search + Learning (in progress)
- Running alphazero on this 2 player game and 3191 levels.
- Deadlocks detection from the game trees
- Value + Policy learning with ResNet

# Thank you for your attention

- Questions?
- Suggestions?
- ...