

A Neural-Symbolic Approach for Object Navigation

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Motivation

Goal

- Intelligent agents need to reason over environments
- Deep learning is not sufficient for high level planning
- End-to-end DL/RL systems are data inefficient

Build an agent that can use neural networks for

perception and symbolic planner for reasoning.

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Symbols

 Object Navigation is trivial for a planner with the right factored representations



Object Detection Network (YOLO)



Planner

(conn f0-0f f0-1f right)

(conn f0-0f f1-0f down)
(conn f0-1f f0-0f left)

(conn f1-0f f0-0f up)

(dropoff)
(handsfree robot0)

Path Search: Dijkstra Semantic Planning: PDDL http://planning.domains/

(:init

Semantic Spatial Graph



Settings

- Exploration Budget: 1000
- Number of Objects: 3
- Number of Settings: 7
- Movements: Non-Stochastic
- Actions: (MoveForward, MoveBack, RotateLeft, RotateRight)
- Termination Condition: Target-in-view and 0.5m away

Results



Results Summary

	Average Length	Success Rate
NS Agent	23	100%
Random Walk	2328	23.8%
Optimal	19	100%

Future Work

More complex reasoning tasks beyond object navigation





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Environment

AI2-THOR:

Observation

https://ai2thor.allenai.org/



Framework