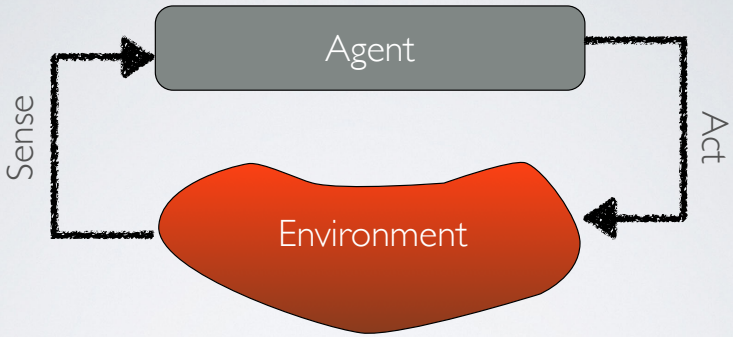
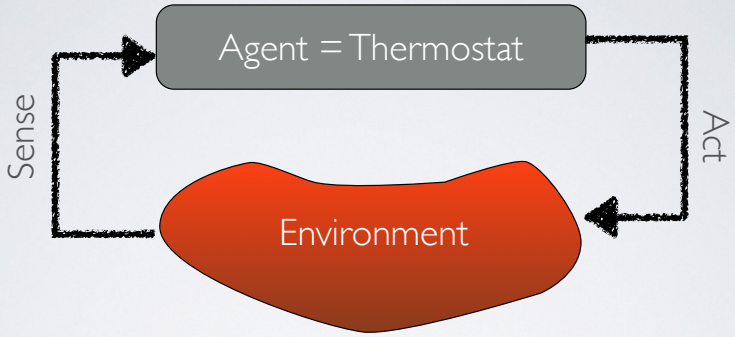
MODELING SEARCH PROBLEMS

CSE 511A: Introduction to Artificial Intelligence

AGENT ARCHITECTURE

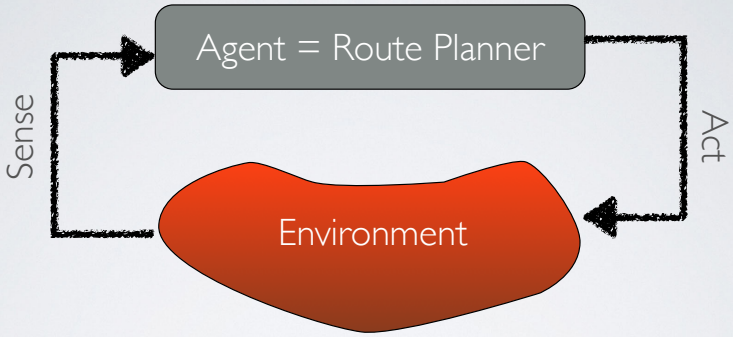


AGENT ARCHITECTURE



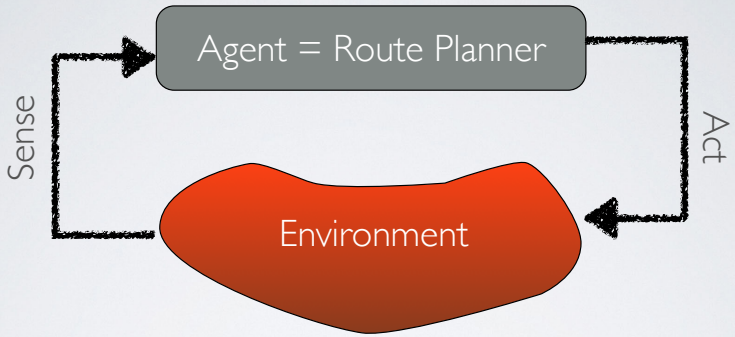
States: Temperatures
Actions and successors: On/off the heater, temperature go up/down
Cost: Energy consumed
Start and goal states: Initial and desired temperatures
Solution: Sequence of actions (a plan) that transforms the start state to a goal state

AGENT ARCHITECTURE



States:
Actions and successors:
Cost:
Start and goal states:
Solution:

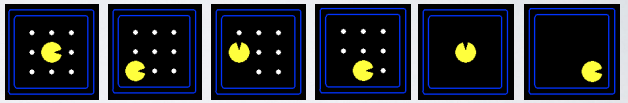
AGENT ARCHITECTURE



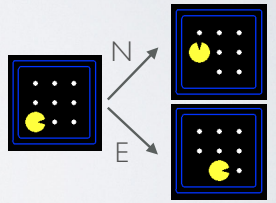
States: Locations
Actions and successors: Movements to neighboring locations
Cost: Length of movement
Start and goal states: Start and goal locations
Solution: Sequence of movements that transforms the start state to a goal state

AGENT ARCHITECTURE

Problem: ***Pathing (Pacman needs to move to a goal location)***
States: Location of Pacman and remaining dots



Actions and successors: N,S,E,W; update to location of Pacman and remaining dots

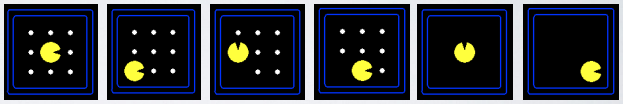


Cost: 1 unit of time

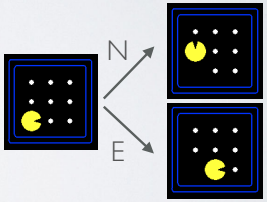
Start state: starting configuration
Goal state: any configuration with Pacman at its goal location

AGENT ARCHITECTURE

Problem: ***Eat-all-dots (Pacman needs to eat all dots)***
States: Location of Pacman and remaining dots



Actions and successors: N,S,E,W; update to location of Pacman and remaining dots



Cost: 1 unit of time

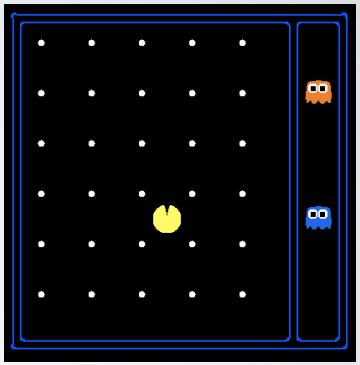
Start state: starting configuration
Goal state: any configuration with no dots remaining

STATE SPACE

World state:
- Pacman position: 120
- Dot count: 30
- Ghost positions: 12
- Direction that is Pacman facing: 4 (NSEW)

How many world states?
- $120 \times 2^{30} \times 12^2 \times 4 = 7.4 \times 10^{13}$

How many states for pathing problem?
- ??



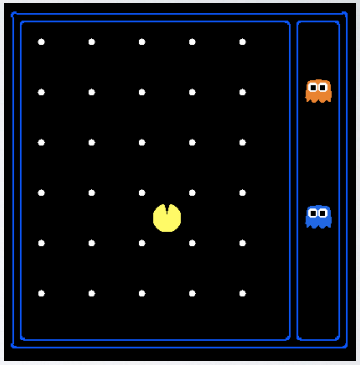
STATE SPACE

World state:
- Pacman position: 120
- Dot count: 30
- Ghost positions: 12
- Direction that is Pacman facing: 4 (NSEW)

How many world states?
- $120 \times 2^{30} \times 12^2 \times 4 = 7.4 \times 10^{13}$

How many states for pathing problem?
- 120

How many states for eat-all-dots problem?
- ??



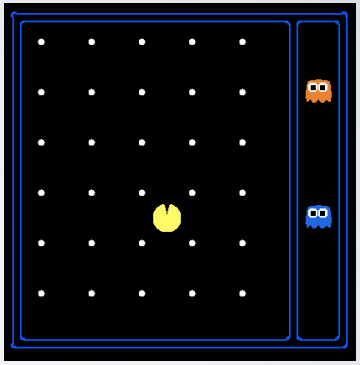
STATE SPACE

World state:
- Pacman position: 120
- Dot count: 30
- Ghost positions: 12
- Direction that is Pacman facing: 4 (NSEW)

How many world states?
- $120 \times 2^{30} \times 12^2 \times 4 = 7.4 \times 10^{13}$

How many states for pathing problem?
- 120

How many states for eat-all-dots problem?
- 120×2^{30}



STATE SPACE

World state:
- Pacman position: 120
- Dot count: 30
- Ghost positions: 12
- Direction that is Pacman facing: 4 (NSEW)

Generally, the larger the state space, the more difficult the problem.

Only store pertinent information in the state information!

How many states for pathing problem?
- 120

How many states for eat-all-dots problem?
- 120×2^{30}