Agents and Environments
Lecture 2

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(Slides based in part on slides from Andrea Thomaz)

Remaining Administrative Items

Resources

Review of Syllabus

Resources

Syllabus is now on T-Square, Piazza is coming soon

Text:

"AI: A Modern Approach," 3rd edition (2010)

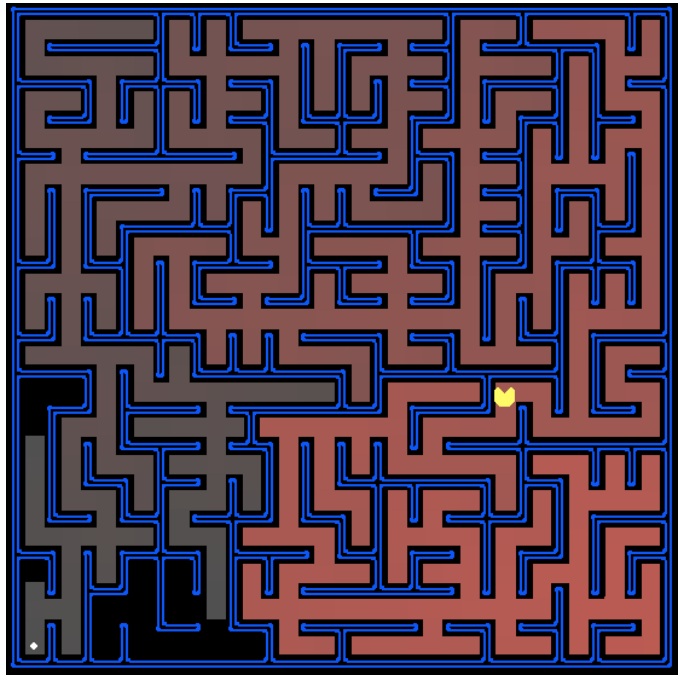
by Stuart Russell (UC Berkeley) & Peter Norvig (Google)

We will follow it reasonably closely in the beginning

Problems will be assigned from it

You must buy it

Grading



Midterm (30%)

Final (35%)

Projects (35%)

- 4 Graded Projects
- 1 Ungraded Project (Python Tutorial)

All projects done in Python (autograder)

No credit given for late submissions

Turn in on-time for Partial Credit

Honor Code: Projects are not collaborative, we test for cheating

Extra Credit

There will be opportunities for extra credit

- Extra credit questions on all projects
- Opportunities to participate in research studies
  - You must write a report

Don’t rely on this!

Start Early Start Early Start Early Start Early

Schedule and Disclaimer

A complete lecture schedule will be on T-Square by Friday

This schedule is subject to change

Any changes announced in class & via T-Square

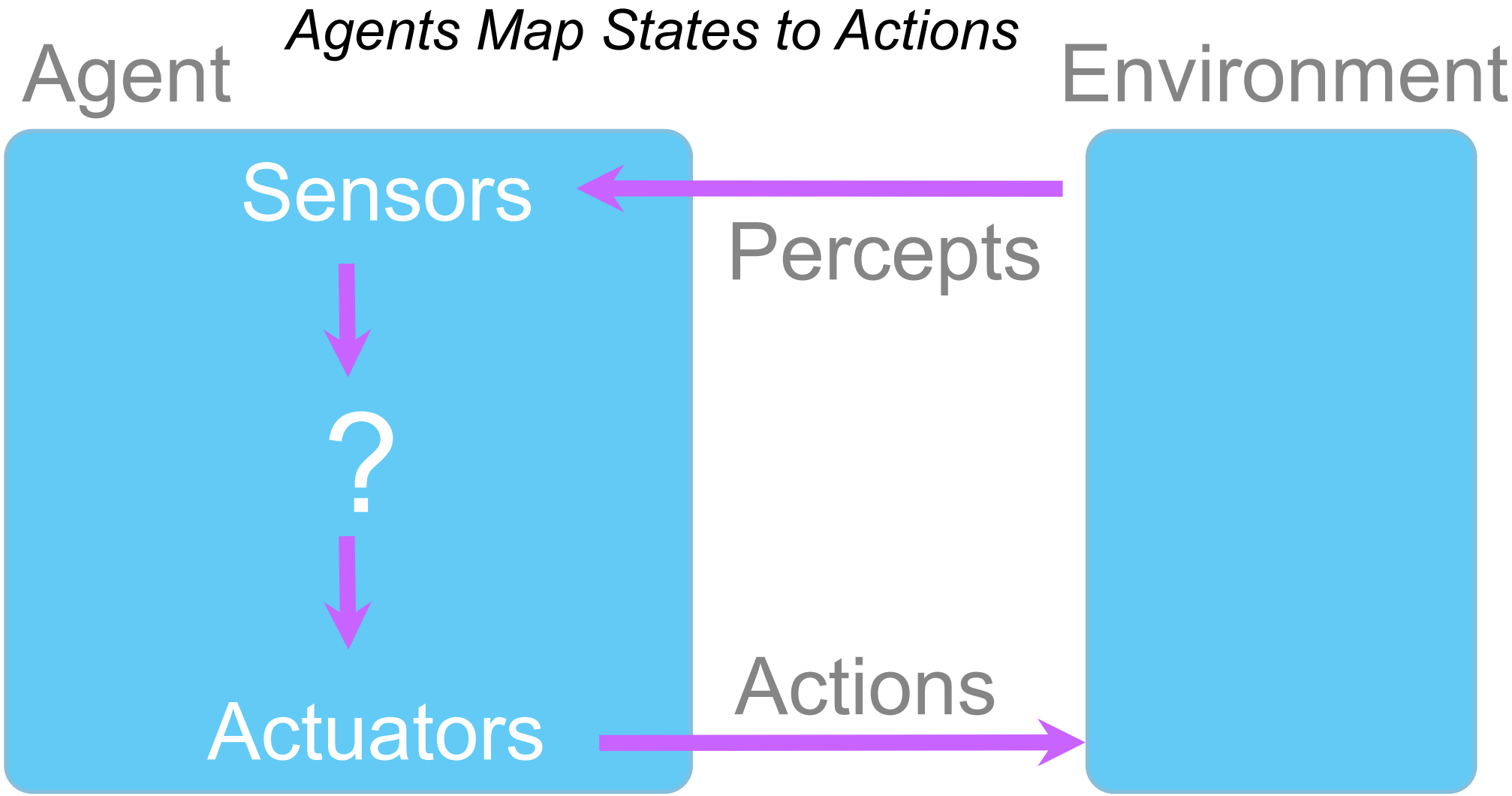
I will miss some classes due to unavoidable travel

I will tell you where I am going and why ☺

My replacement lecturer will be highly trained (usually faculty)

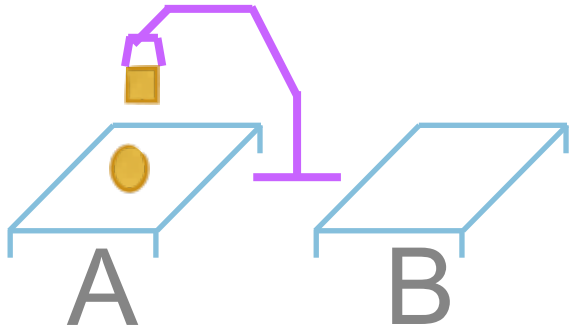
I will provide pre-recorded lectures in every case

Agents as Functions



Tabletop Robot Example

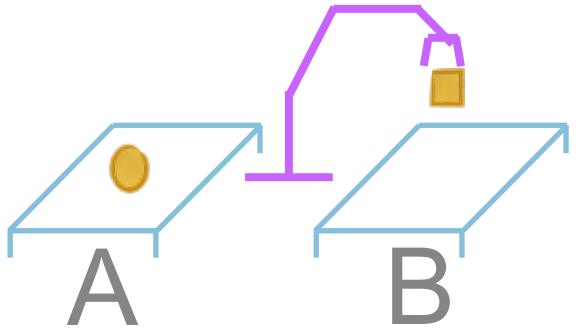
State (perception) <Ball-loc, Sq-loc, Hand-loc>	Action <L, R, Pick(obj), Drop>
Ball-A, Sq-Hand, Hand-A	



Tabletop Robot Example

, Hand-loc>	Action <L, R, Pick(obj), Drop>
Ball-A, Sq-Hand, Hand-A	R
Ball-A, Sq-Hand, Hand-B	

>



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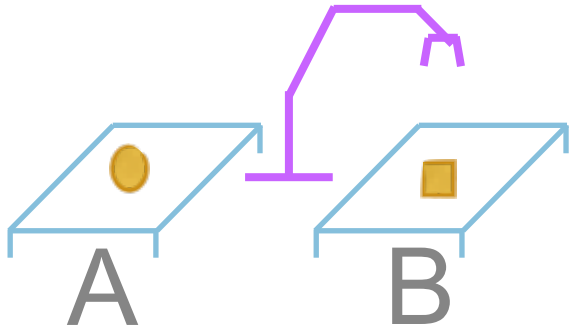
Ball-A, Sq-Hand, Hand-A	R
Ball-A, Sq-Hand, Hand-B	Drop
Ball-A, Sq-B, Hand-B	



Rational Agent

Always chooses actions to get the Best Expected Outcome

How desirable is this action?

Need a task-dependent measure of performance

For a state sequence S, select action A which maximizes the performance measure

Task Setting

The problem the agent is trying to solve:

P – Performance Metric

E – Environment

A – Actuators

S – Sensors

Automated Taxi Problem (coming soon…)

P – ?

E – ?

A – ?

S – ?

Automated Taxi Problem (coming soon…)

P – Safe, fast, legal, max revenue, min cost, min fuel, …

E – city roads, traffic, pedestrians, bikers, construction, …

A – Car controls (steering, gas pedal) and human interface

S – Cameras, radar, laser rangefinder, GPS, mapping, engine sensors, human input devices

Environment Types

Fully Observable	Partially Observable
Deterministic	Stochastic
Episodic	Sequential
Static	Dynamic
Discrete	Continuous
Single-Agent	Multi-Agent

Summary

Agents map states to actions

States and actions represented as tuples

Agents should be rational

Select the action that maximizes the outcome

Task defined by PEAS

Performance metric, Environment, Actuation, Sensors

Environment Types influence the difficulty of the problem

Questions?