CS3243 Tutorial Group 7

Tutorial 1 – Introduction and Agents

About me – George Pîrlea

- Graduate student at SoC

- Work in formal methods, programming languages theory & distributed systems
  - **not artificial intelligence!**

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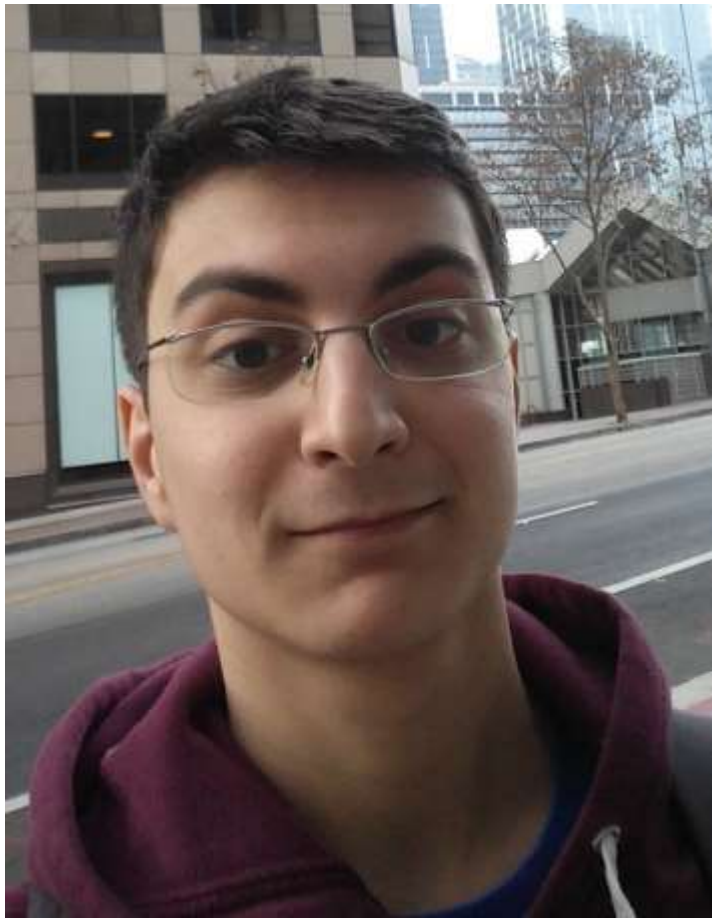

What the tutorials are for

- Apply the lecture material on examples to solidify understanding
- Reinforce key insights from the lecture
- Clarify misconceptions
  - we can all learn from each other's mistakes
  - everyone benefits from questions and participation – help each other learn

Expectations

- Before the tutorial:
  - You review the lecture notes
  - You attempt all tutorial questions and submit the assignment solution
    - **if you didn't try a question, we won't go through it during the tutorial**
- During the tutorial:
  - I will not spoon-feed solutions
  - You ask questions when you are confused or don't understand something
    - the purpose is to learn, not to seem "smart"
  - You participate: ask questions, offer answers, volunteer to present a solution

Introductions and your expectations

- Introduce yourself (name, year, faculty)
- What about Artificial Intelligence do you find exciting?
- What do you expect to get out of the module?

Quick recap

- Build “intelligent” mechanisms → make computers solve human tasks

- Rational agents
  - **perceive** an **environment** through **sensors**, and act on it through **actuators**
    - defined/specified via an **agent function** and implemented using an **agent program**
  - a rational agent performs the “right” actions (judged by their *consequences*)
    - the “rightness” of an action sequence is determined by the **performance measure**

- Task environments
  - PEAS specification
  - properties of task environments

- Types of agents:
  - reflex, model-based, goal-based, utility-based, learning agents

Tutorial 1: Introduction to AI

"An environment which is deterministic with complete information will remain deterministic when some information is obscured."

DETERMINISTIC
STOCHASTIC

Deterministic vs. **stochastic**. If the next state of the environment is completely determined by the current state and the action executed by the agent, then we say the environment is deterministic; otherwise, it is stochastic. In principle, an agent need not worry about uncertainty in a fully observable, deterministic environment. (In our definition, we ignore uncertainty that arises purely from the actions of other agents in a multiagent environment; thus, a game can be deterministic even though each agent may be unable to predict the actions of the others.) If the environment is partially observable, however, then it could *appear* to be stochastic. Most real situations are so complex that it is impossible to keep track of all the unobserved aspects; for practical purposes, they must be treated as stochastic. Taxi driving is clearly stochastic in this sense, because one can never predict the behavior of traffic exactly; moreover, one's tires blow out and one's engine seizes up without warning. The vacuum world as we described it is deterministic, but variations can include stochastic elements such as randomly appearing dirt and an unreliable suction mechanism (Exercise 2.13). We say an

UNCERTAIN

environment is **uncertain** if it is not fully observable or not deterministic. One final note: our use of the word "stochastic" generally implies that uncertainty about outcomes is quan-

NONDETERMINISTIC

tified in terms of probabilities; a **nondeterministic** environment is one in which actions are characterized by their *possible* outcomes, but no probabilities are attached to them. Nondeterministic environment descriptions are usually associated with performance measures that require the agent to succeed for *all possible* outcomes of its actions.

Diagnostic Quiz 1

- 22 students total
- 56 quiz attempts

Statistic	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Wrong attempts (WA)	1	15	21	9	3	18	15	21	6
WA percentage	1.8%	26.8%	37.5%	16.1%	5.4%	32.1%	26.8%	37.5%	10.7%
Incorrect best attempts	0	0	1	1	1	1	0	1	0
% students incorrect	0.0%	0.0%	4.5%	4.5%	4.5%	4.5%	0.0%	4.5%	0.0%

Agent function vs. program distinction

Performance measure

is **external** to the agent*

Task environments

Solitaire

is **partially** (not fully) observable

Rationality

random agent **is rational** when all actions have equal rewards

Stochastic env.

for the agent, **uncertainty** appears stochastic