FACULTY OF ENGINEERING AND ARCHITECTURE

DEPARTMENT OF TELECOMMUNICATIONS AND INFORMATION PROCESSING
GROUP FOR ARTIFICIAL INTELLIGENCE AND SPARSE MODELLING (GAIM)

Practical sessions

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imec

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Contact

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- Office hours – by appointment

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Course organisation

- Lectures
- Theoretical problem-solving sessions
- Practical sessions

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Practical sessions

- Goal: apply learned theoretical knowledge in practice
- 3 sessions (not including this one)
- 3 graded assignments (one per session)
- Grading based on submitted code and written report
  - Deadline: 2 weeks from the session
- Every next practical session oral questioning of randomly selected students about previous assignment

  => presence is obligatory
- 1/3 of the final grade
- Groups of two, join on Ufora

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Calendar for practical sessions

- 0th – Introduction to Python (today) – no graded assignment
- 1st – Path finding (18 Oct 2019)
- 2nd – Bayesian networks (8 Nov 2019)
- 3rd – Neural networks (29 Nov 2019)

Python

- High-level programming language
- Free & open-source
- Dynamically typed
- Automatic memory management
- ‘Easy to read’ code (Matlab-like)

- For the assignments:
  - Path finding: list, dictionary, function, class
  - Neural networks: packages Keras and Tensorflow

Python installation

- All-in-one package Anaconda
- Includes the following:
  - Python 3
  - PIP python package management system (how-to)
  - Jupyter Notebook: Matlab-like
  - Integrated development environment (IDE)
    - Alternatives: PyCharm, running from the terminal...

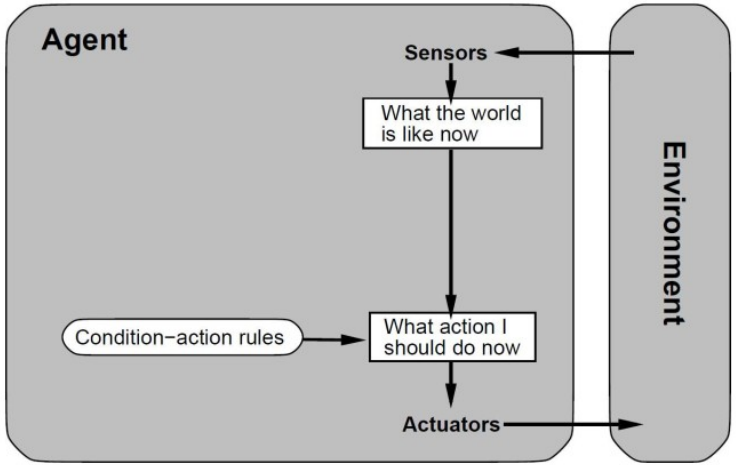
Agents: from theory to practice

```
class GhostAgent( Agent ):
    def __init__( self, index ):
        self.index = index

    def getAction( self, state ):
        dist = self.getDistribution(state)
        if len(dist) == 0:
            return Directions.STOP
        else:
            return util.chooseFromDistribution( dist )

    def getDistribution(self, state):
        "Returns a Counter encoding a distribution over actions from the provided state."
        util.raiseNotDefined()
```

Simple reflex agents



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Agents: from theory to practice

```
class GhostAgent( Agent ):
    def __init__( self, index ):
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    def getAction( self, state ):
        dist = self.getDistribution(state)
        if len(dist) == 0:
            return Directions.STOP
        else:
            return util.chooseFromDistribution( dist )

    def getDistribution(self, state):
        "Returns a Counter encoding a distribution over actions from the provided state."
        util.raiseNotDefined()

class RandomGhost( GhostAgent ):
    "A ghost that chooses a legal action uniformly at random."
    def getDistribution( self, state ):
        dist = util.Counter()
        for a in state.getLegalActions( self.index ): dist[a] = 1.0
        dist.normalize()
        return dist
```
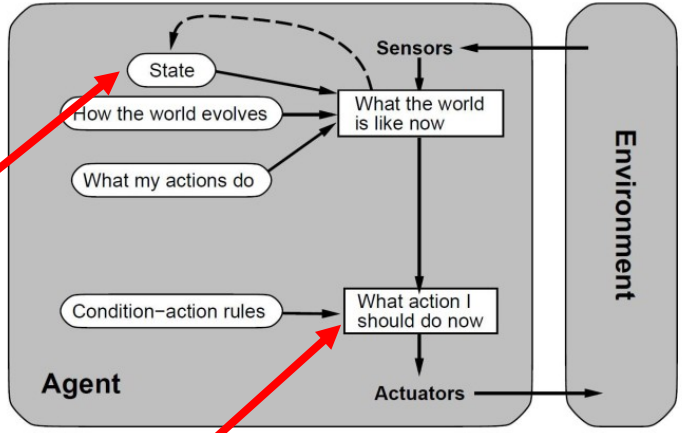

Reflex agents with state



Today's schedule

- Starting to use Python

  File: Python_basics.ipynb
- Agents and environments in Pacman world

  File: search.zip
- State-Space Search with Pacman

  File: search.zip
- Multi-Agent Search with Pacman

  File:multiagents.zip

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Extra material

- Keras + Tensorflow (last practical session on neural networks)
  - https://keras.io/

- Codingame
  - challenge-based/sandbox training platform to improve your coding skills
  - Examples:
    - Easy (simple reflex agent): https://www.codingame.com/training/easy/mars-lander-episode-1
    - Increasing difficulty (from simple reflex agent to goal-based to utility-based): https://www.codingame.com/multiplayer/bot-programming/coders-strike-back