Artificial Intelligence

COMP9414

Lecturers

- Dr. Francisco Cruz (LiC – Lecturer in Charge)
  - https://www.unsw.edu.au/staff/francisco-cruz-naranjo

- Dr. Armin Chitizadeh (Guest Lecturer in week 3)
  - https://www.unsw.edu.au/staff/armin-chitizadeh

Course admin

- Maryam Hashemi
  - https://maryamhashemi1995.github.io/index3.html

Tutors

- Siti Mariyah, s.mariyah@unsw.edu.au
- Malhar Patel, malhar.patel@unsw.edu.au
- Stefano Mezza, s.mezza@unsw.edu.au
- Janhavi Jain, j.jain@student.unsw.edu.au
- Adam Stucci, a.stucci@unsw.edu.au
- Jingying Gao, jingying.gao@unsw.edu.au
- Zahra Donyavi, z.donyavi@unsw.edu.au
- Shengyuan Xie, shengyuan.xie@student.unsw.edu.au
- Lina Phaijit, l.phaijit@unsw.edu.au
- Raktim Kumar Mondol, r.mondol@unsw.edu.au
- Aayush Gupta, aayush.gupta@unsw.edu.au
- Kiran Jeet Kaur, kiran_jeet.kaur@student.unsw.edu.au
- Maher Mesto, m.mesto@unswalumni.com
- Zhijin Meng, zhijin.meng@student.unsw.edu.au
- Ramya Kumar, ramya.kumar1@student.unsw.edu.au

- Session will be BYOD. Alternatively, you can borrow a laptop. See https://taggi.cse.unsw.edu.au/FAQ/Borrow_A_Laptop/

Artificial Intelligence (AI)

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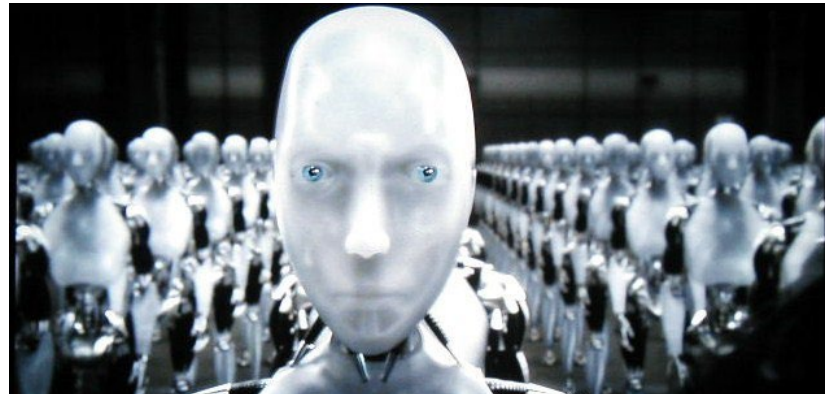- Can you give some examples?

AI is not ML is not ANN
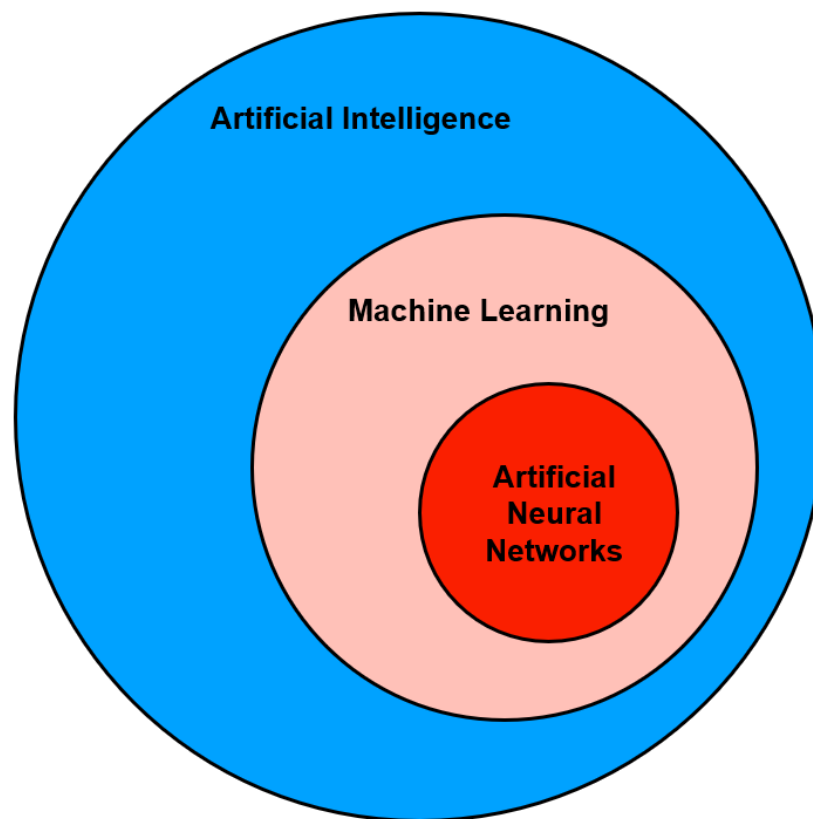
AI is not Python

Current (mis)understanding of AI

How are currently perceived AI-based systems?

Current (mis)understanding of AI

But in reality, it's still an open problem

Course Plan

- Introduce AI concepts through intelligent agents
- Start with very simple reactive agents
- Progress by adding more capabilities
- End with agents that learn, reason and communicate

Learning Agent

Communicating Agents

Planning Agents

Model-Based Agents

Reactive Agents
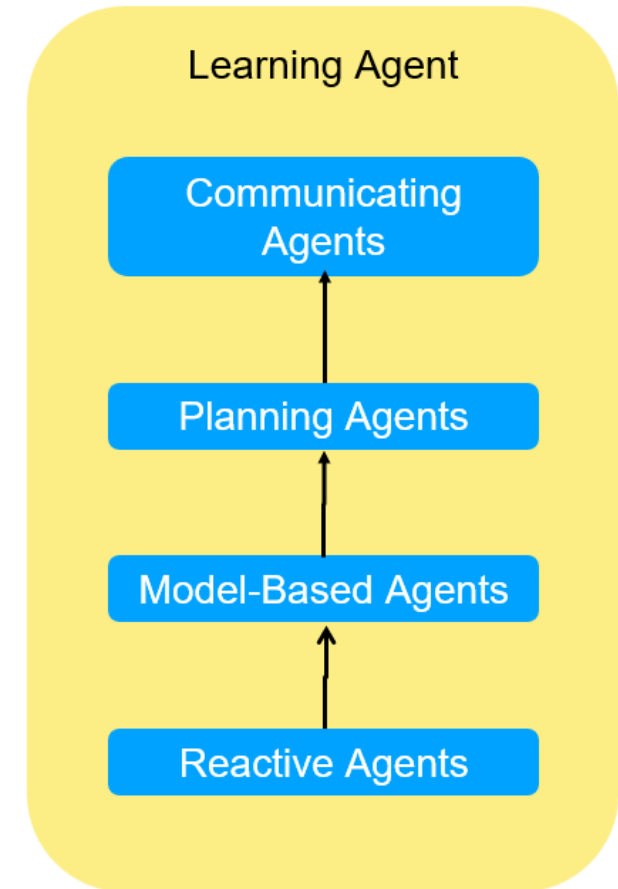
Course Plan

Week 1
1 Introduction
1.1 History of AI
1.2 Agents
1.3 Knowledge representation
1.3.1 Feature-based vs iconic representations
1.3.2 Logic
1.3.3 Learning rules

Week 2
2 Neural Networks
2.1 Neurons - biological and artificial
2.2 Single-layer perceptron
2.3 Linear separability
2.4 Multi-layer networks
2.5 Backpropagation
2.6 Neural engineering methodology

Week 3
3 Search
3.1 Uninformed search
3.2 Informed search
3.3 Informed vs uninformed

Week 4
4 Rewards instead of goals
4.1 Elements of reinforcement learning
4.2 Exploration vs exploitation
4.3 The agent-environment interface
4.4 Values functions
4.5 Temporal-difference prediction

Week 5
5 Metaheuristics
5.1 Asymptotic complexity
5.2 Classes of problems
5.3 Linear programming
5.4 Search space
5.5 Metaheuristics with and without memory
5.6 Population-based methods

Week 6
Recap and consultation

Week 7
7 Computer vision
7.1 Image processing
7.2 Scene analysis
7.3 Cognitive vision

Week 8
8 Language processing
8.1 Formal languages
8.1.1 Chomsky's hierarchy
8.1.2 Grammars
8.2 Regular expressions
8.3. Minimum edit distance and words
8.4 Natural languages: N-gram models

Week 9
9 Reasoning with uncertain information
9.1 Confidence factors
9.1 Probability and probabilistic inference
9.2 Bayes nets
9.3 Fuzzy logic

Week 10
10 Human-aligned intelligent robotics
10.1 Human interaction and human-in-the-loop robot learning
10.2 Explainability and interpretability
10.3 Safe robot exploration
10.4 Ethics

Related Course

- COMP3431 Robot Software Architectures
- COMP4418 Knowledge Representation and Reasoning
- COMP9417 Machine Learning and Data Mining
- COMP9444 Neural Networks and Deep Learning
- COMP9491 Applied Artificial Intelligence
- COMP9517 Computer Vision
- COMP6713 Natural Language Processing
- COMP9418 Advance Machine Learning

Timetable

- Lecture:
  - Mon 4:00 – 7:00pm
  (E19 Patricia O'Shane 109)

- Consultation time:
  - Thu 1:00 – 2:00pm
  (J17 Lv 5 Rm 510J)

- Tutorials:

Nr.	Class	Section	Room	Day/Time	Name	Status
1	4210	F12A	Colombo LG01 (K-B16-LG01)	Fri 12:00 - 14:00 (Weeks:1-10)	Siti Mariyah	Confirmed
2	4211	F12B	Goldstein G01 (K-D16-G01)	Fri 12:00 - 14:00 (Weeks:1-10)	Malhar Patel	Confirmed
3	4212	F14A	Webster 302 (K-G14-302)	Fri 14:00 - 16:00 (Weeks:1-10)	Stefano Mezza	Confirmed
4	4213	F14B	Quadrangle G046 (K-E15-G046)	Fri 14:00 - 16:00 (Weeks:1-10)	Janhavi Jain	Confirmed
5	4214	F14C	Goldstein G01 (K-D16-G01)	Fri 14:00 - 16:00 (Weeks:1-10)	Adam Stucci	Confirmed
6	4215	F16A	Quadrangle G046 (K-E15-G046)	Fri 16:00 - 18:00 (Weeks:1-10)	Janhavi Jain	Confirmed
7	4216	F18A	Online (ONLINE)	Fri 18:00 - 20:00 (Weeks:1-10)	Jingying Gao	Confirmed
8	4217	H14A	Quadrangle G032 (K-E15-G032)	Thu 14:00 - 16:00 (Weeks:1-10)	Shengyuan Xie	Confirmed
9	4218	H14B	Webster 256 (K-G14-256)	Thu 14:00 - 16:00 (Weeks:1-10)	Adam Stucci	Confirmed
10	4219	H14C	Quadrangle G031 (K-E15-G031)	Thu 14:00 - 16:00 (Weeks:1-10)	Malhar Patel	Confirmed
11	4220	H16A	Blockhouse G6 (K-G6-G6)	Thu 16:00 - 18:00 (Weeks:1-10)	Siti Mariyah	Confirmed
12	4221	H18A	Law Building 163 (K-F8-163)	Thu 18:00 - 20:00 (Weeks:1-10)	Jingying Gao	Confirmed
13	4223	T09A	Quadrangle G047 (K-E15-G047)	Tue 09:00 - 11:00 (Weeks:1-10)	Zahra Donyavi	Confirmed
14	4224	T12A	Colombo LG01 (K-B16-LG01)	Tue 12:00 - 14:00 (Weeks:1-10)	Lina Phaijit	Confirmed
15	4225	T12B	Old Main Building 229 (K-K15-22!	Tue 12:00 - 14:00 (Weeks:1-10)	Raktim Kumar Mondol	Confirmed
16	4226	T12C	Webster 302 (K-G14-302)	Tue 12:00 - 14:00 (Weeks:1-10)	Stefano Mezza	Confirmed
17	4227	T16A	Quadrangle G044 (K-E15-G044)	Tue 16:00 - 18:00 (Weeks:1-10)	Shengyuan Xie	Confirmed
18	4228	T16B	Quadrangle G045 (K-E15-G045)	Tue 16:00 - 18:00 (Weeks:1-10)	Zahra Donyavi	Confirmed
19	4229	T16C	Quadrangle G031 (K-E15-G031)	Tue 16:00 - 18:00 (Weeks:1-10)	Raktim Kumar Mondol	Confirmed
20	4230	T16D	Quadrangle G032 (K-E15-G032)	Tue 16:00 - 18:00 (Weeks:1-10)	Aayush Gupta	Confirmed
21	4231	T18A	Webster 302 (K-G14-302)	Tue 18:00 - 20:00 (Weeks:1-10)	Aayush Gupta	Confirmed
22	4232	W09A	Goldstein G02 (K-D16-G02)	Wed 09:00 - 11:00 (Weeks:1-10)	Kiran Jeet Kaur	Confirmed
23	4233	W13A	Online (ONLINE)	Wed 13:00 - 15:00 (Weeks:1-10)	Maher Mesto	Confirmed
24	4234	W13B	Quadrangle G032 (K-E15-G032)	Wed 13:00 - 15:00 (Weeks:1-10)	Kiran Jeet Kaur	Confirmed
25	12564	W12A	Online (ONLINE)	Wed 12:00 - 14:00 (Weeks:1-10)	Lina Phaijit	Confirmed
26	12565	T16E	Online (ONLINE)	Tue 16:00 - 18:00 (Weeks:1-10)	Zhijin Meng	Confirmed
27	12696	H18B	Mathews 106 (K-F23-106)	Thu 18:00 - 20:00 (Weeks:1-10)	Ramya Kumar	Confirmed
28	12695	T18B	Ainsworth 101 (K-J17-101)	Tue 18:00 - 20:00 (Weeks:1-10)	Maher Mesto	Confirmed
29	12693	W18A	Ainsworth 201 (K-J17-201)	Wed 18:00 - 20:00 (Weeks:1-10)	Zhijin Meng	Confirmed
30	12694	W18B	Mathews 108 (K-F23-108)	Wed 18:00 - 20:00 (Weeks:1-10)	Ramya Kumar	Confirmed

Important dates

- **First lecture:** Monday 27th May 2024
- **Last lecture:** Monday 29th July 2024
- **Guest lecture:** Friday 7th June 2024, 9am-12pm (online)
- **Assignment 1 open:** Week 2
- **Assignment 1 deadline:** Week 5 (discussion in week 6)
- **Assignment 2 open:** Week 6
- **Assignment 2 deadline:** Week 9 (discussion in week 10)
- **Exam:** Exams period

Assessment

- Assessment will consist of:
  - Assignment 1: 25%.
  - Assignment 2: 25%.
  - Final exam 50%.
- To pass, you must score:
  - A combined mark of at least 50/100.
  - At least 20/50 for the exam.

Student Conduct

- Assignments will be done individually.
  - Students must participate in the discussion.
- Late deliveries will be accepted subject to 5% discount per day from the results (including weekends and public holidays), for up to 5 days, after which mark is 0.
- It's students' responsibility to have code discussions with tutors in time.
- Plagiarism is academic misconduct.

Contact

- The first contact should be the forums.

- Additionally, a consultation time is scheduled every week.

- In special circumstances you could also email to the lecturing team (cs9414@cse.unsw.edu.au)

Texts & References

- Poole, D.L. & Mackworth, A. Artificial Intelligence: Foundations of Computational Agents. Second Edition. Cambridge University Press, Cambridge, 2017.

- Russell, S.J. & Norvig, P. Artificial Intelligence: A Modern Approach. Fourth Edition, Pearson Education, Hoboken, NJ, 2021.

- Sutton, R. & Barto, A. Reinforcement Learning: An Introduction. MIT press. 2018.

- Jurafsky, D. & Martin, J. H. Speech and Language Processing. Stanford. 2023.

Feedback

- In case you want to provide anonymous feedback on these lectures, please visit:

- https://forms.gle/KBkN744QuffuAZLF8

AI Lecture Feedback

This is a short form to provide early feedback for lectures

franciscocruzhh@gmail.com Switch account

Not shared

* Indicates required question

In case you want a reply, provide your zID. Otherwise your answer is anonymous.

Your answer

how did you participate? *

○ In the classroom

○ Watch the class from automatic recording

If you have any comments, feedback, or question about the lectures, this is the place.   *

Your answer

Submit   Clear form