EDAF70: Applied Artificial Intelligence
or
TAI: Tillämpad Artificiell Intelligens

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January 23rd, 2019

Plan for today

- Administrative stuff
- Brief intro (AIMA Chapter 1)
- Agents (AIMA Chapter2)

What is (Artificial) Intelligence?

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What is Intelligence?

- adaptivity

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What is Intelligence?

- adaptivity
- learning

What is (Artificial) Intelligence?

What is Intelligence?

- adaptivity
- learning
- problem solving capability

What is (Artificial) Intelligence?

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- creativity

What is (Artificial) Intelligence?

What is Intelligence?

- adaptivity
- learning
- problem solving capability
- creativity
- logical reasoning

What is (Artificial) Intelligence?

What is Intelligence?

- adaptivity
- learning
- problem solving capability
- creativity
- logical reasoning
- ...

Can it be compared? Measured?

What is Artificial Intelligence?

Artificial intelligence (AI) is the intelligence of machines and the branch of computer science that aims to create it.

Textbooks define the field as "the study and design of intelligent agents," where an **intelligent agent** is a system that **perceives** its environment and takes **actions** that maximize its chances of success.

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Late John McCarthy, who coined the term in 1956, defines it as *"the* **science** *and* **engineering** *of making intelligent machines."* (Wikipedia)

In 2005:

Automated agent traders account for over 50% of portfolio trades by value most weeks on the New York Stock Exchange and, in some weeks, as much as 70% of portfolio trades.

Problems: "2010 flash crash"

In 2011:

Cleverbot: `https://www.youtube.com/watch?v=WnzlbyTZsQY`

In 2018:

Google Duplex: `https://www.youtube.com/watch?v=D5VN56jQMWM`

A couple of agents more ...

- IBM Watson;
  `https://www.youtube.com/watch?v=Sp4q60BsHoY`
- Ishiguro's Geminoid;
  `https://www.youtube.com/watch?v=KPl28gCxcno`
- Google car; `https://www.youtube.com/watch?v=MqUbdd7ae54`
- Boston Dynamics Atlas.
  `https://www.youtube.com/watch?v=fRj34o4hN4I`

But...

"What is the only former Yugoslav republic in the European Union?" (2012)

2880 POWER7 cores, 16 Terabytes memory, 4 Terabytes clustered storage (i.e., IBM Watson) still could not answer this question!

Winograd Schemas

Joan made sure to thank Susan for all the help she had given.
Who had given the help?
- Susan
- Joan

Joan made sure to thank Susan for all the help she had **received**.
Who had **received** the help?
- Susan
- Joan

Winograd Schemas

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Who had given the help?
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More Winograd Schemas

The trophy would not fit in the brown suitcase because it was too small.
What was too small?
- the trophy
- the brown suitcase

More Winograd Schemas

The trophy would not fit in the brown suitcase because it was too small.
What was too small?

- the trophy
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The town councillors refused to give the angry demonstrators a permit because they feared violence.
Who feared violence?

- the town councillors
- the angry demonstrators

Subdomains of Artificial Intelligence

- Search, Problem solving
- Reasoning, Logical reasoning, Probabilistic reasoning
- **Machine Learning**
- Natural Language Processing
- Perception, Computer Vision
- Autonomous Robots
- Knowledge Processing
- ...

State of the art

- Human-level AI back on the agenda
- 1997: Deep Blue defeats Kasparov
- Robbins conjecture (mathematics) proven after decades of human attempts
- Autonomous driving, flying, sailing, ...
- Logistics for Gulf, Iraq and Afghanistan
- Warfare for Iraq and Afghanistan
- 2011: Siri; Watson defeats humans in Jeopardy
- Medical diagnoses and treatment
- 2016: Alpha Go defeats Lee Sedol
- 2017: Deep Stack defeats professionals in Heads-up no-limit Texas hold'em poker; AlphaGo Zero defeats AlphaGo

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What's in the course
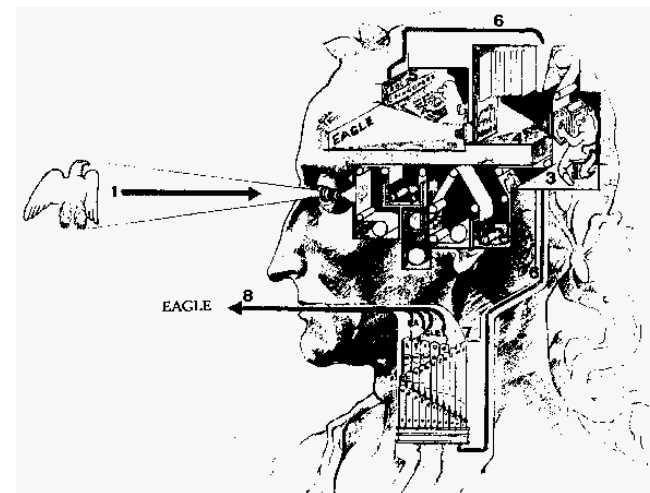
NEW! What's also in the course

Ethics

- enhancements of our capacities (bodies, minds)
  - do we want that?
  - can we afford not having that?
- elderly care, rehabilitation, medicine
  vs. war-fighting, sex, socializing
- emotional artificial partners
- large finances come from military sources (e.g., DARPA)
  - defensive
  - preventive attacks
  - robots that kill

Do we have the **right** to create robot servants?

About the course

- EDAF70: Applied artificial intelligence
- `http://cs.lth.se/edaf70`
- Serves as an announcement board as well!
- Meaning I expect you to read it often!!!
- Teachers: Pierre Nugues, Elin Anna Topp, Stefan Larsson, Jacek Malec
- Administrator: Ulrika Templing

Contents

- 7,5 hp (ECTS)
- Lectures (15), normally Wednesdays, 13–15 in MA:5 and Fridays, 13–15, in E:A, last one Monday 13–15 in E:A
- Three programming assignments
- Home reading (textbook)
- S. Russell, P. Norvig, Artificial Intelligence, a Modern Approach, 3rd int. ed., Prentice Hall

Evaluation

- Exam: worth 4,5p out of 7,5p. Material pointed to in the "reading advice" section.
- Programming assignments: worth 3p. Important: both correctness **and presentation** count.
- Complexity level of programming assignments may vary, although we strive for even division of labour;

but

- We need your feedback ...
- Kursombud (course representatives) need to be chosen

Programming assignments

1. Search
2. Machine Learning (tentative list)
   1. Decision Trees
   2. Logistic Regression
3. Probabilistic reasoning

Programming assignment submission

- The submission is to be sent to `tai@cs.lth.se` in the format described on the course web.
- This address works for **assignment submissions only!**. May or may not work for other things, so mail me (or any of the other teachers) **directly** for other purposes.
- All assignments are to be handed in electronically (as pdf documents), **on time!**

End of the admin stuff

Questions? Comments?

Please elect a course representative. Thank you.