

# Applied AI

Lecture 1

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# IIT Lecture Panel

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# Agenda

- Introduction
- Assessment
- Resources
- Lectures
- Seminars
- History, developments, issues
- Next steps

# What is AI?

- Come up with your own definition before the lecture.
- We will fill in a definition after we discuss this in the lecture.

Definition:

# Introduction

Aims: To give the student the background knowledge and practical skills to use and evaluate AI techniques over a range of problem domains.

- Understand the fundamental concepts, issues, and techniques of AI.
- Implement and use AI techniques across a broad range of AI sub-fields.
- Evaluate when and under what conditions it is appropriate to use each AI technique.
- Understand the historical background and evolution of AI techniques.
- Each week an essential technique will be demonstrated via a working implementation followed by a presentation of the theory and conditions needed to enable the student to set up and use the techniques themselves. Guest presentations by experts in a relevant topic will be arranged where possible.

# Assessment

Session	Period	Assessment Type	Assessment Name	Weight	Qual Mark	Due Date
2021/2	SEM1	Coursework	Coursework	50	30	Wed, 12 <sup>th</sup> Jan 12-01-2022
2021/2	SEM1	In-Class Test/Assignment exam conditions	In-Class Test	50	30	Week 12 In your seminar (must attend in person or seek MC)

# Resources

- Your main resource will be the book Artificial Intelligence: A Modern Approach, Russel and Norvig
  - Access via the Reading List on Blackboard
- Sample code in many languages and available on the book website:
- <https://github.com/aimacode>
- The web (obviously)
- Guest lecturers

# Lecture schedule

1. Introduction and History of AI
2. Agents and Environments
3. Problem Solving
4. Planning
5. Knowledge representation and reasoning
6. Engagement week
7. Uncertain Knowledge and Reasoning
8. Neural Networks
9. Speech and Language Processing (Dr Maria Chondrogianni)
10. Computer Vision/Deep Learning (Dr Aleka Psarrou)
11. Reinforcement Learning/Deep Learning (Dr Dimitris Dracopoulos)
12. Revision session

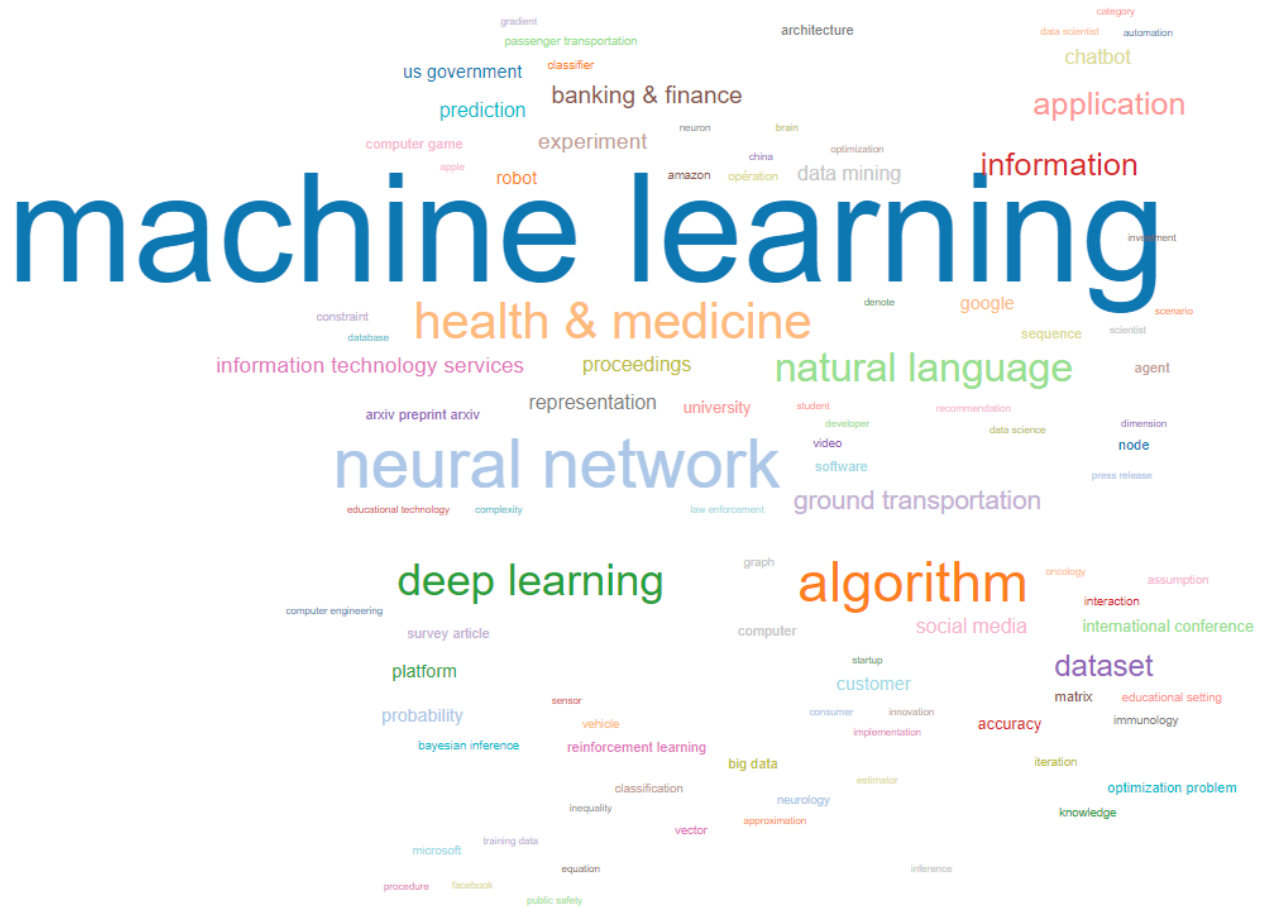


# Seminar/tutorial schedule

1. **No Seminar – Seminar Exercises will be released every Friday.**
2. Python, Jupyter and development environment.
3. Search Algorithms in Agent Environment
4. Planning – Adversarial search
5. Knowledge representation and reasoning
6. **Engagement week – No seminar/tutorial**
7. Probabilistic Reasoning
8. Neural Networks
9. Speech and Language Processing (Dr Maria Chondrogianni)
10. Computer Vision/Deep Learning (Dr Aleka Psarrou)
11. Reinforcement Learning/Deep Learning (Dr Dimitris Dracopoulos)
12. **In-class test in your allocated seminar.**

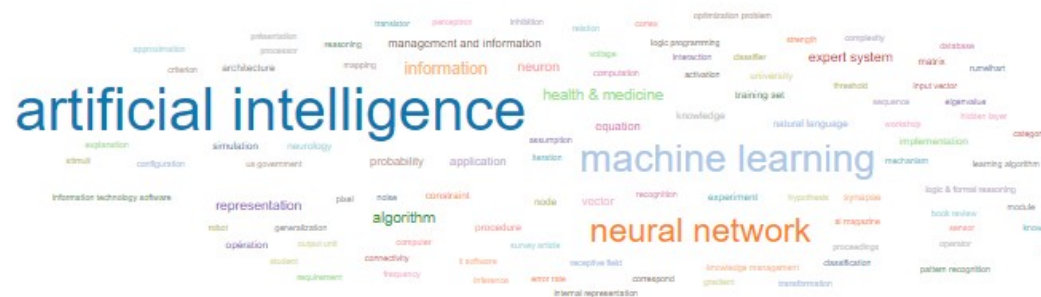
# AI Topics

<https://aitopics.org/search#>

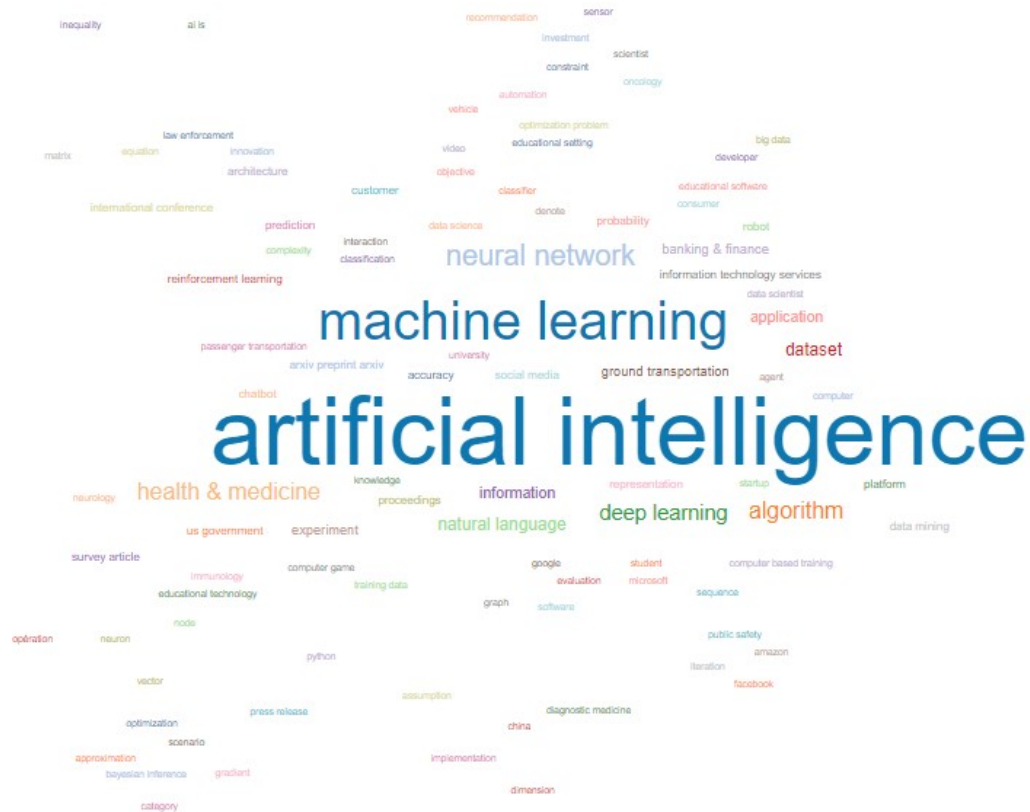


# AI - Then and Now

## 1986-1990 vs 2017-2021

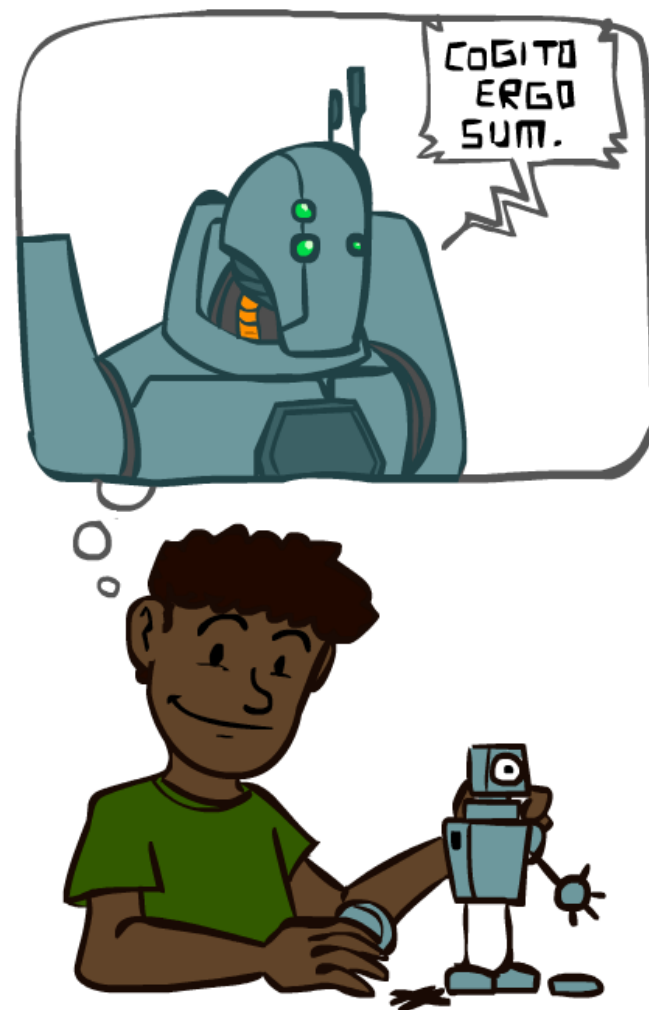


What are the main differences?  
Explore other periods on your own.



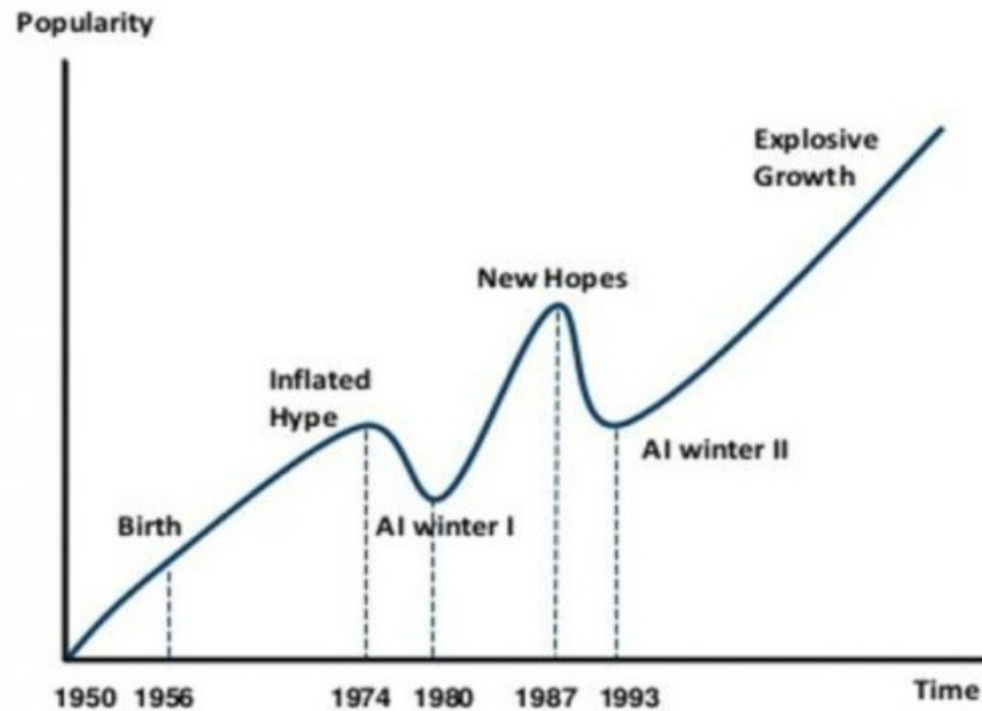
# A (Short) History of AI

- 1940—1950: Early days
  - 1943: McCulloch & Pitts: Boolean circuit model of brain
  - 1950: Turing's "Computing Machinery and Intelligence"
- 1950—70: Excitement: Look, Ma, no hands!
  - 1950s: Early AI programs, including Samuel's checkers program, Newell & Simon's Logic Theorist, Gelernter's Geometry Engine
  - 1956: Dartmouth meeting: "Artificial Intelligence" adopted
  - 1965: Robinson's complete algorithm for logical reasoning
- 1970—90: Knowledge-based approaches
  - 1969—79: Early development of knowledge-based systems
  - 1980—88: Expert systems industry booms
  - 1988—93: Expert systems industry busts: "AI Winter"
- 1990—2012: Statistical approaches + subfield expertise
  - Resurgence of probability, focus on uncertainty
  - General increase in technical depth
  - Agents and learning systems... "AI Spring"?
- 2012—: Excitement: Look, Ma, no hands!
  - Big data, big compute, neural networks
  - Some re-unification of subfields
  - AI used in many industries



# AI Promises

AI HAS A LONG HISTORY OF BEING “THE NEXT BIG THING” ...



## Timeline of AI Development

- **1950s-1960s:** First AI boom - the age of reasoning, prototype AI developed
- **1970s:** AI winter I
- **1980s-1990s:** Second AI boom: the age of Knowledge representation (appearance of expert systems capable of reproducing human decision-making)
- **1990s:** AI winter II
- **1997:** Deep Blue beats Gary Kasparov
- **2006:** University of Toronto develops Deep Learning
- **2011:** IBM's Watson won Jeopardy
- **2016:** Go software based on Deep Learning beats world's champions


# Golden Age or another AI Winter?

- <https://venturebeat.com/2019/11/16/is-ai-in-a-golden-age-or-on-the-verge-of-a-new-winter/>
- Lots of hype but also something is different (non toy-domain results)
- Some of the success can be attributed to advancement of computational capability and availability of 'big data'
- AI is always the next big thing, hence never attainable. Should we call it Computational Intelligence to tone down the hype?
- Money and marketing vs Scientific reality. Gartner predicts 16Trillion industry by 2030!



# Recent developments

Please say that again



## OpenAI Codex

Developers can now join the waitlist to access OpenAI Codex,  
our AI system that translates natural language into code.

[LEARN MORE ABOUT CODEX >](#) [JOIN THE WAITLIST >](#)





Photo: Google / Getty Images

# Issues and concerns with AI

- During last semester's Engagement Week we discussed issues and concerns surrounding AI. Some suggestions were:
- Ethical/Legal implications – if AI is mainstream who is responsible?
- What happens if/when we reach the **singularity** – many have weighed in on this topic including – Hawking, Musk, Kurzweil etc
- Can AI achieve Consciousness? Is General AI even possible? Mind transfer?
- Inherent bias in data? AI favours men for jobs due to historic training data
- Can you think of others?

# Advantages and benefits of AI

- Higher intelligence brings greater insight and understanding. Did AlphaGo destroy the game of Go?
- AI/Robots can do jobs that humans cannot. Greater efficiency 24x7, productivity and hence quality of life.
- Autonomous wars – no/less humans involved?

# Tutorial (Seminar)

- No onsite tutorial this week but you can do some home study.
- Find your favourite example of AI, one from fiction and one from real life. For example, HAL9000 from the movie 2001 A space Odyssey, and Alpha Zero (Go implementation)
- Familiarise yourself with the book.
  - Read chapter 1. Introduction.
- Revise your python knowledge from first year.
- In next weeks seminar we will cover Python and work through the environment we will be using: Anaconda, jupyter notebook, how to install libraries.

# Questions Discussion?