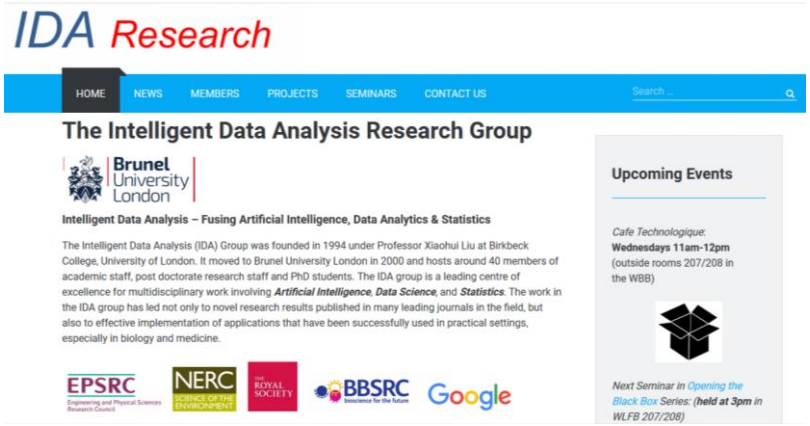
Artificial Intelligence:

Who Am I?

Allan Tucker: Reader in
Dept of Computer Science
Head of IDA Group:

- Founded in 1995 at University of London
- Focusses on AI models that work WITH experts and users
- Applications in Environment, Health, Engineering & Education
- Funded by many sources, nationally and internationally
- Website: *ida-research.net*

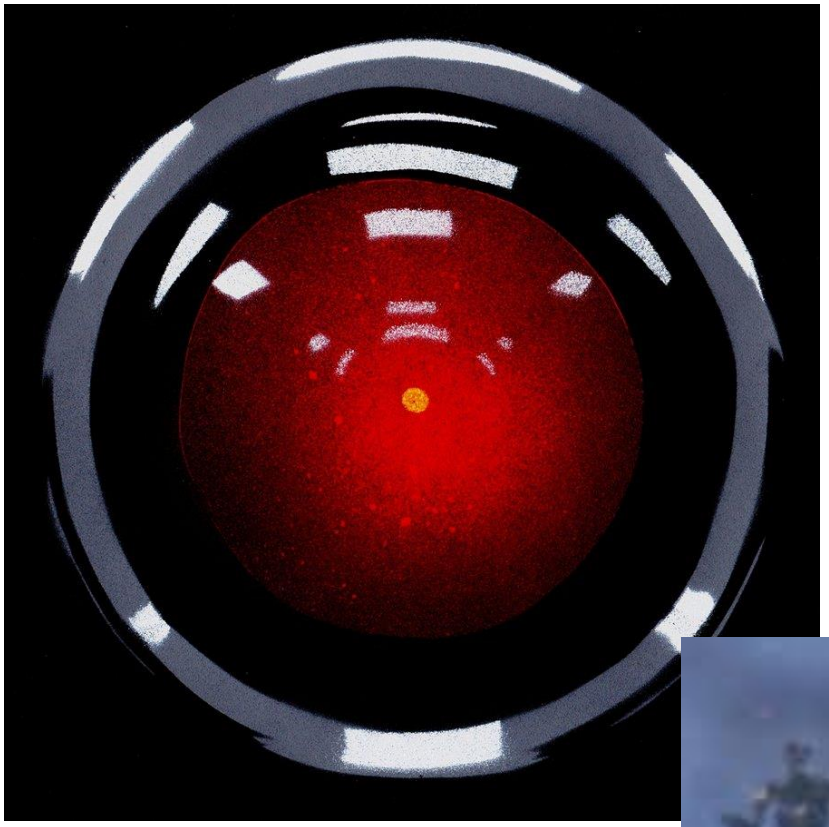


Artificial Intelligence:

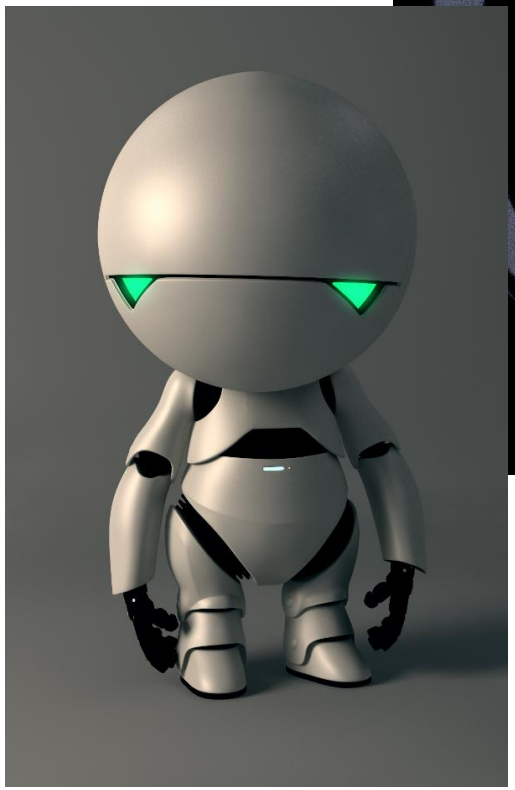
Introduction to AI

3rd Year Optional Module

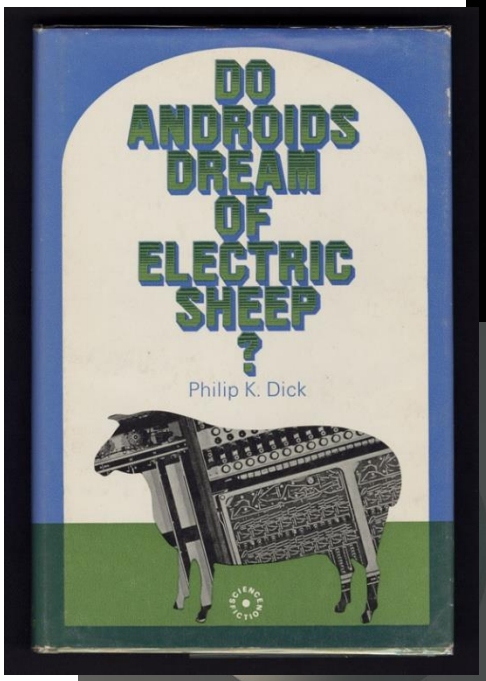
AI in Popular Culture

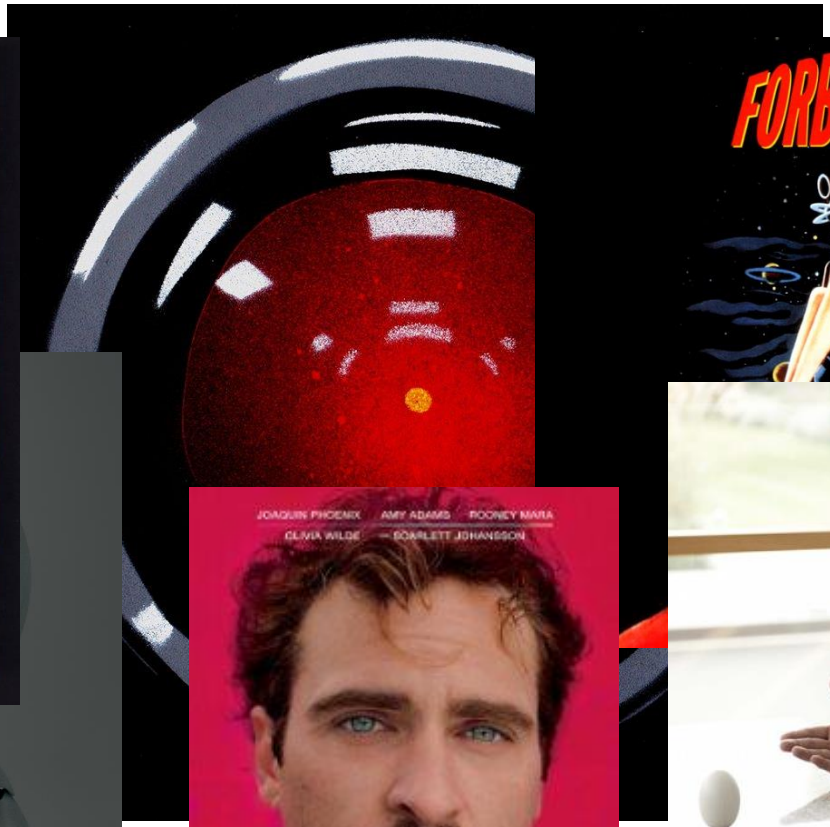


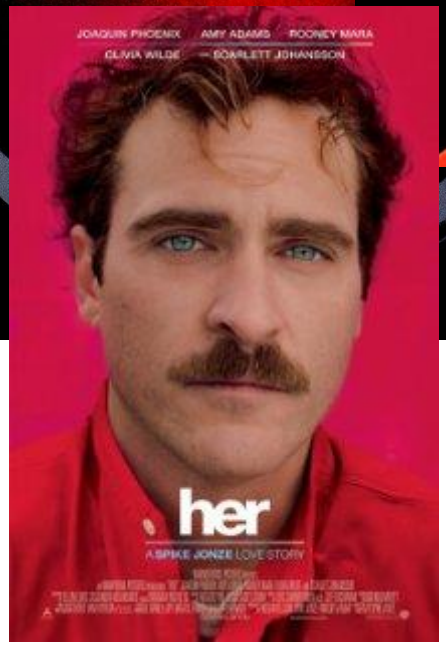
AI in Popular Culture



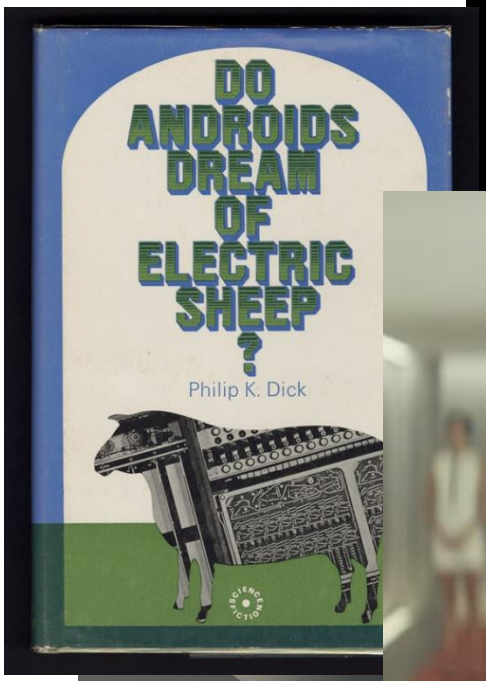
AI in Popular Culture

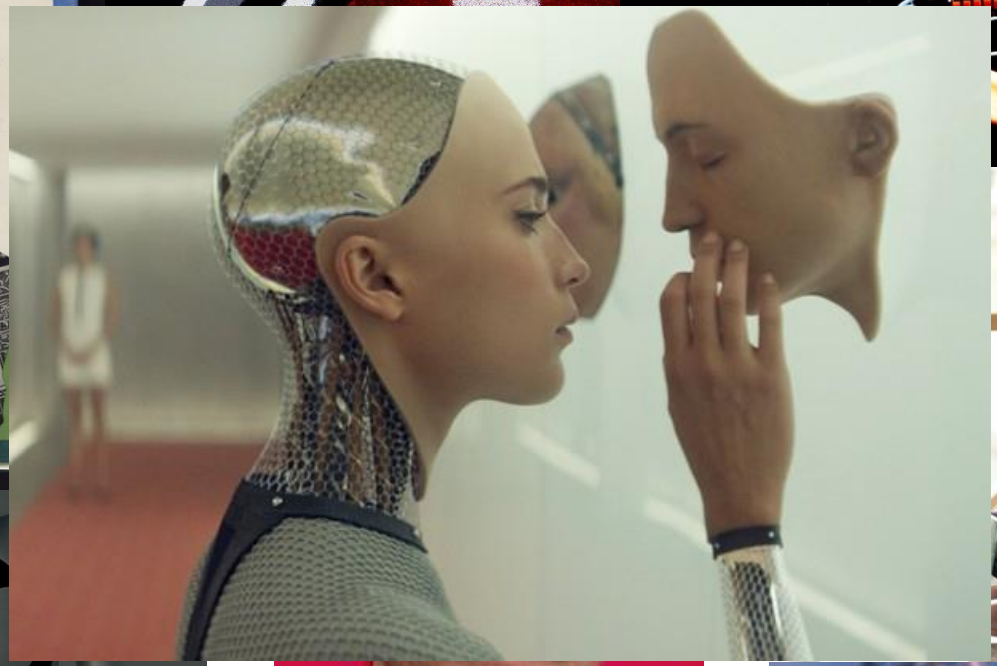


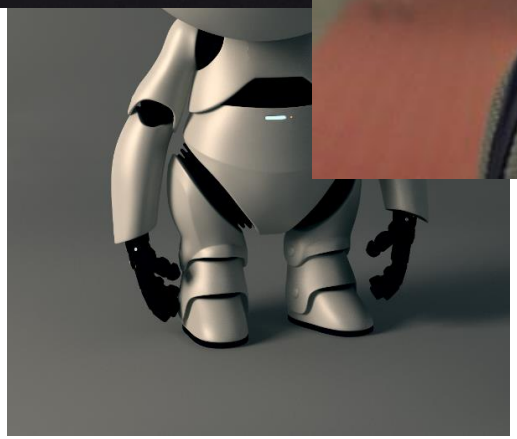




AI in Popular Culture

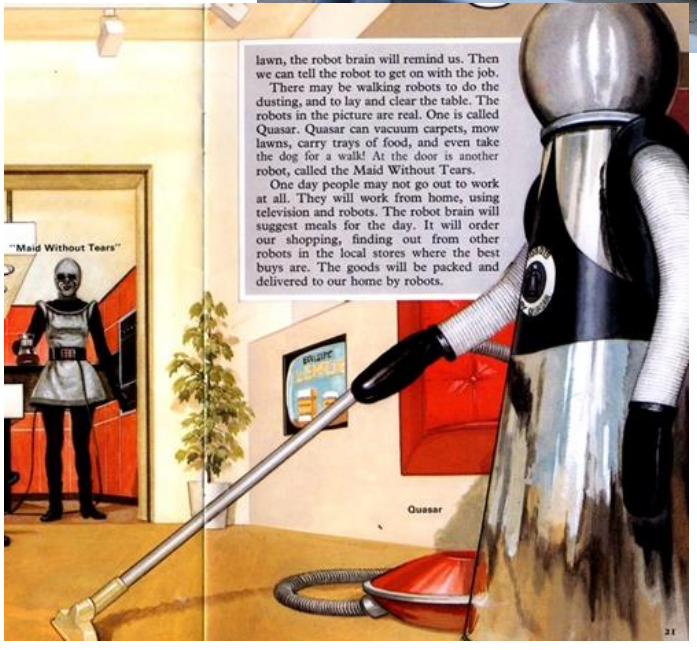






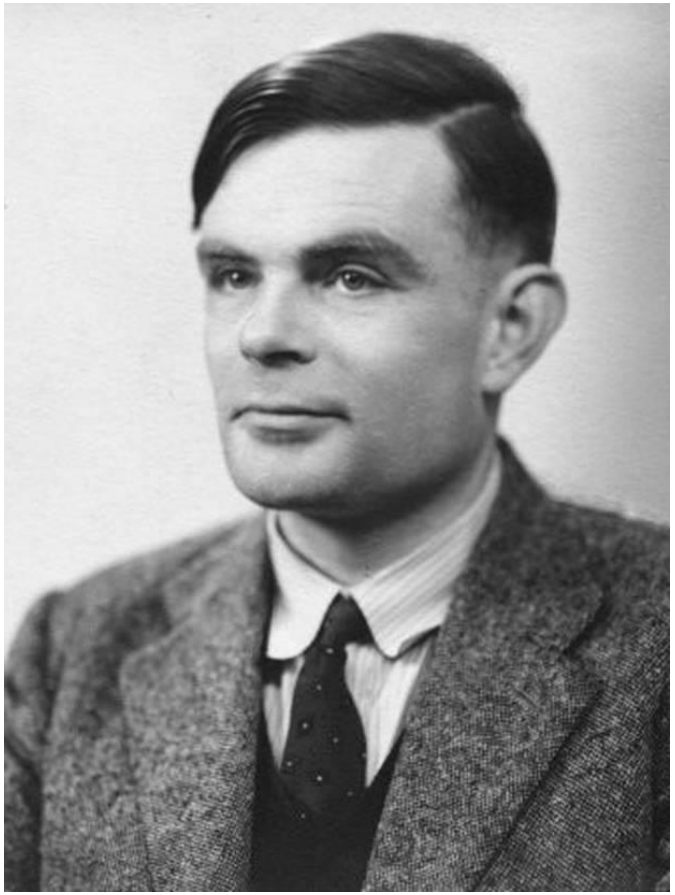
AI in Popular Culture

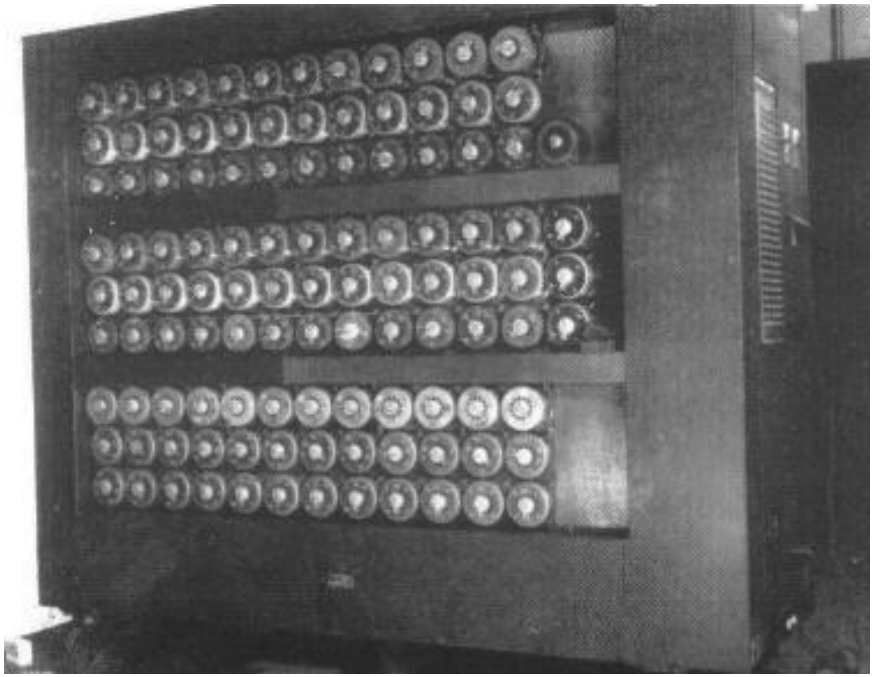
AI in Popular Culture



AI in Reality

Early Computers & Turing (1940s)





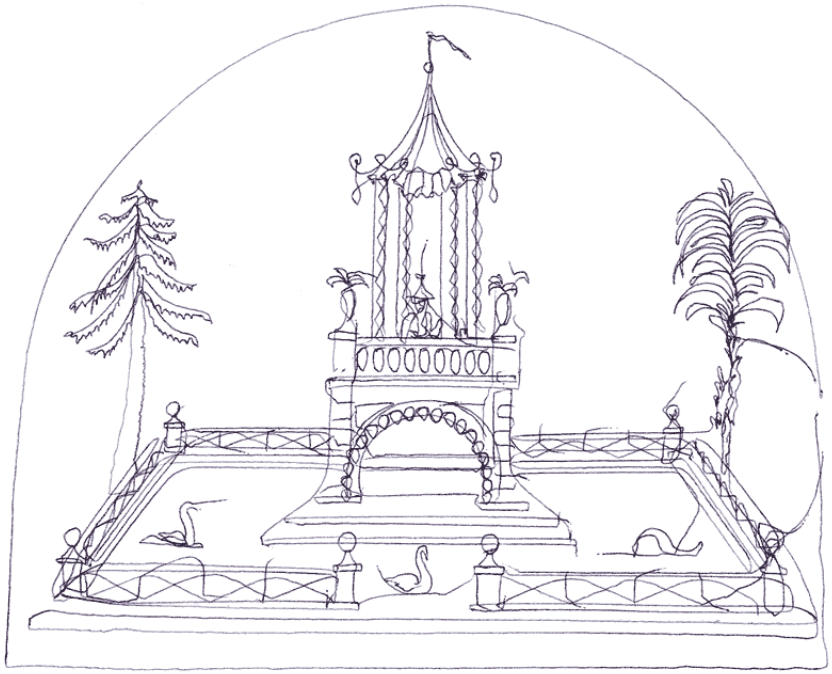
British Bombe (1 ton)

Clockwork & Automata (1700s-1800s)

Maillardet's Automaton - pre 1800

The Writer - 1775

Clockwork & Automata (1700s-1800s)



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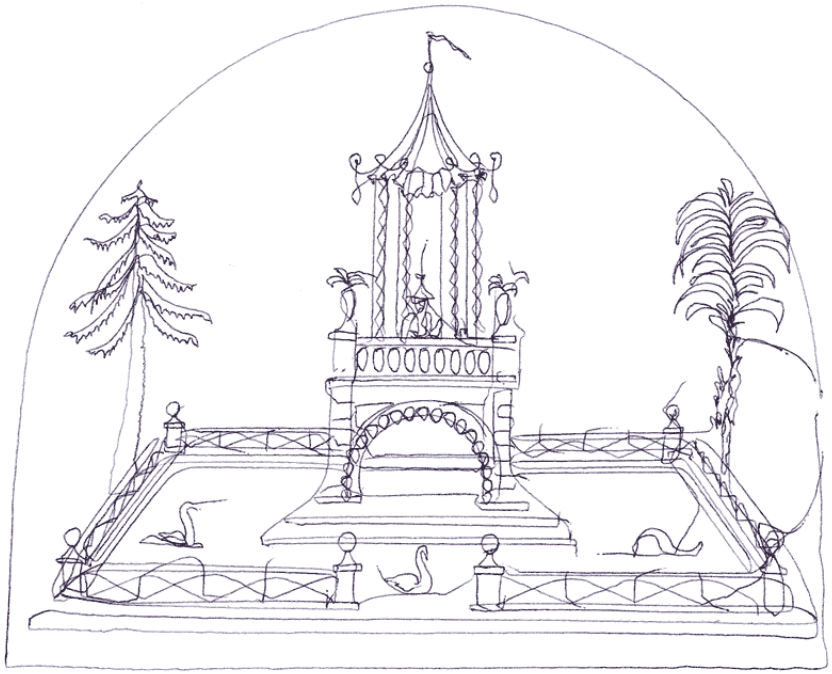
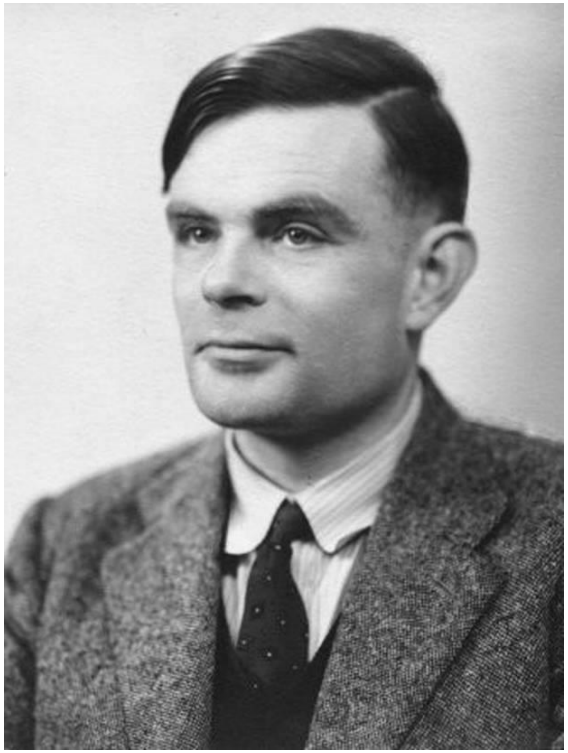
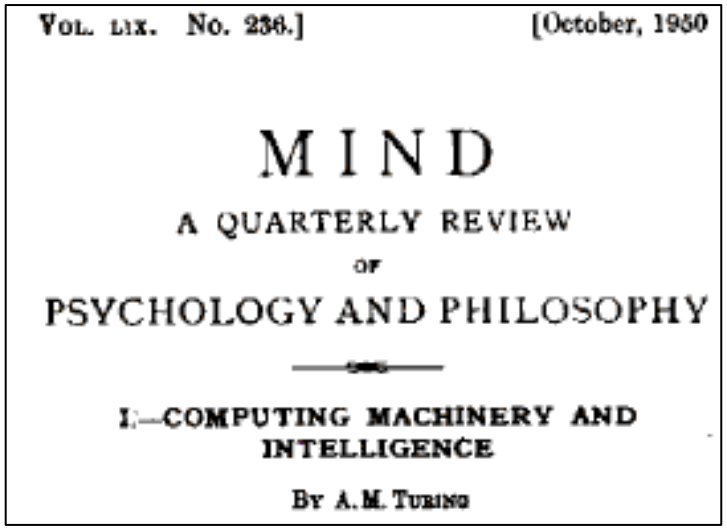


Maillardet's Automaton - pre 1800

Back to Turing





Vol. lix. No. 236.] [October, 1950

MIND

A QUARTERLY REVIEW

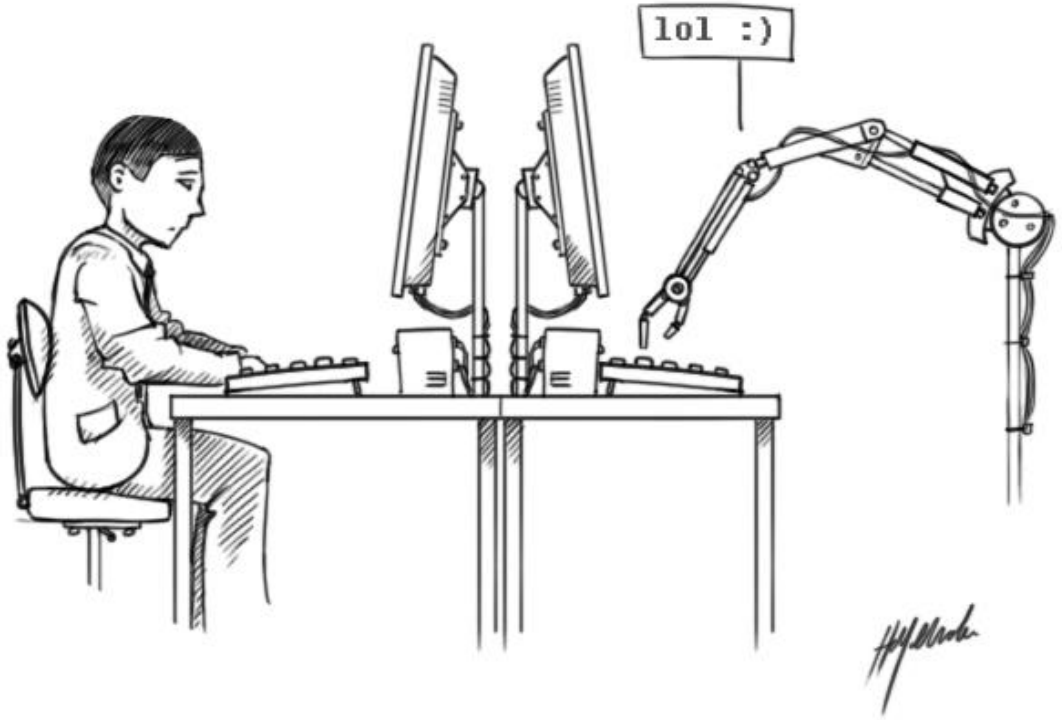
OF

PSYCHOLOGY AND PHILOSOPHY

I.—COMPUTING MACHINERY AND INTELLIGENCE

By A. M. Turing

Turing Test (1951)



- **a conversation between eliza and a young woman**
- **young woman:** Men are all alike.
- **eliza:** In what way?
- **young woman:** They're always bugging us about something specific or other.
- **eliza:** Can you think of a specific example?
- **young woman:** Well, my boyfriend made me come here.
- **eliza:** Your boyfriend made you come here?
- **young woman:** He says I'm depressed much of the time.
- **eliza:** I am sorry to hear you are depressed.
- **young woman:** It's true. I'm unhappy.
- **eliza:** Do you think coming here will help you not to be unhappy?
- **young woman:** I need some help, that much seems certain.
- **eliza:** What would it mean to you if you got some help?
- **young woman:** Perhaps I could learn to get along with my mother.
- **eliza:** Tell me more about your family.
- **young woman:** My mother takes care of me.
- **eliza:** Who else in your family takes care of you?
- **young woman:** My father.
- **eliza:** Your father.
- **young woman:** You are like my father in some ways.

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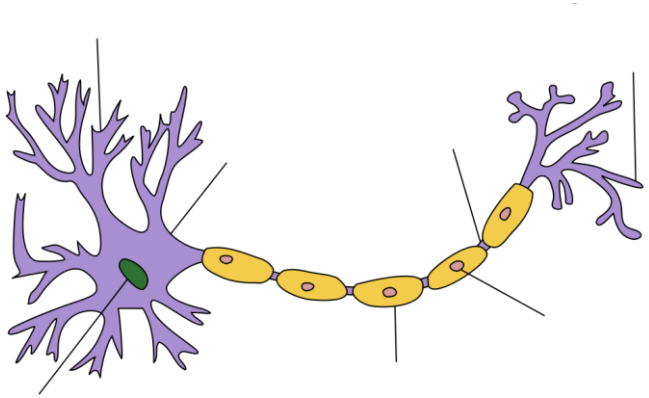
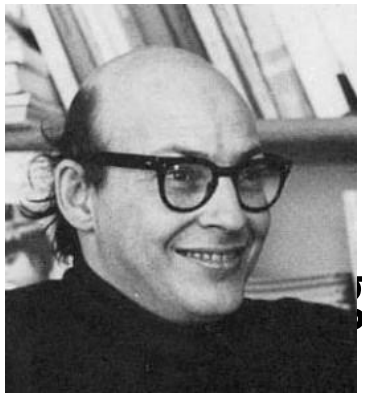
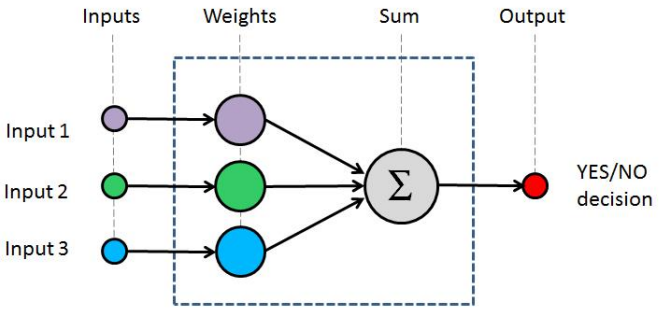
Early AI
Lots of Optimism
Promised the world?

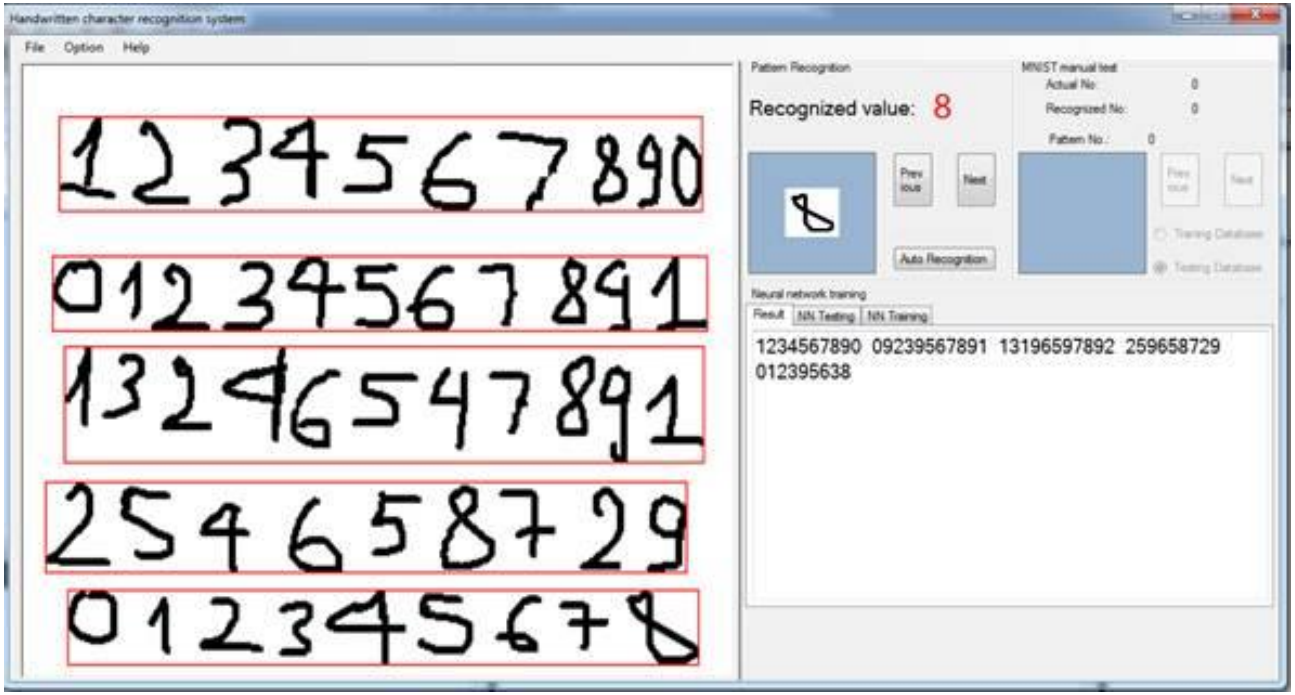






The “Perceptron” – model of a neuron

Early AI
Lots of Optimism
Promised the world?

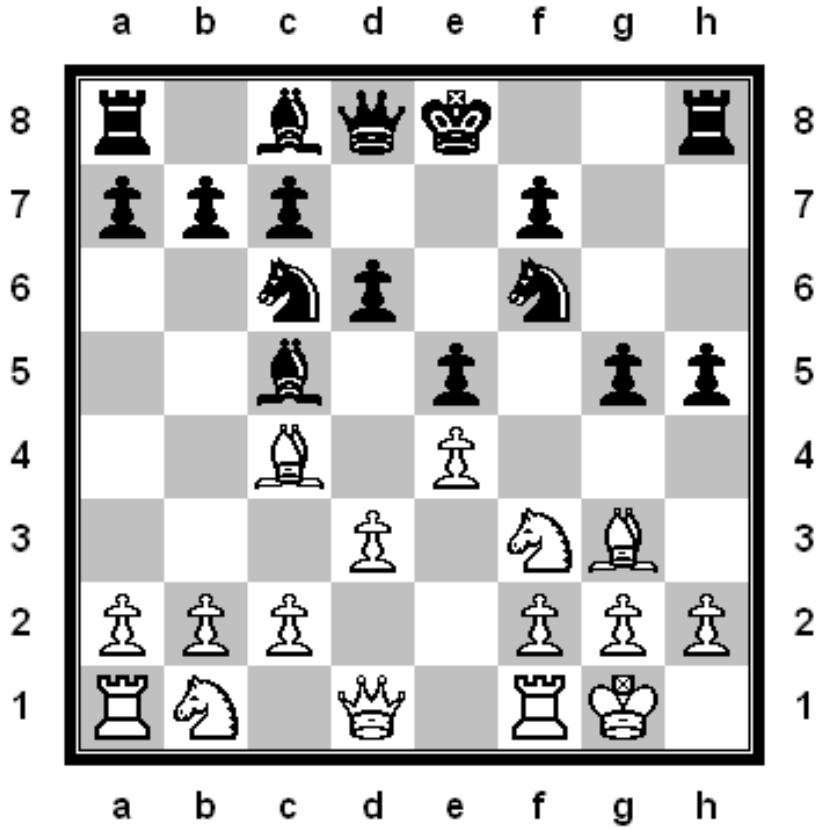


Handwriting Recognition

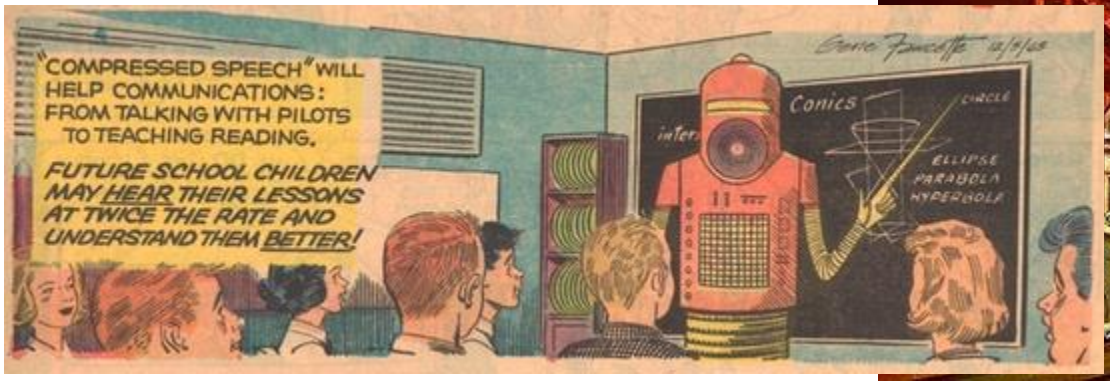
Early AI
Lots of Optimism
Promised the world?

Problem Solving:

General logic, games

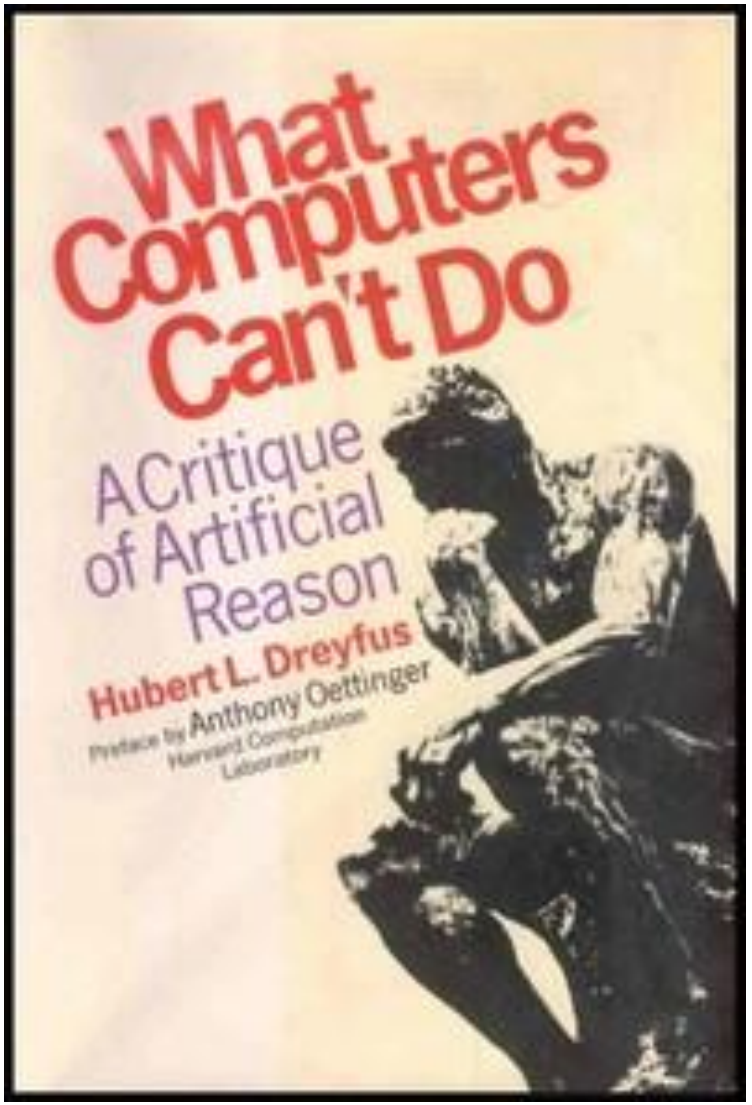


Visions of the future



But …

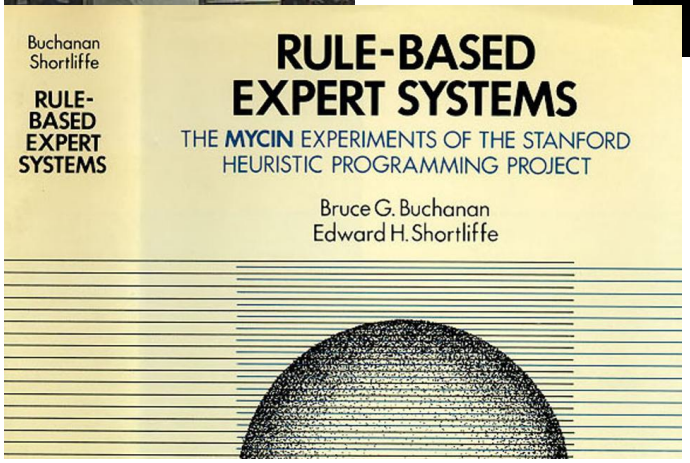
- Hubert Dreyfus, in “What Computers Can't Do” 1972
- Machine Translation couldn’t cope with context
- Handwriting only worked on “easy” examples
- Chess was still dominated by Humans



Nevertheless interesting discoveries / tools:

- Deeper understanding of language
- Foundations for later developments:
  - Neural Models
  - Expert Systems

Expert Systems 1970s-Present



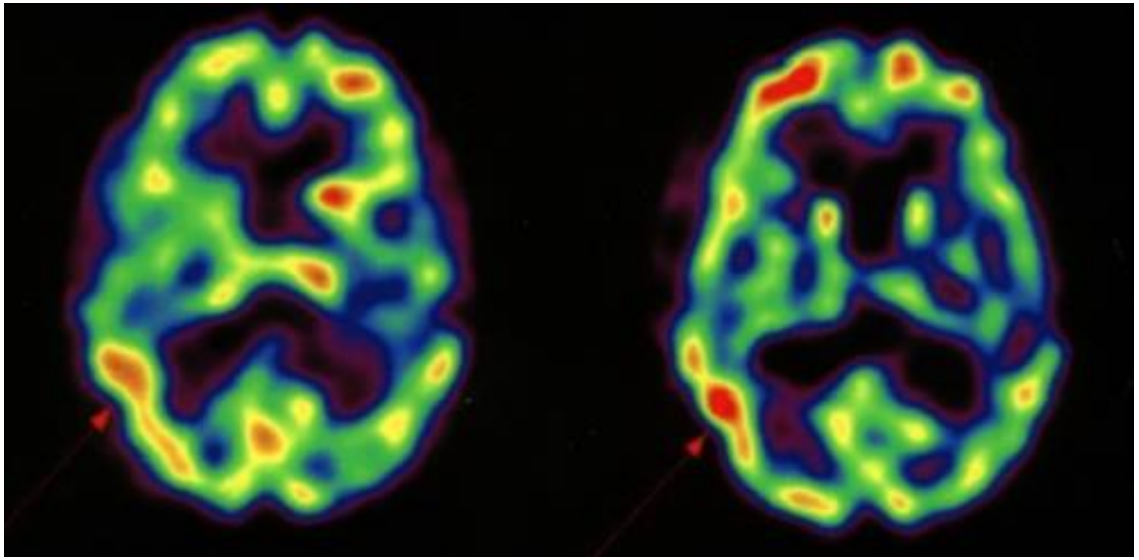
Since the 70s computers got bigger & faster:

Deep Blue 1997

Since the 70s computers got bigger & faster:

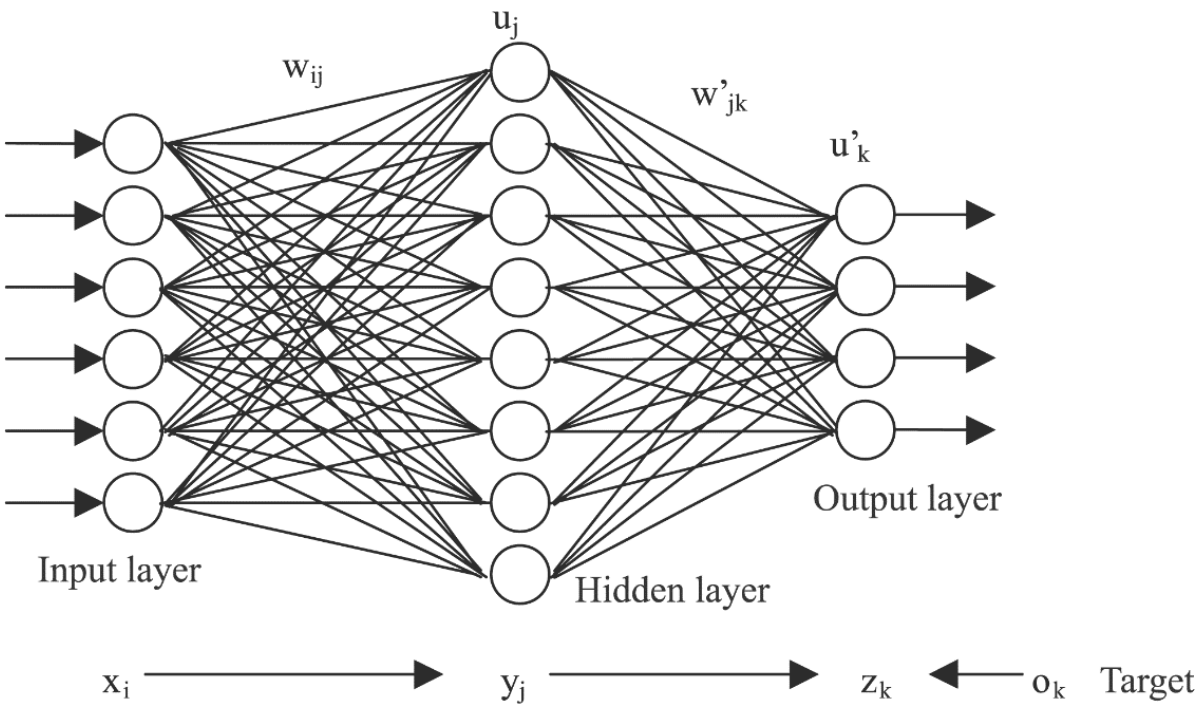
Deep Blue 1997

… and we learnt lots about the brain:



Deep Blue 1997

… and algorithms and models got better:



Deep Blue 1997

Neural Networks & “Connectionism”

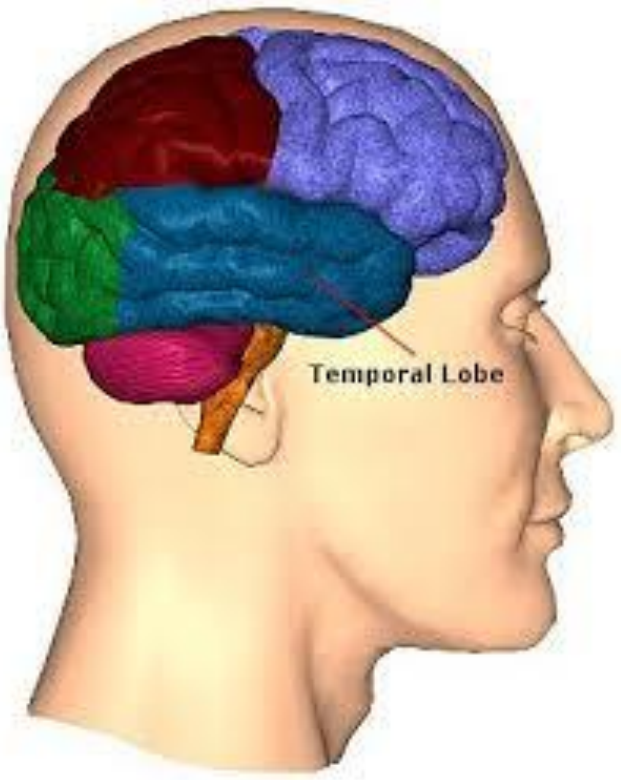
“Lesion Studies” showed recovery of damaged brains

Connectionism focusses on distributed processing

Graceful Degradation

Ability to adapt & generalise

Assimilate new information



AI: Where are we at?

What has been easy and what has been hard?

AI: Where are we at?

What has been easy and what has been hard?

Pattern Recognition

Reasoning

Sensing & Responding

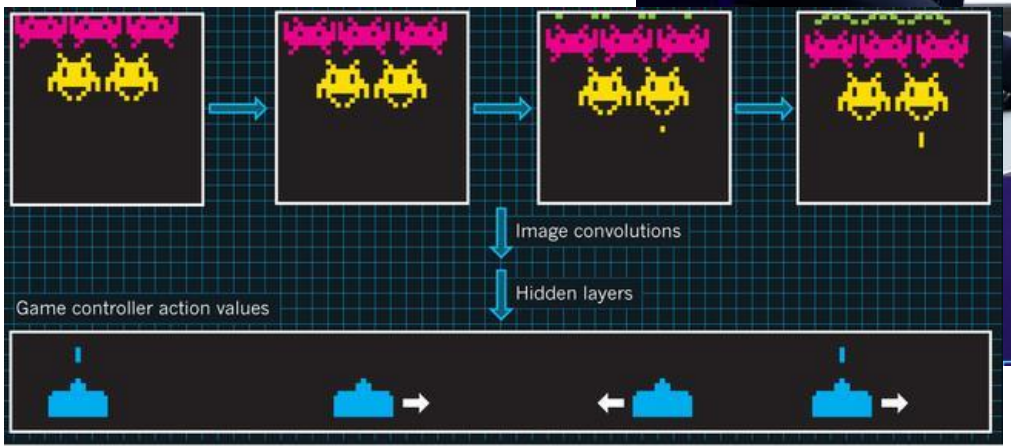
AI: Physical & Responsive

http://www.youtube.com/watch?v=cNZPRsrwumQ

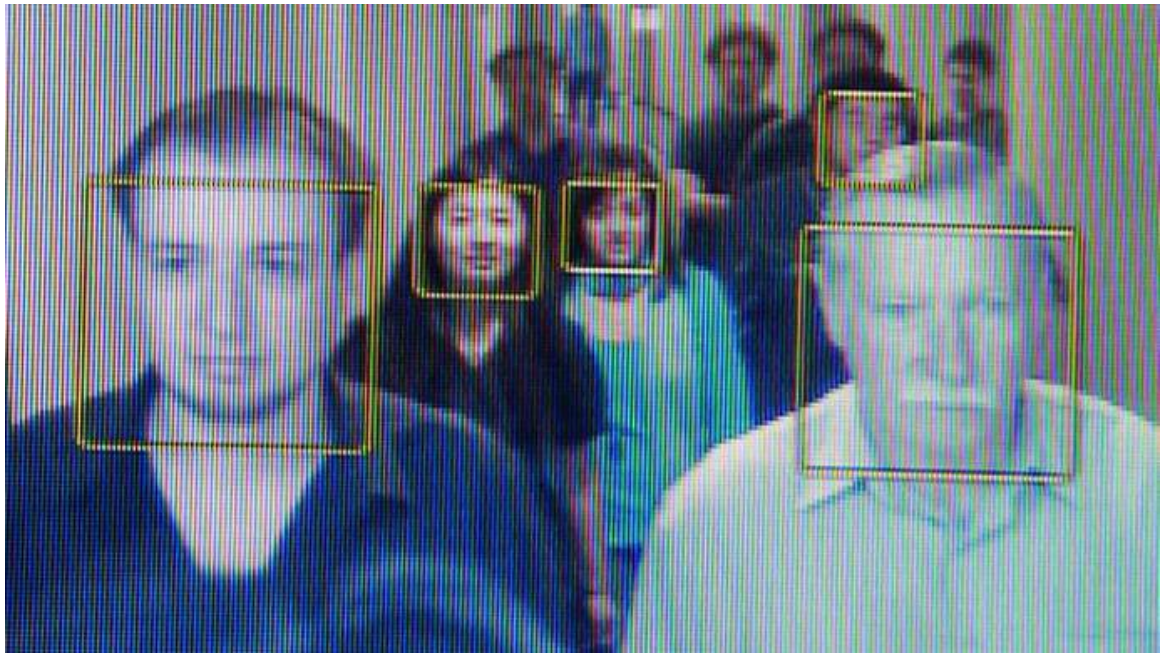
Boston Dynamics
Boston Dynamics

Boston Dynamics

AI: Learning Logic and Game Playing

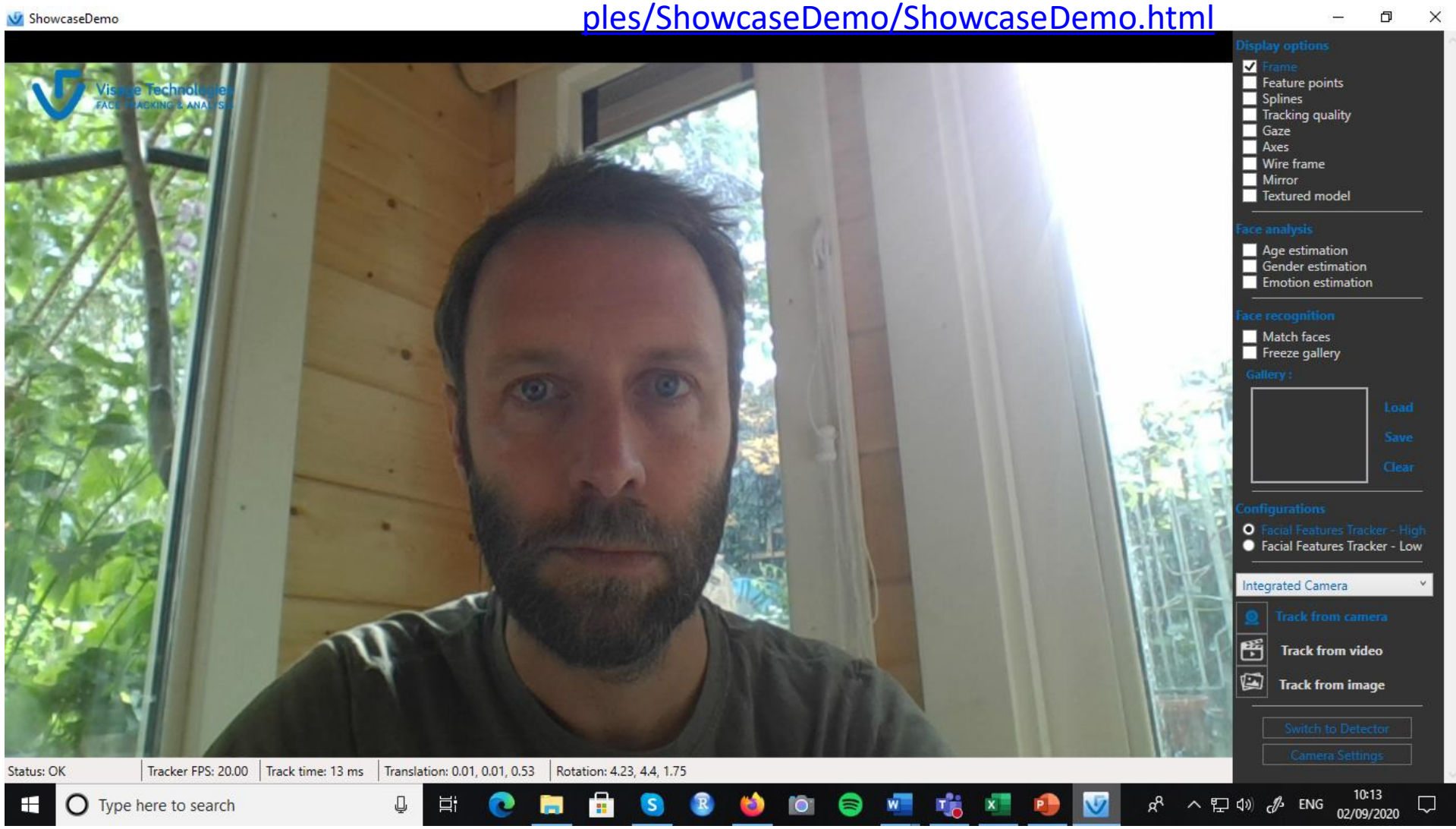


AI: Sensing & Recognition



Face Recognition Software

https://www.visagetechnologies.com/HTML5/latest/Samples/ShowcaseDemo/ShowcaseDemo.html



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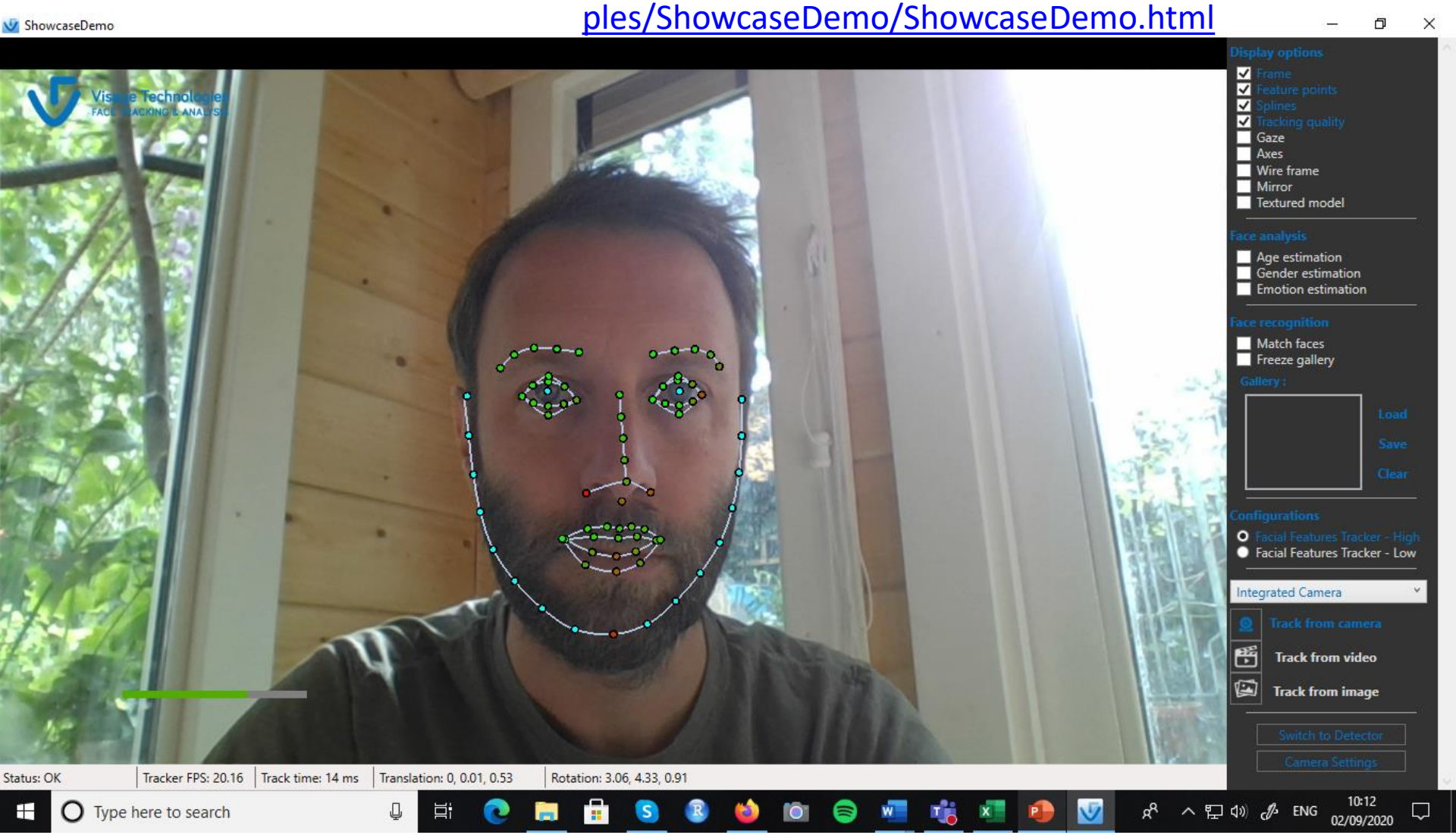

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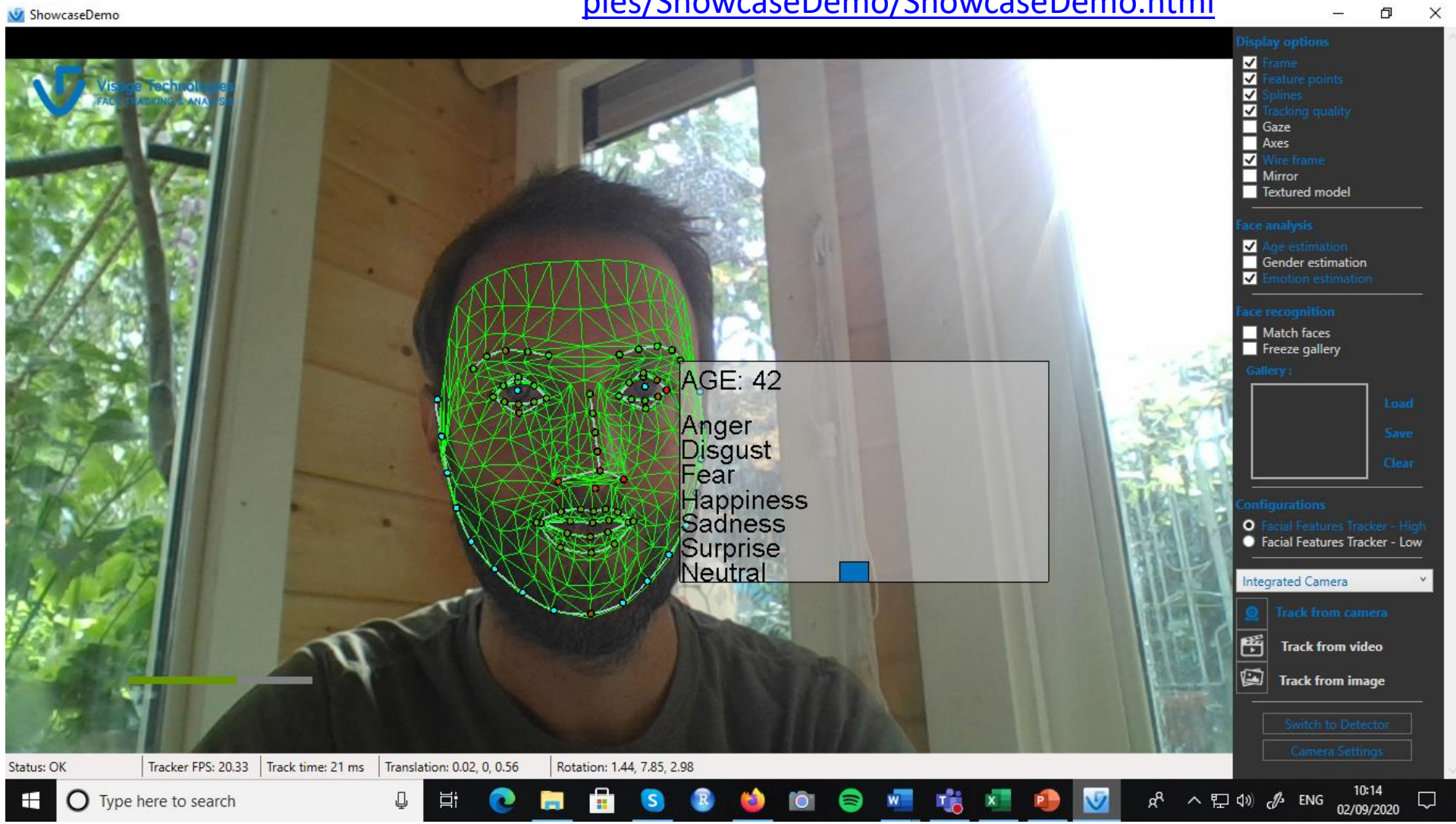
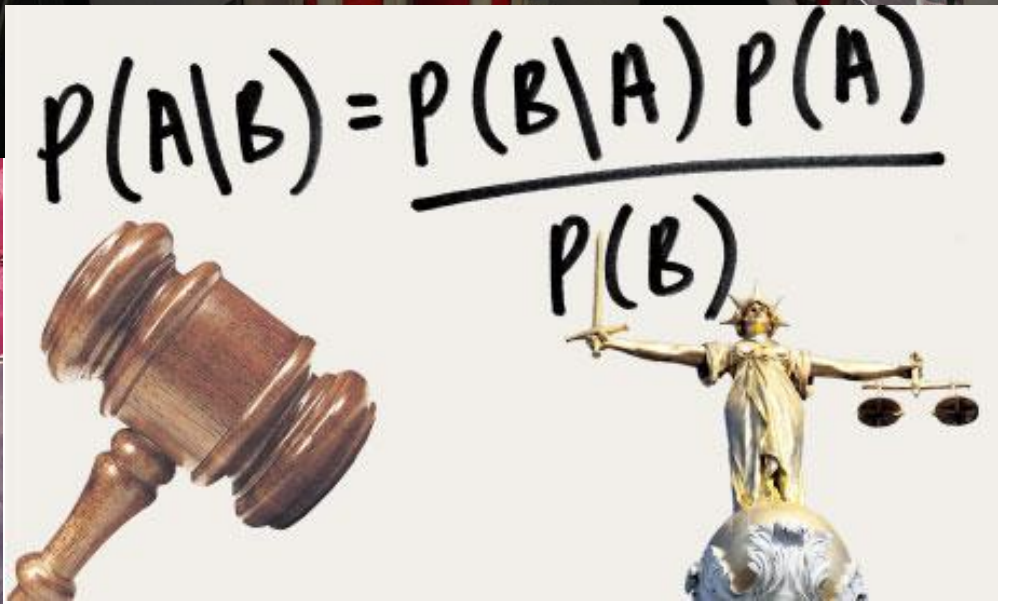


AI: Reading & Reasoning

IBM's WATSON on gameshow "Jeopardy"

AI: Medicine / Law / Science / Art



AI: Where are we at?

What has been easy and what has been hard?

Language & Turing Test

Creativity & Limits of Learning

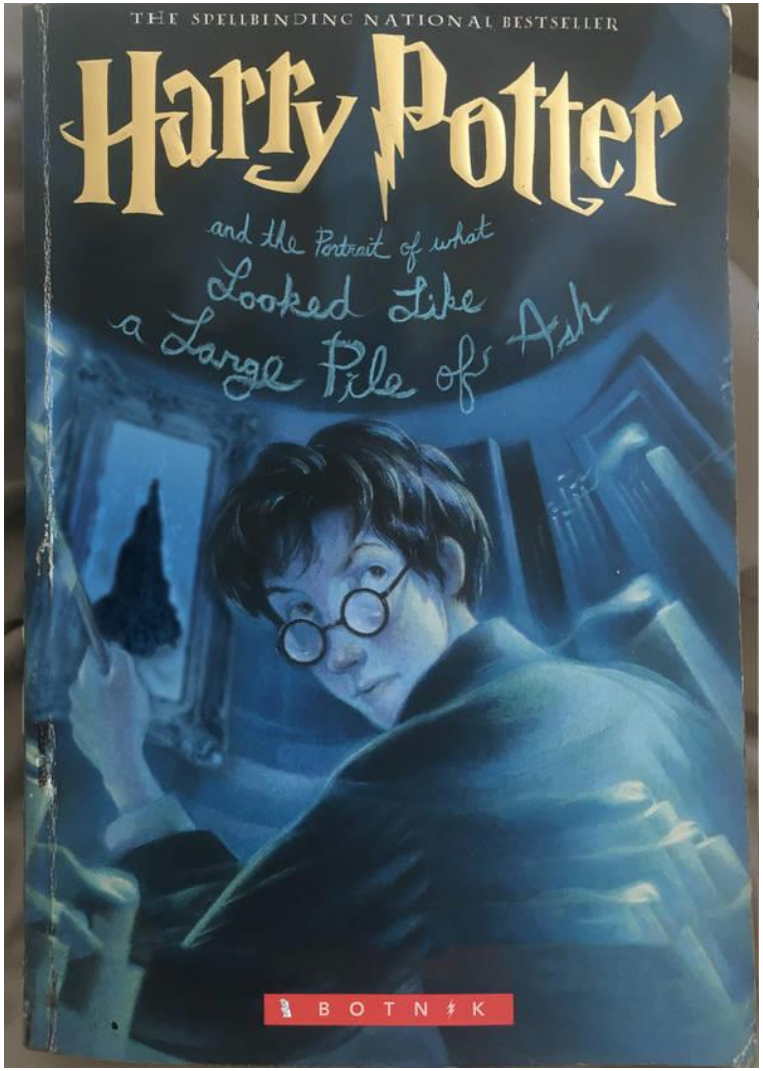
AI: Language

What has been easy and what has been hard?

http://www.youtube.com/watch?v=WnzlbyTZsQY

AI Chatbot: Cleverbot

AI: Learning to Write



CHAPTER THIRTEEN

THE HANDSOME ONE

The castle grounds snarled with a wave of magically magnified wind. The sky outside was a great black ceiling, which was full of blood. The only sounds drifting from Hagrid's hut were the disdainful shrieks of his own furniture. Magic: it was something that Harry Potter thought was very good.

Leathery sheets of rain lashed at Harry's ghost as he walked across the grounds toward the castle. Ron was standing there and doing a kind of frenzied tap dance. He saw Harry and immediately began to eat Hermione's family.

Ron's Ron shirt was just as bad as Ron himself.

"If you two can't clump happily, I'm going to get aggressive," confessed the reasonable Hermione.

Harry could tell that Voldemort was standing right behind him. He felt a great overreaction. Harry tore his eyes from his head and threw them into the forest. Voldemort raised his eyebrows at Harry, who could not see anything at the moment.

"Voldemort, you're a very bad and mean wizard," Harry savagely said. Hermione nodded encouragingly. The tall Death Eater was wearing a shirt that said '*Hermione Has Forgotten How To Dance*,' so Hermione dipped his face in mud.

Ron threw a wand at Voldemort and everyone applauded. Ron smiled. Ron reached for his wand slowly.

"Ron's the handsome one," muttered Harry as he reluctantly reached for his. They cast a spell or two, and jets of green light shot out of the Death Eaters' heads. Ron flinched.

"Not so handsome now," thought Harry as he dipped Hermione in hot sauce. The Death Eaters were dead now, and Harry was hungrier than he had ever been.

***

The Great Hall was filled with incredible moaning chandeliers and a large librarian who had decorated the sinks with books about masonry. Mountains of mice exploded. Several long pumpkins fell out of McGonagall. Dumbledore's hair scooted next to Hermione as Dumbledore arrived at school.

The pig of Hufflepuff pulsed like a large bullfrog. Dumbledore smiled at it, and placed his hand on its head: "You are Hagrid now."

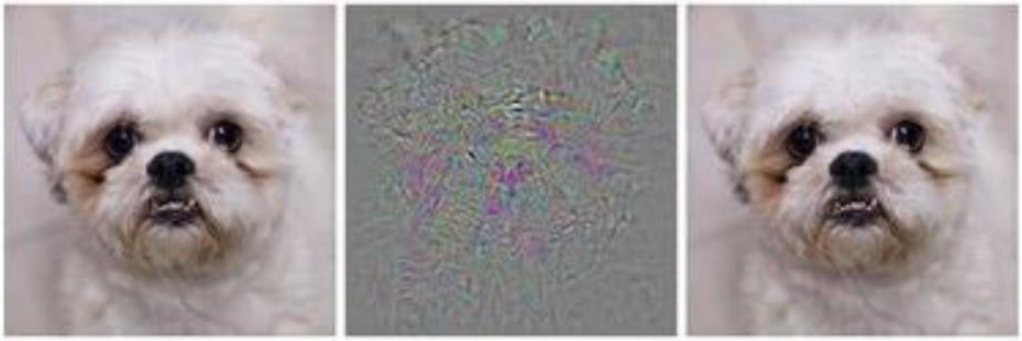
AI: Learning to Recognise

Original Image

Persian cat 87%
lynx 0%
Angora 0%
dishwasher 0%
Pomeranian 0%

Hacked Image

toaster 98%
Crock Pot 1%
Siamese cat 0%
wallaby 0%
carton 0%



Prediction: **Dog** + Distortion Prediction: **Ostrich**

Google's self-driving car in broadside collision after other car jumps red light

Autonomous Lexus SUV could not prevent accident that caved in front and rear passenger-side doors, setting off airbags and forcing it to be towed away

The Module

- Clustering
- Classification
- Neural Networks
- Vision / Image Analysis (Yongmin Li)
- Expert Systems
- Deep Learning for Images (Alina Miron)
- Deep Learning for Text (Alina Miron)
- Bayesian Networks
- Time Series / Sequence Models
- AI in Society

Labs & Assessment

- Many topics will have an associated lab
- 3 of these will be assessed by a GTA
  - Clustering
  - Classification
  - Neural Networks
  - All labs use R & PYTHON

COVID, Labs & Assessment

- Urge as many students as possible to use their own laptops.
  - Please install R from:

    https://cran.r-project.org/
  - And Rstudio from:

    https://www.rstudio.com/products/rstudio/

- All assessed labs will involve a 1-1 viva with a GTA
  - Conducted via several Zoom meeting rooms
  - When you click on a viva room, you will need to register
  - You will enter a waiting room and when the GTA is free you will undergo a share-screen 1-1 viva

Assessed Labs

Clustering, Classification, Neural Networks

To pass these labs:

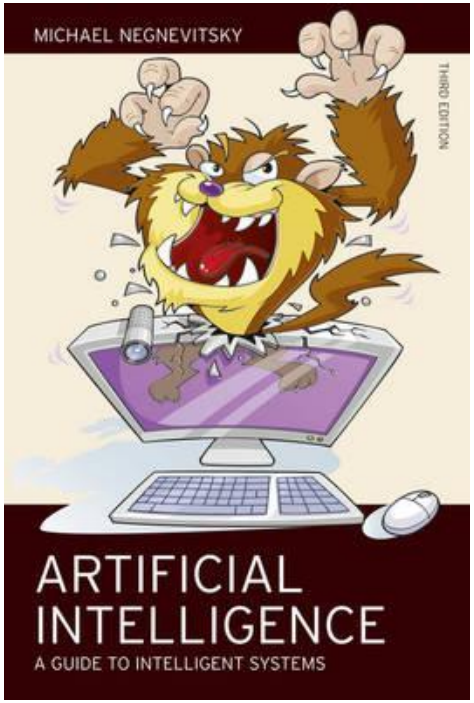
1) Submit your commented .R file (this can be done via the Labs folder on BB)

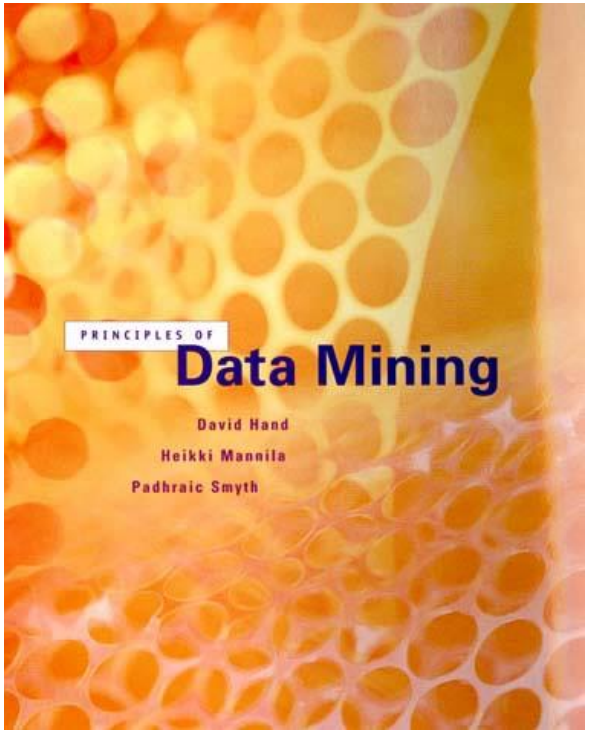
2) During the lab sessions click on one of the links below to enter the waiting room to be viva'd by a GTA via zoom:

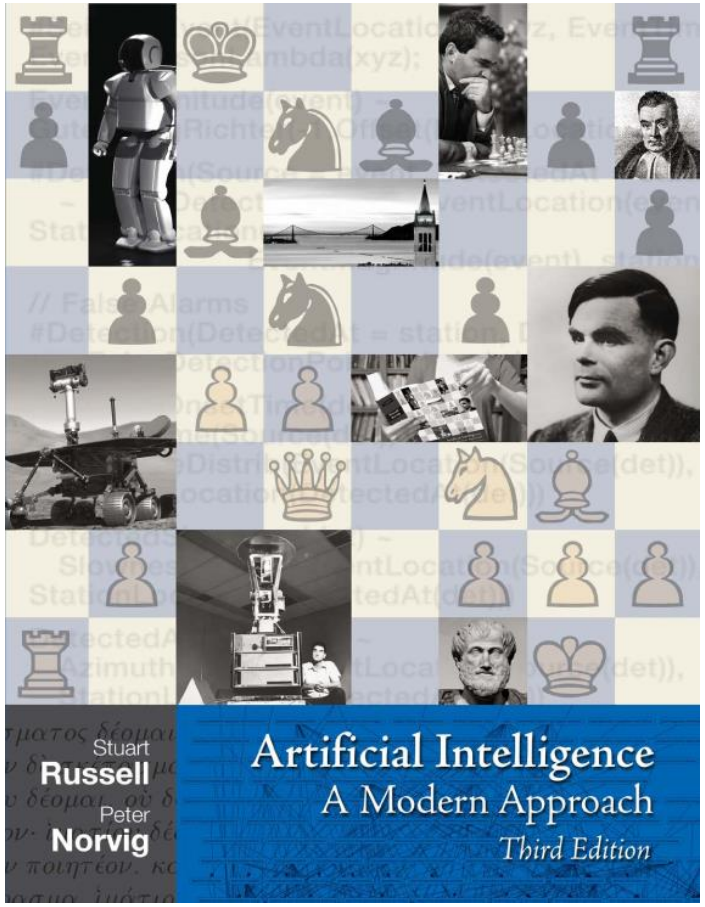
https://bruneluniversity.zoom.us/j/94237462734
https://bruneluniversity.zoom.us/j/98075982868
https://bruneluniversity.zoom.us/j/96542921718
https://bruneluniversity.zoom.us/j/95378996860
https://bruneluniversity.zoom.us/j/98621442487

Password : “alanturing”

Reading







+ journal papers etc.