



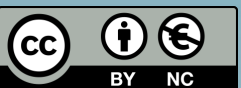
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Supporting the Professional
Learning of School Leaders
and Teachers

Leaving Certificate Computer Science National Workshop 5

Day 1





Workshop Overview

Session 1 10:00 - 11:30	Computers and Society 2
Tea/Coffee 11:30 – 12:00	
Session 2 12:00 - 13:30	Databases
Lunch 13:30 - 14:30	
Session 3 14:30 - 16:30	Inclusion and Curriculum Planning



Key Messages

All learning outcomes (LOs) are interwoven. This means that the specification can be used in many ways.

ALTs provide an opportunity to teach theoretical aspects of LCCS.

LCCS is suitable for all! This includes students with SEN and of all ability levels.

LCCS can be mediated through a constructivist pedagogical approach.

Group work is a key feature in the teaching, learning and assessment of LCCS.



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LCCS NW5 Session 1 Computers and Society 2





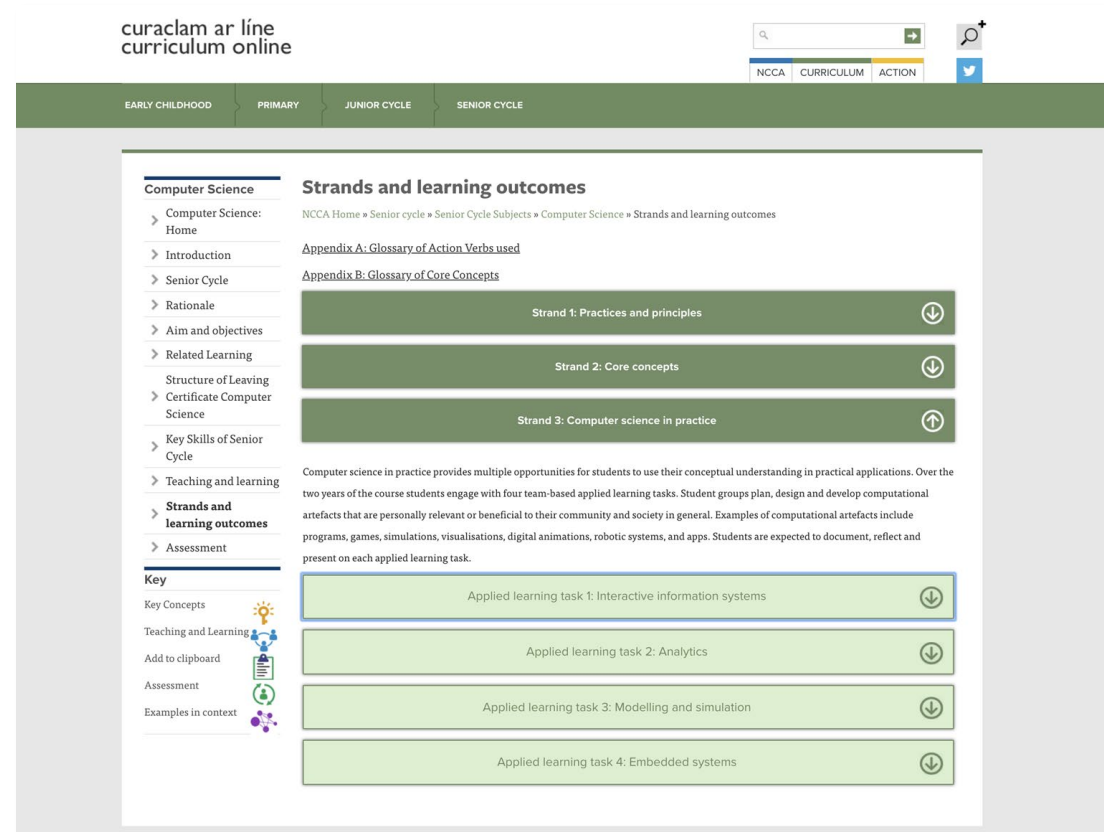
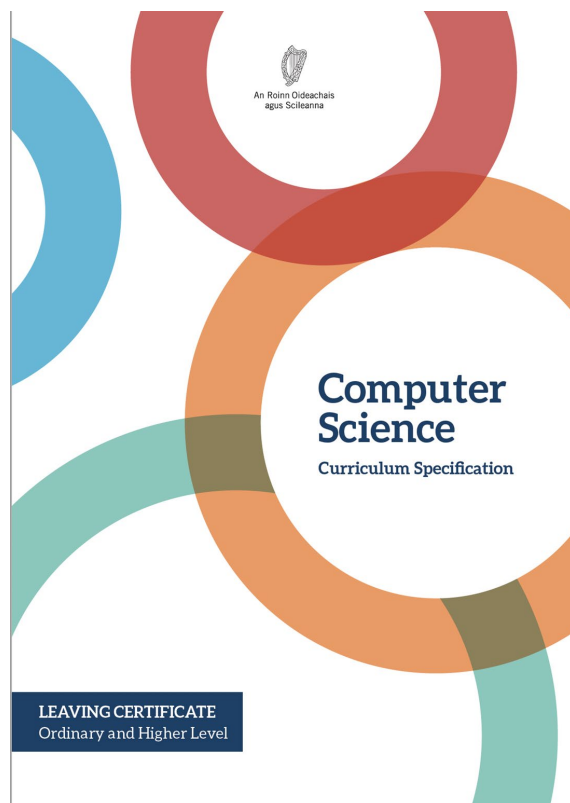
By the end of this session

Participants will be enabled to:

- reflect on what the specification says about Computers and Society
- listen to other teachers as they share their own classroom experiences
- further their pedagogic content knowledge of Computers and Society
- develop their knowledge of Artificial Intelligence and related concepts
- participate in an activity to select when and what machine learning and AI algorithms might be used in certain contexts



LCCS Curriculum Specification



<https://www.curriculumonline.ie>



What does the specification say?

*Computer science is the study of computers and algorithmic processes. Leaving Certificate Computer Science includes how programming and computational thinking can be applied to the solution of problems, and **how computing technology impacts the world around us.***

[LCCS Spec. Page 2, paragraph 1]

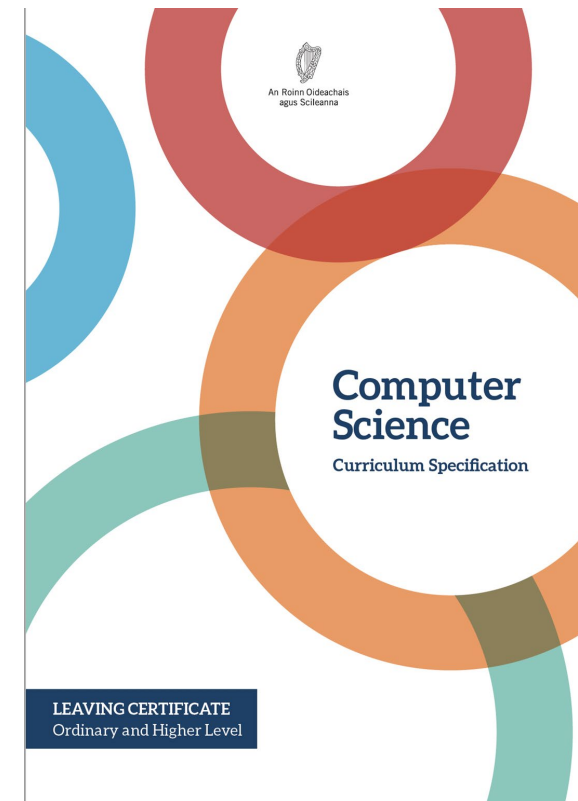
Strand 1: Practices and principles	Strand 2: Core concepts	Strand 3: Computer science in practice
<ul style="list-style-type: none">▶ Computers and society▶ Computational thinking▶ Design and development	<ul style="list-style-type: none">▶ Abstraction▶ Algorithms▶ Computer systems▶ Data▶ Evaluation/Testing	<ul style="list-style-type: none">▶ Applied learning task 1<ul style="list-style-type: none">- Interactive information systems▶ Applied learning task 2 - Analytics▶ Applied learning task 3<ul style="list-style-type: none">- Modelling and simulation▶ Applied learning task 4<ul style="list-style-type: none">- Embedded systems



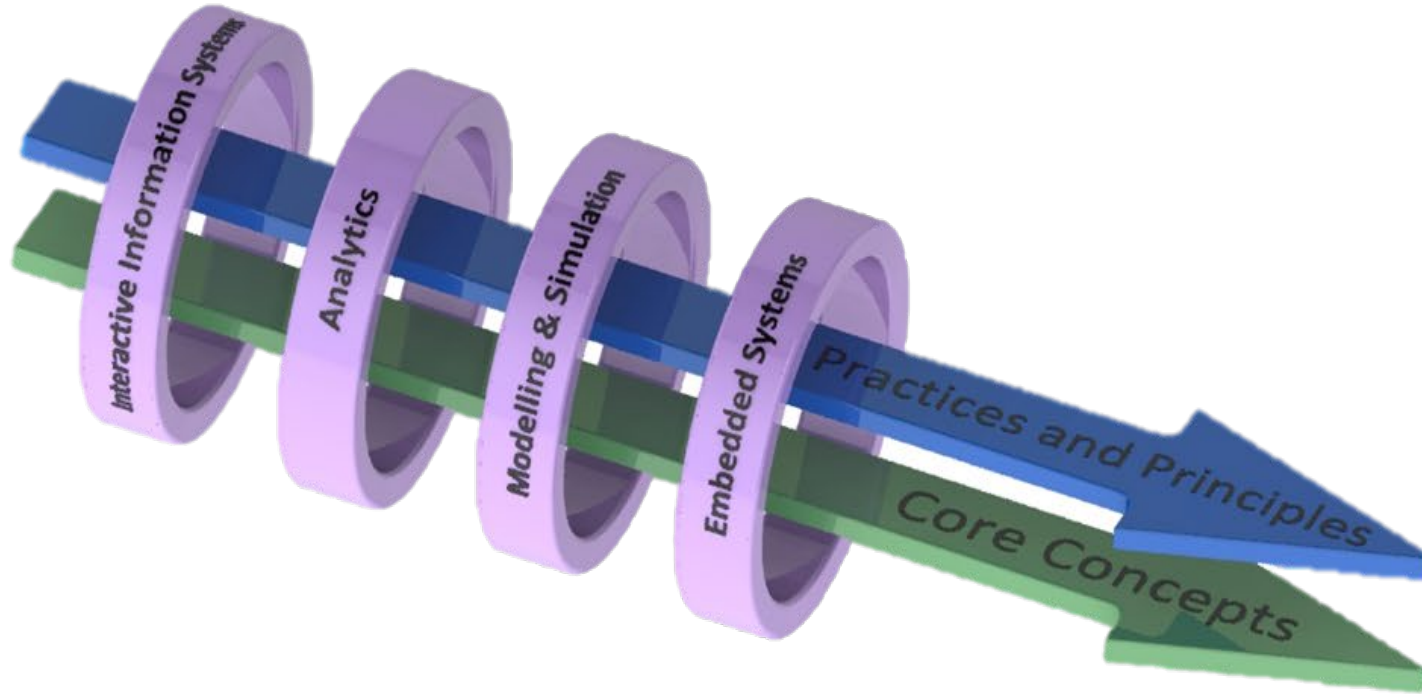
What does the specification say?

Objectives

- appreciate the ethical and social implications relating to the use of computing technology and information and identify the impact of technology on personal life and society
- understand how information technology has changed over time and the effects these changes may have on education, the workforce and society



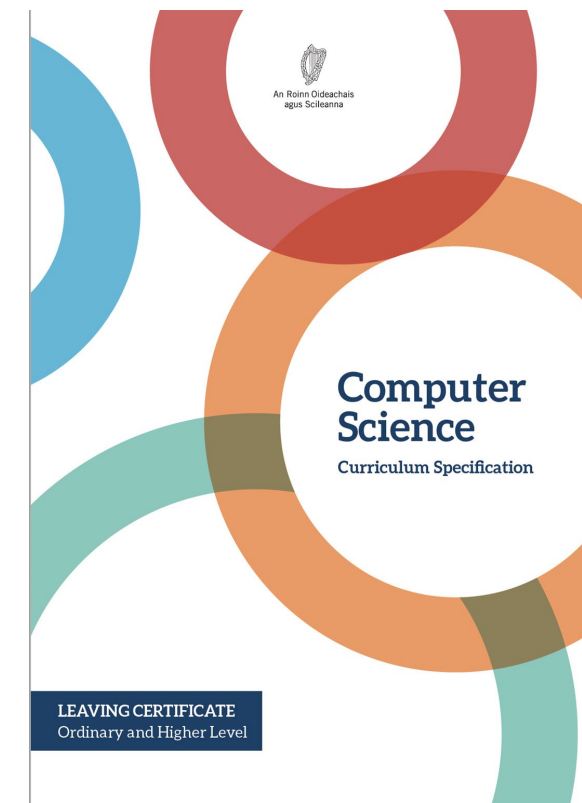
What does the specification say?





Computers and Society Learning Outcomes

Students learn about: ²	Students should be able to:
<p>S1: Computers and society</p> <p>Social and ethical considerations of computing technologies</p> <p>Turing machines</p> <p>The Internet</p> <p>Machine learning</p> <p>Artificial intelligence</p> <p>User-centred design</p>	<p>1.11 discuss the complex relationship between computing technologies and society including issues of ethics</p> <p>1.12 compare the positive and negative impacts of computing on culture and society</p> <p>1.13 identify important computing developments that have taken place in the last 100 years and consider emerging trends that could shape future computing technologies</p> <p>1.14 explain when and what machine learning and AI algorithms might be used in certain contexts</p> <p>1.15 consider the quality of the user experience when interacting with computers and list the principles of universal design, including the role of a user interface and the factors that contribute to its usability</p> <p>1.16 compare two different user interfaces and identify different design decisions that shape the user experience</p> <p>1.17 describe the role that adaptive technology can play in the lives of people with special needs</p> <p>1.18 recognise the diverse roles and careers that use computing technologies</p>





Group Discussion

Instructions:

In your groups, discuss the following question. You may use the prompts on page 4 of the Professional Learning Booklet to help.



P5

Focusing on Computers and Society, how might you approach this section of the course with your students?





Group Discussion: Feedback

Instructions:

In your groups, discuss the following question. You may use the prompts on page 4 of the Professional Learning Booklet to help.



P5

Focusing on Computers and Society, how might you approach this section of the course with your students?





NCCA - The Evolution of Computers in Society

Stimulate a Debate Strategy

1. Engage with Stimulus material (e.g., video/text)
2. Provide prompt questions to provoke discussion and elicit opinion
3. Divide into research groups and explore topic from key standpoints
4. Choose a teaching/facilitation methodology





Stimulate a Debate



China's social credit system



Agree/Disagree Line...What if?

Could you be friends with a robot?



P7



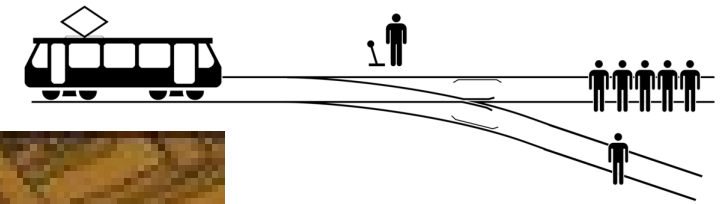
100%
AGREE

100%
DISAGREE

Agree/Disagree Line: The Trolley Problem



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P8



[The Trolley Problem](#)



Agree/Disagree Line: Activity



[The ethical dilemma of self-driving cars - Patrick Lin](#)



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LCCS NW5

Introduction to AI



Introduction to AI



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"Do You Love Me?"



Group Discussion

Instructions:

In your groups, discuss and agree on the following ..

1. Examples of Artificial Intelligence
2. A definition of Artificial Intelligence
3. Terminology/Concepts you associate with AI



P9



Group Discussion - Feedback

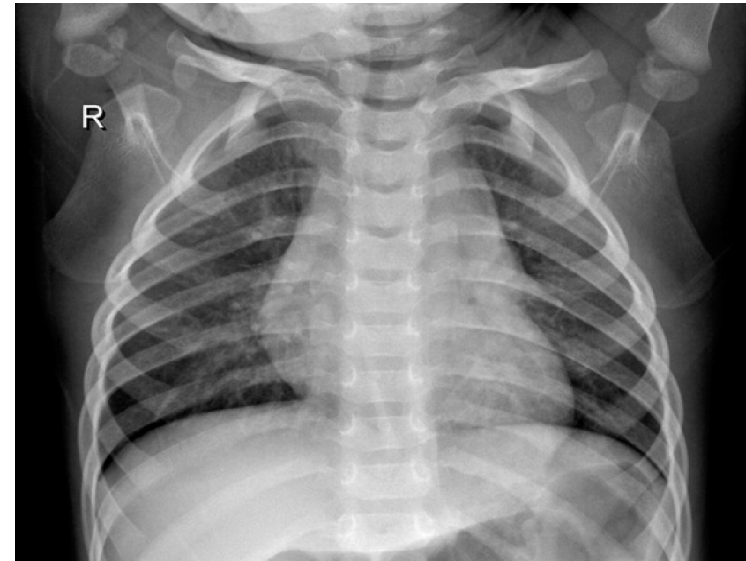
Instructions:

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Terminology and Definition



Artificial General Intelligence

Narrow Artificial Intelligence

“Artificial intelligence can be defined as a branch of knowledge that strives to recreate human intelligence within machines”

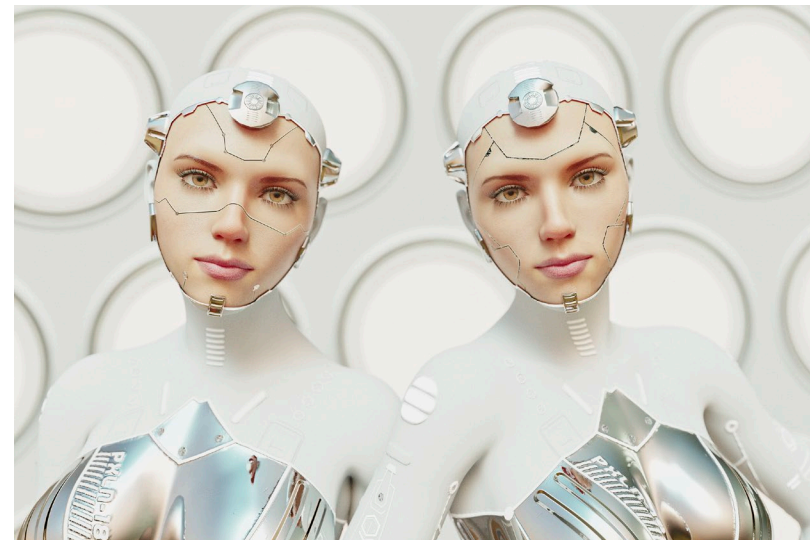
Source: How to talk to Robots (Tabitha Goldstaub)



AI and Philosophy

The study of artificial intelligence raises a lot of philosophical questions:

- What is intelligence?
- Is consciousness a requirement of intelligence?
- Is intelligent behaviour equivalent to intelligence?
- Sentience vs. Sapience





AI and Philosophy

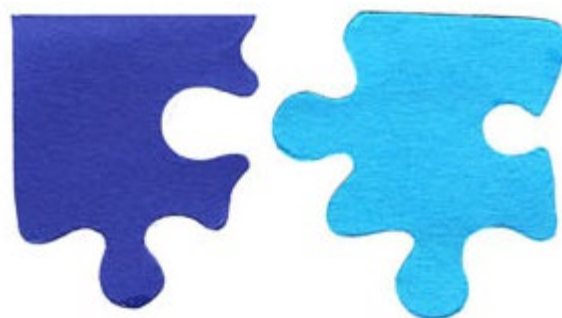


[The Chinese Room - 60-Second Adventures in Thought](#)

Terminology Matching Exercise



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Terminology Matching Exercise



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Intelligence

The ability to learn and perform suitable techniques to solve problems and achieve goals, appropriate to the context in an uncertain, ever-varying world.

Narrow AI

Intelligent systems for one particular thing, e.g., speech or facial recognition.

AGI

A theoretical ideal that aims to create machines with a level of intelligence comparable to human intelligence.

**Human Centred
Artificial Intelligence**

A type of AI that seeks to augment the abilities of, address the societal needs of, and draw inspiration from human beings. It researches and builds effective partners and tools for people, such as a robot helper and companion for the elderly.

Terminology Matching Exercise



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Machine Learning

A branch of AI studying how computer agents can improve their perception, knowledge, thinking, or actions based on experience or data.

Supervised Learning

A technique whereby computers can be trained predict human-given labels, such as dog breed based on labelled dog pictures.

Unsupervised Learning

A type of learning that does not require labels, sometimes making its own prediction tasks such as trying to predict each successive word in a sentence.

Deep Learning

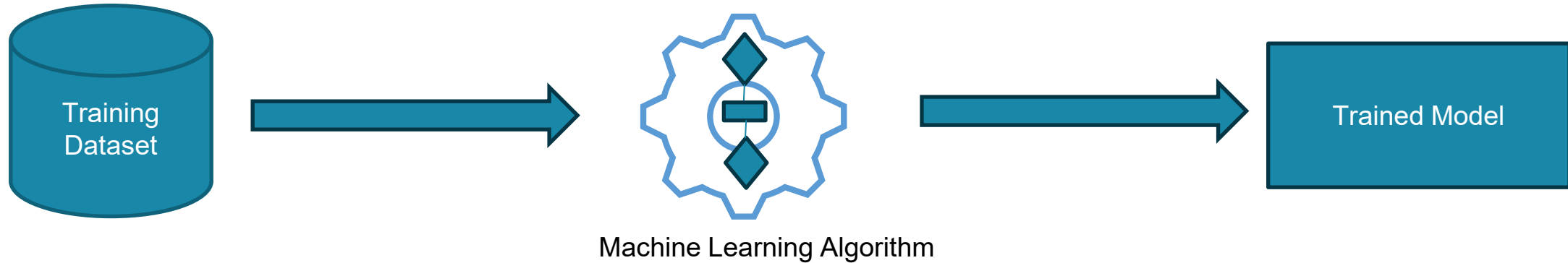
The use of large multi-layer (artificial) neural networks that compute with continuous (real number) representations, a little like the hierarchically organised neurons in human brains.

Machine Learning Process

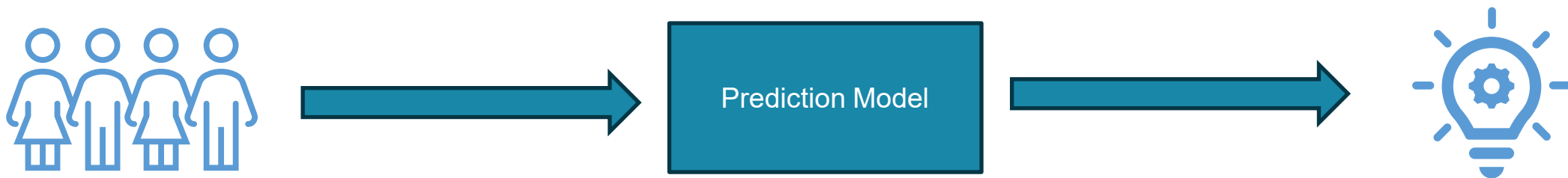


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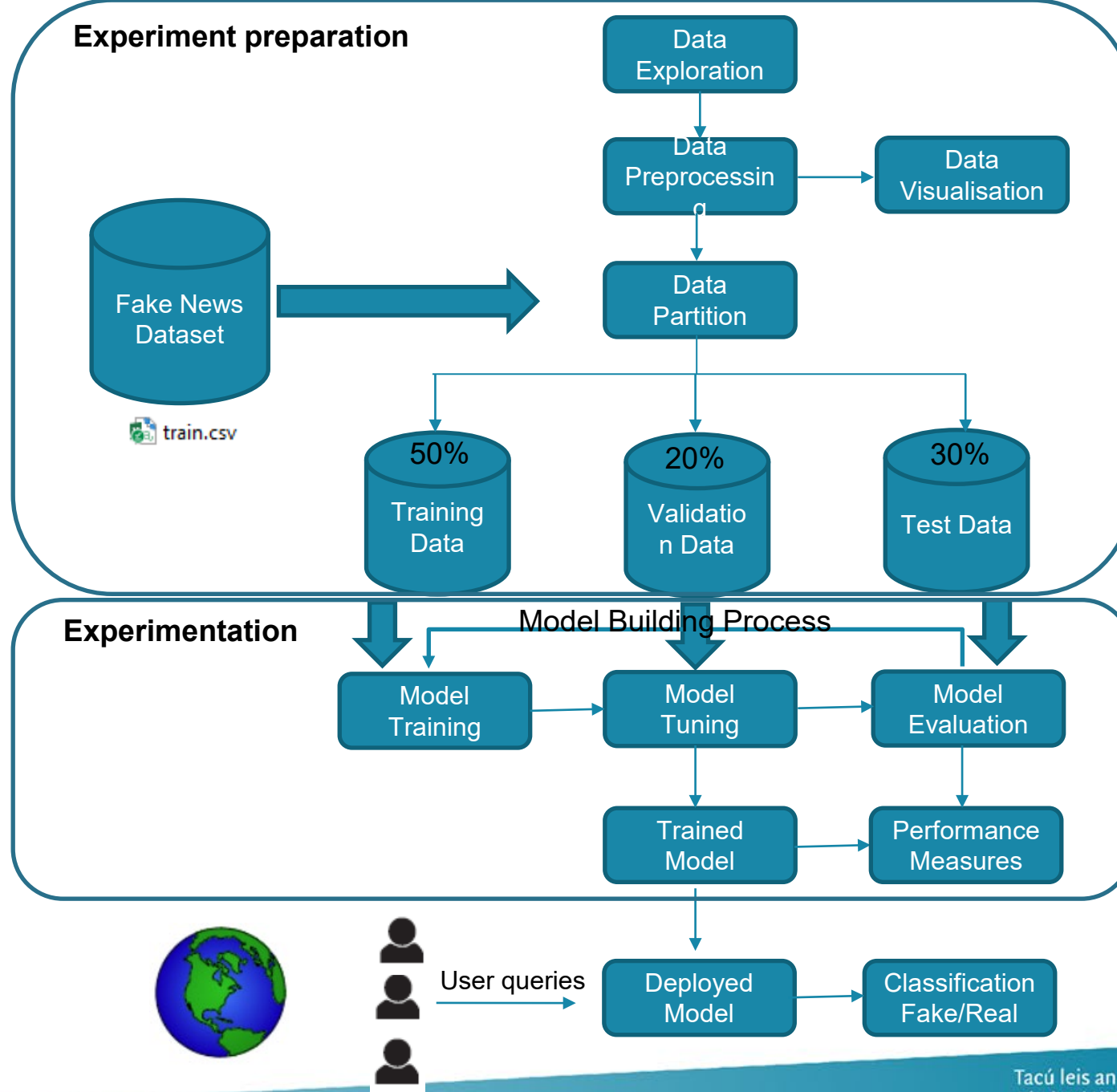
STEP 1 – Train the Model



STEP 2 – Use the Model



Example

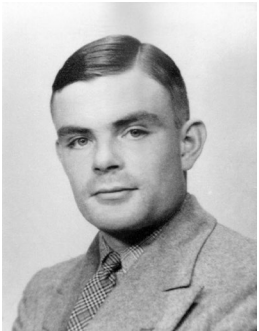


AI History

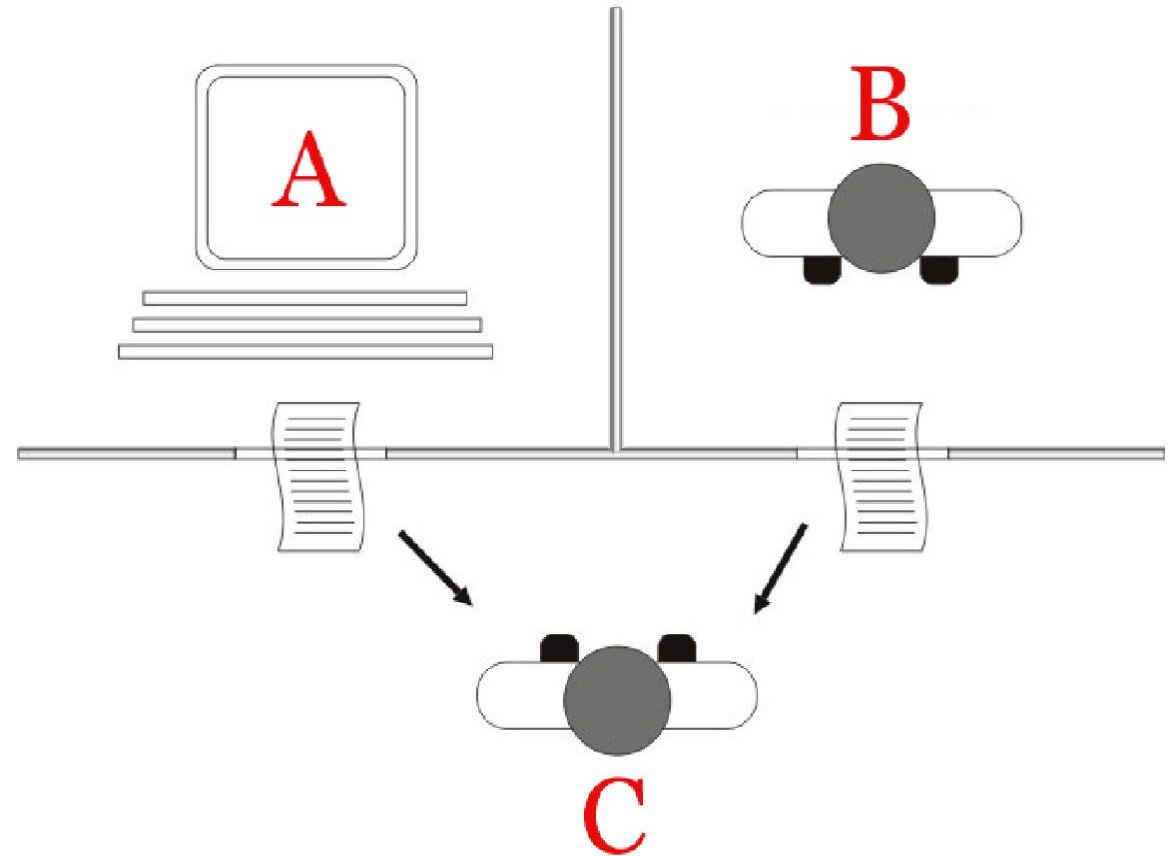


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“Computing Machinery & Intelligence”,
Alan Turing, 1950



Fundamental paper in artificial intelligence that described what came to be known as the **Turing Test**



A.I. HISTORICAL TIMELINE



Ada Lovelace

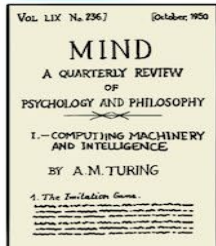
First design of a computer program by Ada Lovelace

1837



Invention of the algorithm concept (Turing machine)

1939



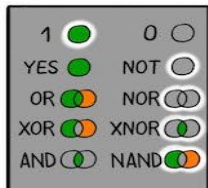
Test for machines' "intelligence" (Turing test)

1950



Margaret Masterman
Creation of the Cambridge Language Research Unit

1953



First artificial intelligence program (Logic Theorist)

1956



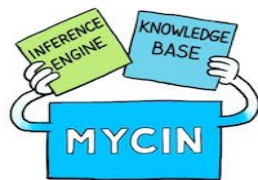
First psychotherapist chatbot (ELIZA)

1965



First general-purpose mobile robot (Shakey the robot)

1966

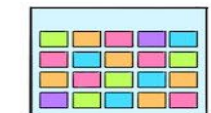


Expert system used for the diagnosis and therapy of infectious diseases (MYCIN)

1972



1974-1980



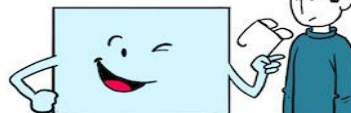
Large-scale hierarchical Image Database (ImageNET)

2009



DeepLearning in Image recognition (AlexNet)

2012



Computer vision exceeds human vision

2015



Electronic Numerical Integrator Analyser and Computer (ENIAC)



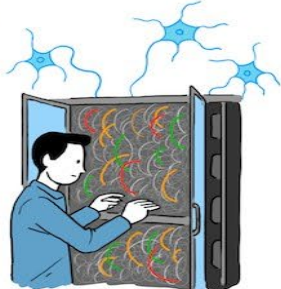
1945

Birth of the term "Artificial Intelligence"



1956

First single layer neural network (Perceptron)



1957

The computer is given a voice (NETtalk)



1986

First computer controlled vehicles (Navlab)



2nd winter of AI

1988-1993



AI boom
Rise of expert systems

1980-1987

Turing Award for recent advances in deep learning



2018

A demonstration of machine translation: Georgetown-IBM Experiment



1954

General Problem Solver



THINK LEARN CREATE

Natural language processing technique (Word2Vec)



2013

Announcement of fully autonomous cars



2015



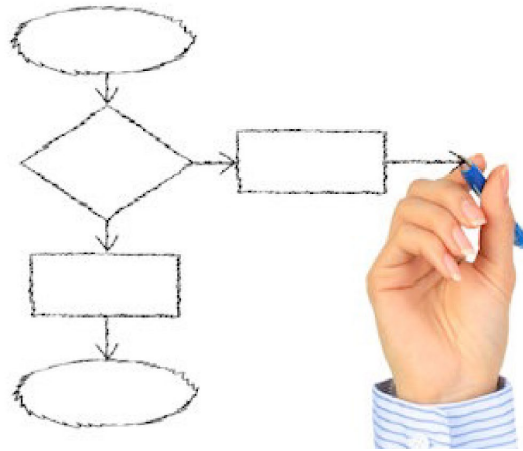
Co-funded by the Erasmus+ Programme of the European Union



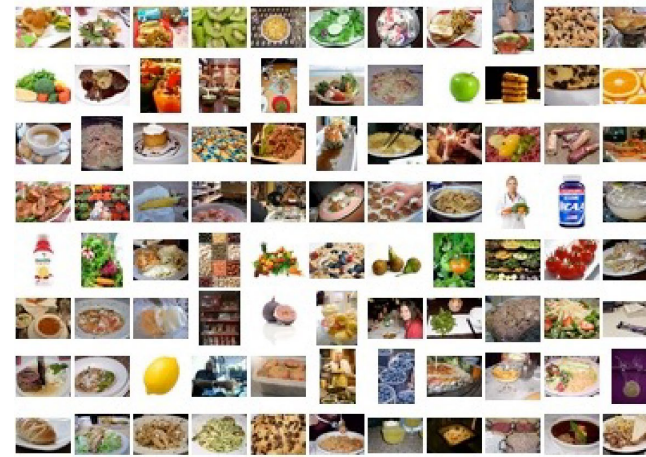
Key Drivers of AI



Algorithms



Data



4 Key drivers

Hardware



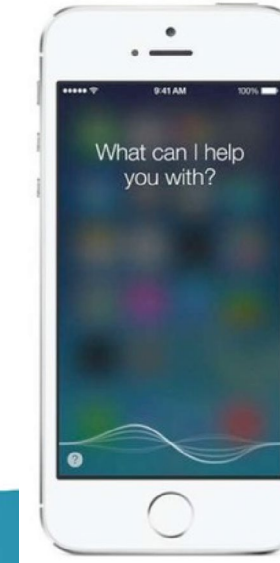
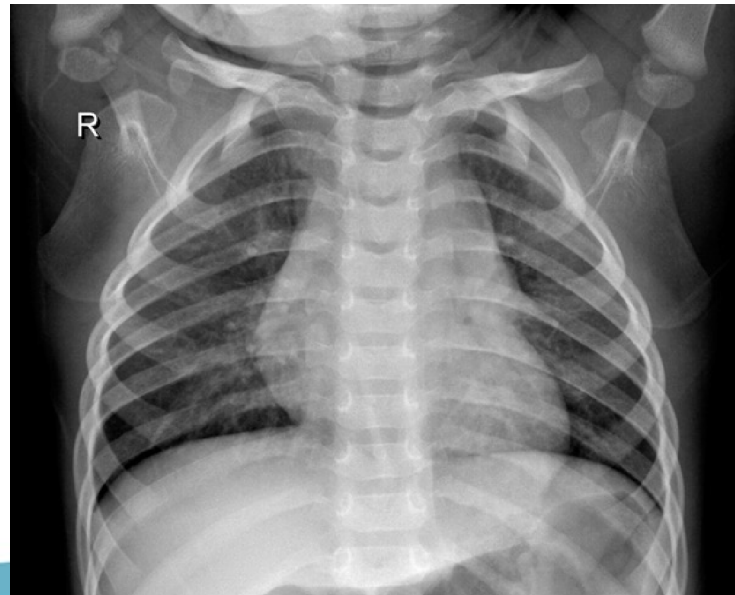
Applications



Applications of AI



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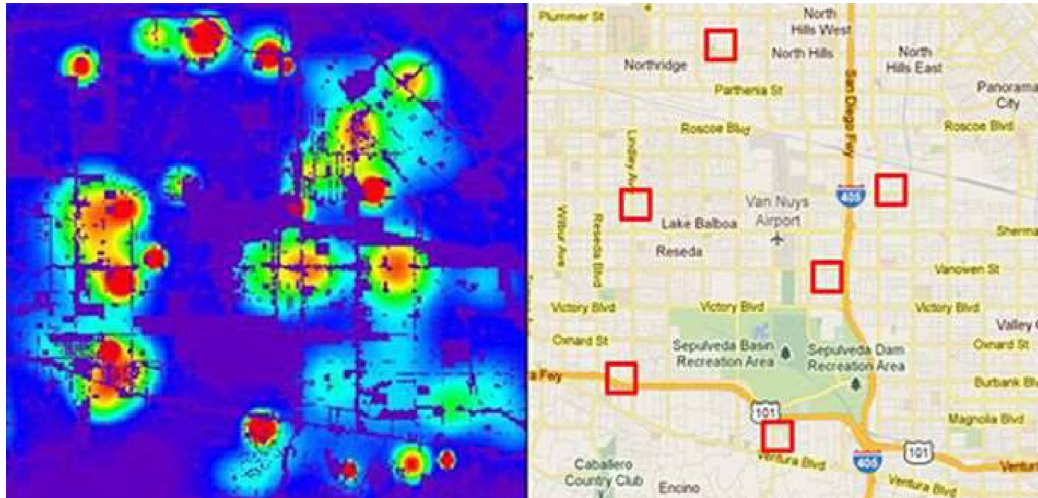
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More applications of AI



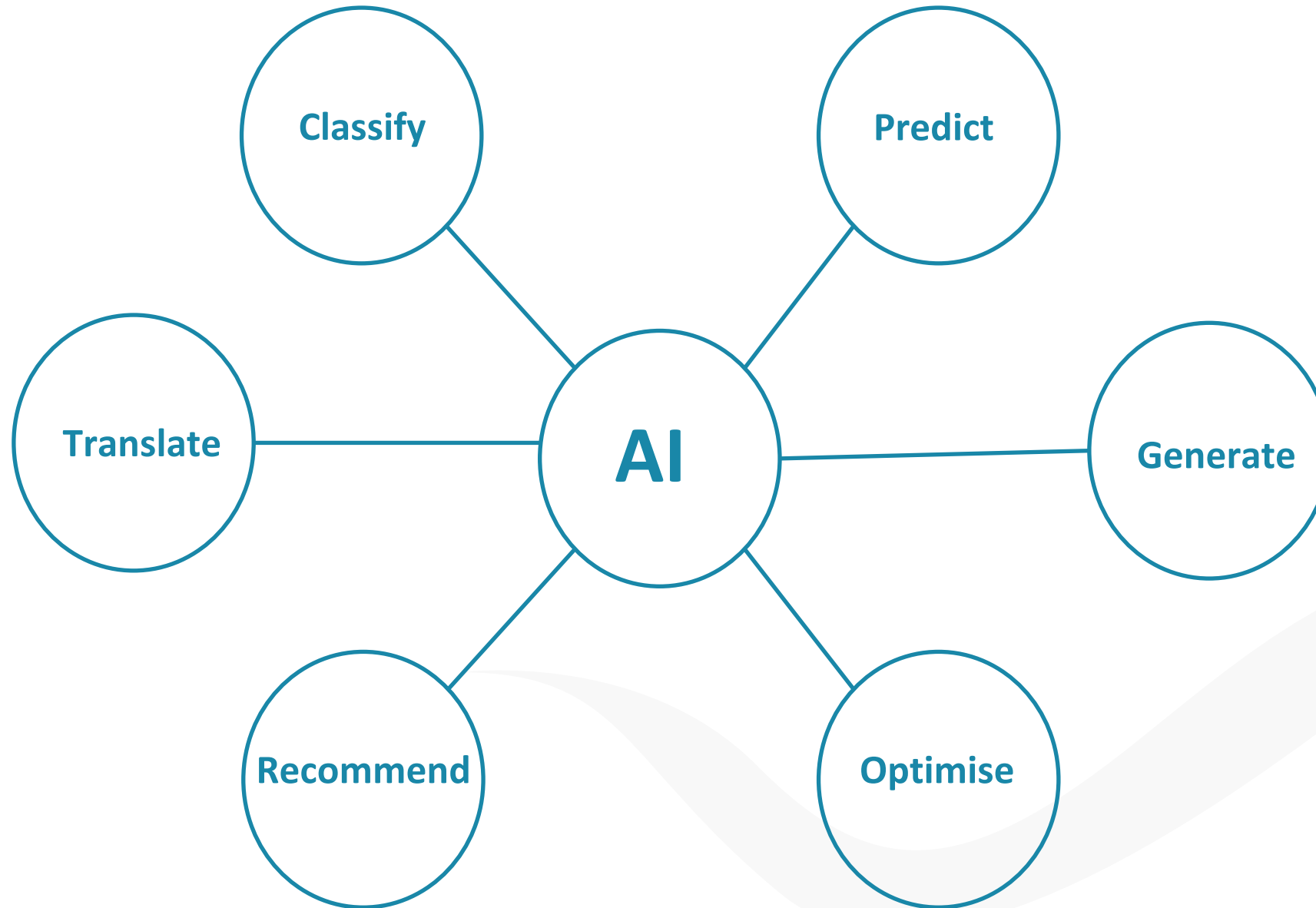
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Categorising Applications of AI





Group Discussion

Discuss whether the applications should or should not be considered applications of AI.



P11



Group Discussion - Feedback

Discuss whether the applications should or should not be considered applications of AI.



P11





3-2-1 Reflection



3 - List three things you learned

2 - List two areas you would like to learn more about

1 - One question you still have

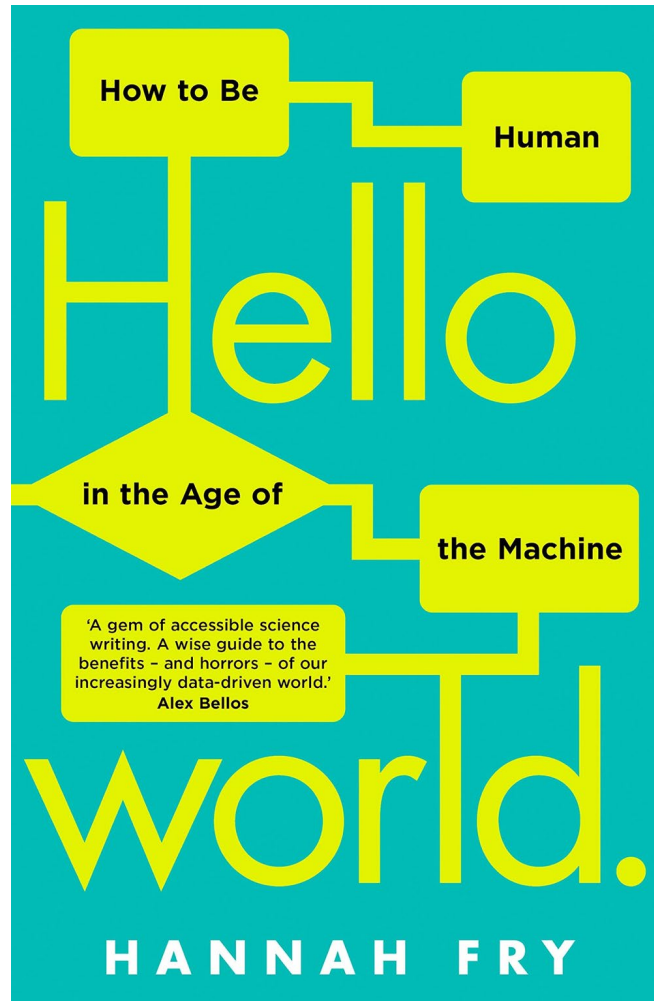


P12

Additional Resources



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Power
Data
Justice
Medicine
Cars
Crime
Art
Conclusion



<https://helloworld.raspberrypi.org/>

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