

OSLOMET

Basics of A.I

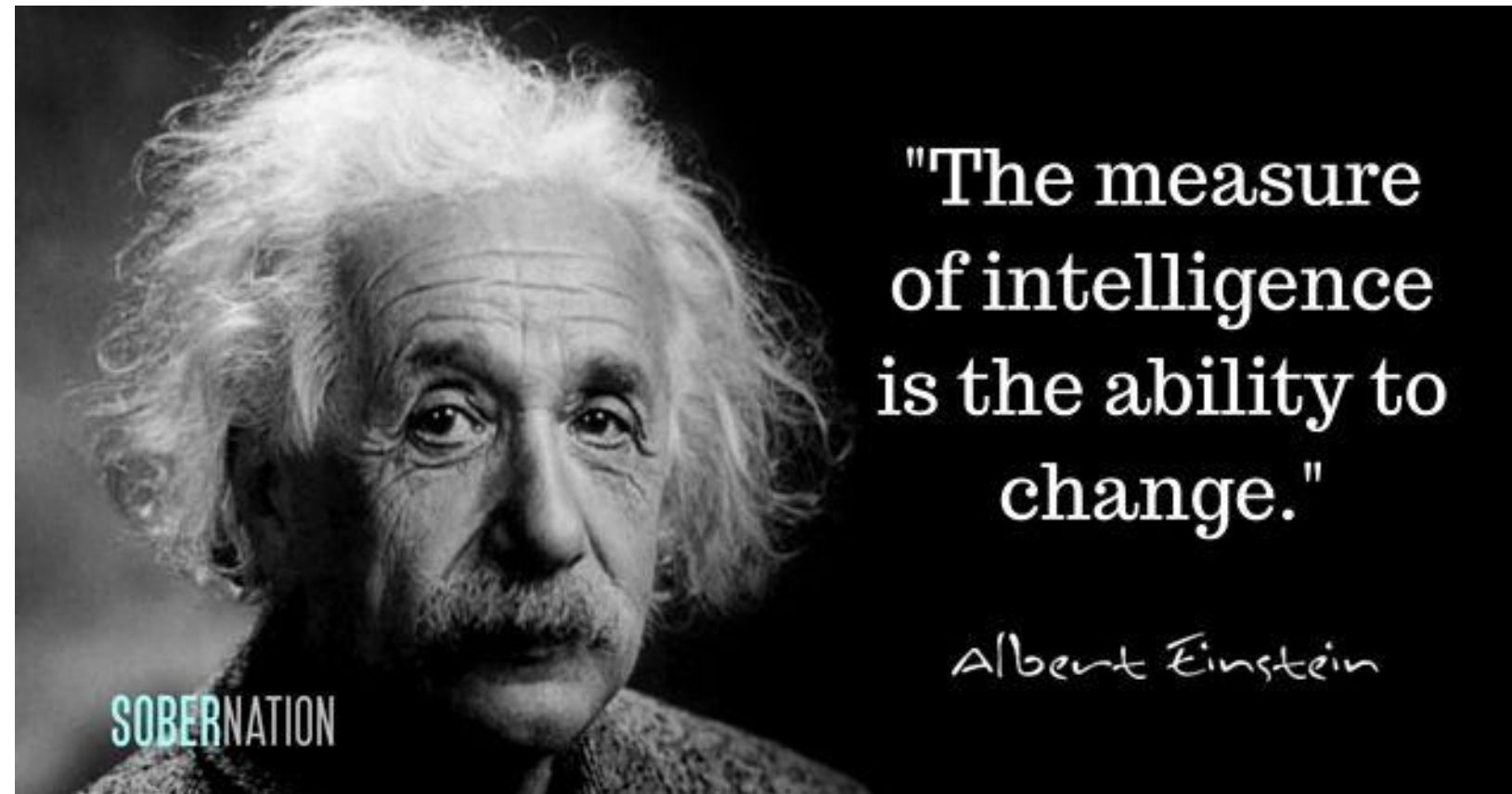
Umair Mehmood Imam

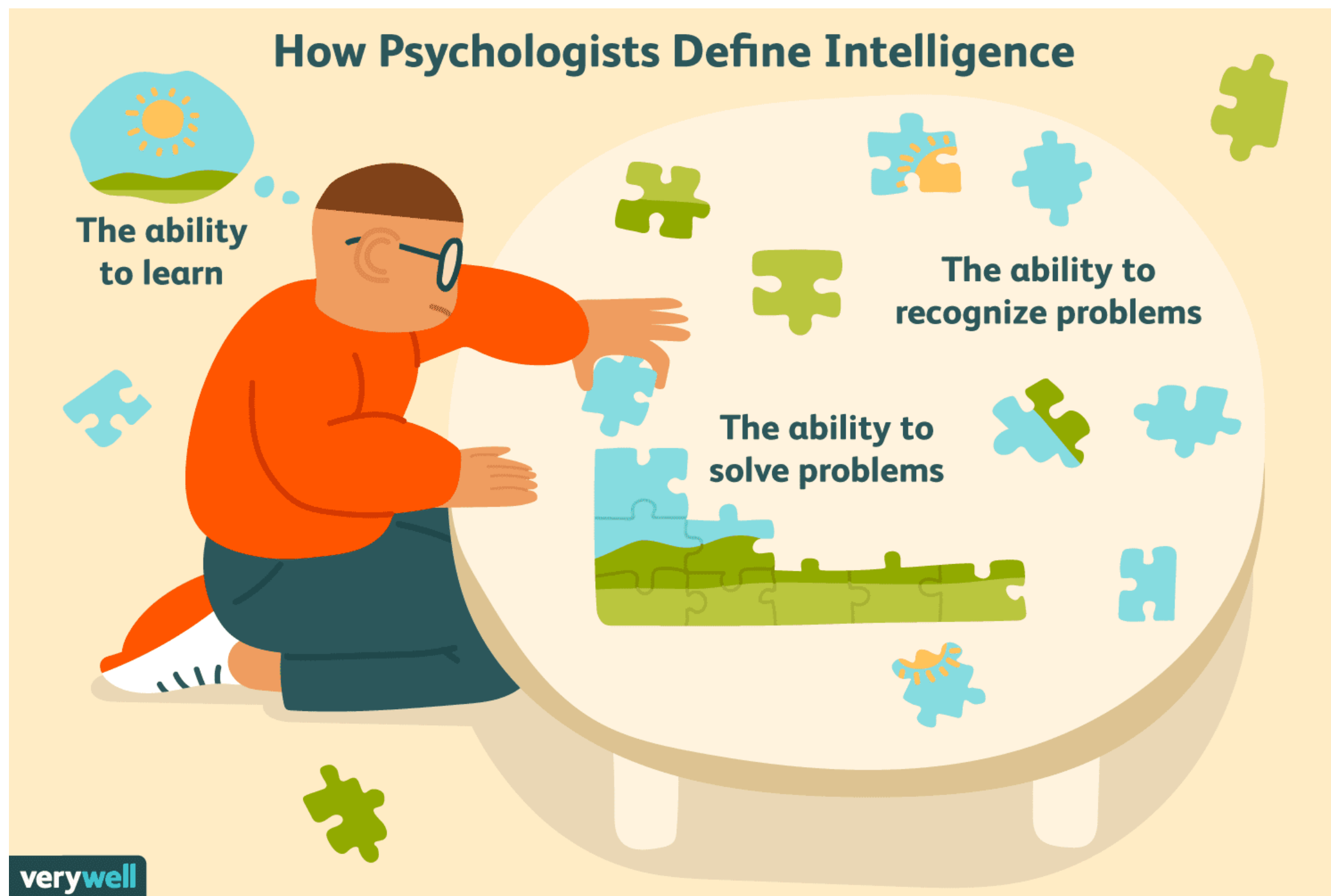
INTRODUCTION TO A.I - UMAIR M.I

OSLO METROPOLITAN UNIVERSITY
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What is Intelligence ?





What is Artificial Intelligence ?

A.I is when we artificially introduce intelligence in machines

thereby giving us:

- a machine which mimics human like intelligence
- a machine which has decision making capabilities
- a machine which learns on its own

Software that solves a problem without explicit human instruction

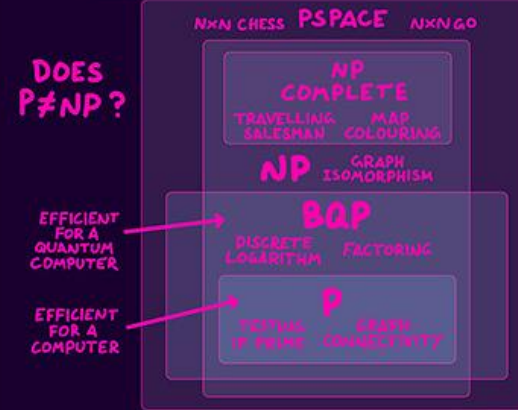
Artificial Intelligence versus conventional programming

Conventional programming	Artificial Intelligence
Programmers look at the problem (desired output) and build an algorithm/application to solve this problem.	Ai programmers show the problem (desired output) to the A.I algorithms and expect the algorithms to find a solution.
A programmer has complete control over their application	An A.I programmer can never claim to have full control over their A.I applications. (Explainable A.I is hard to achieve)
The software must follow a logical series of steps to reach a conclusion (hard coded instructions by the programmer)	Ai applications use the technique of search and pattern matching
Its easy to explain a conventional algorithm	Its very hard to explain how an A.I algorithm reached its desired output
The most important element here is the algorithm	The most important elements here are data and algorithms

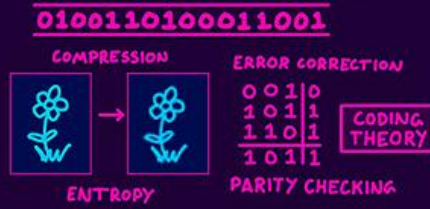


MAP OF COMPUTER SCIENCE

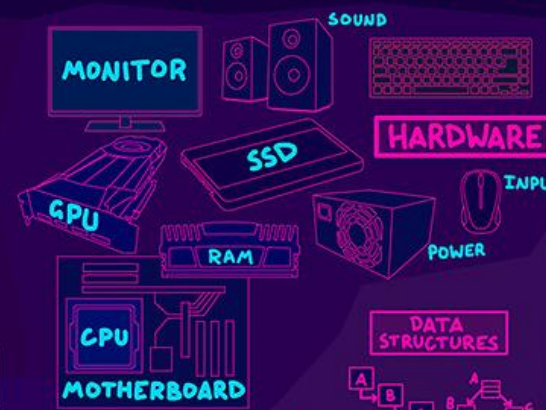
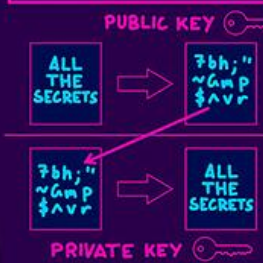
COMPUTATIONAL COMPLEXITY



INFORMATION THEORY



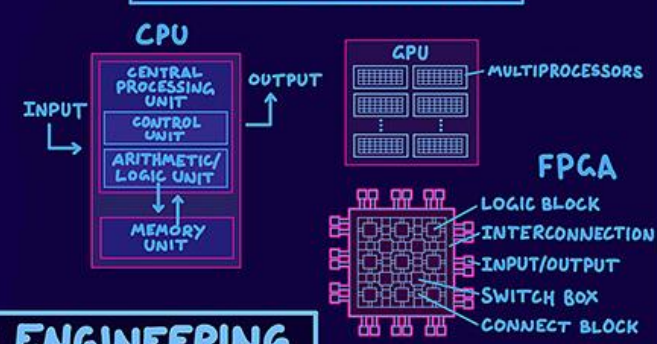
CRYPTOGRAPHY



SCHEDULING



COMPUTER ARCHITECTURE

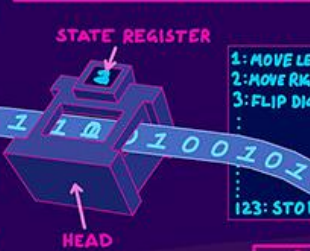


THEORETICAL COMPUTER SCIENCE

COMPUTABILITY THEORY

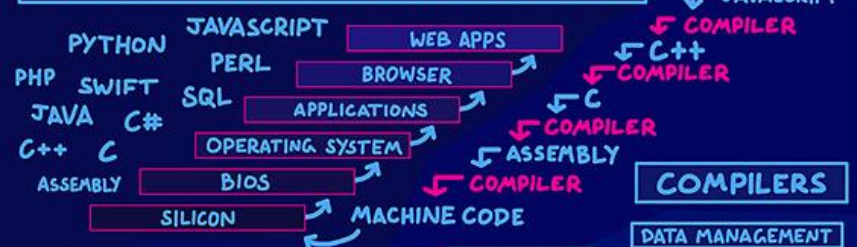


TURING MACHINE

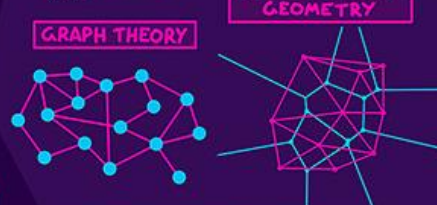
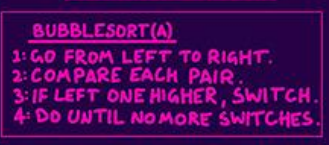


COMPUTER ENGINEERING

SOFTWARE AND PROGRAMMING LANGUAGES



ALGORITHMS



COMPUTABILITY THEORY



TURING MACHINE



DATA STRUCTURES

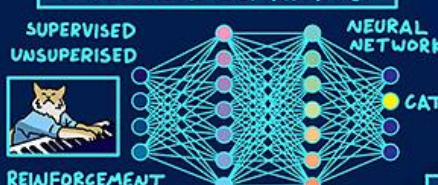


COMPUTER ENGINEERING

SOFTWARE AND PROGRAMMING LANGUAGES



MACHINE LEARNING



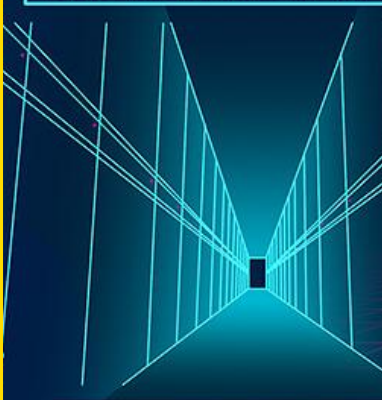
OPTIMISATION



BOOLEAN SATISFIABILITY



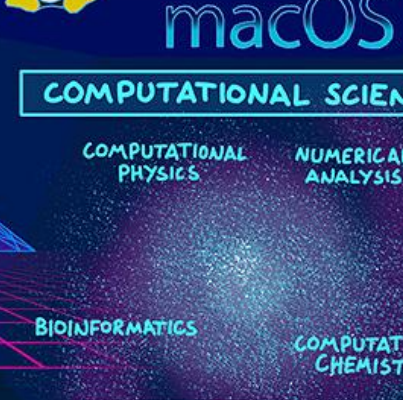
SUPER COMPUTING



SOFTWARE ENGINEERING



OPERATING SYSTEMS



NETWORKING



COMPUTER VISION



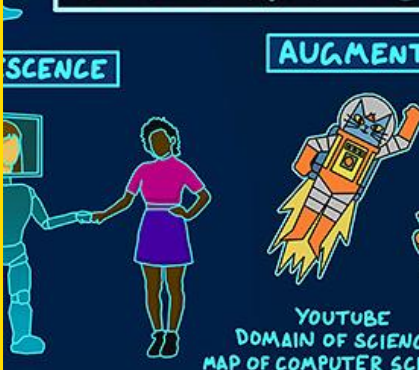
ARTIFICIAL INTELLIGENCE



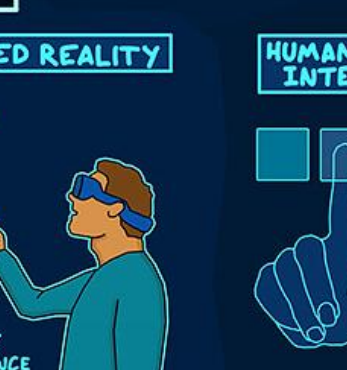
ROBOTICS



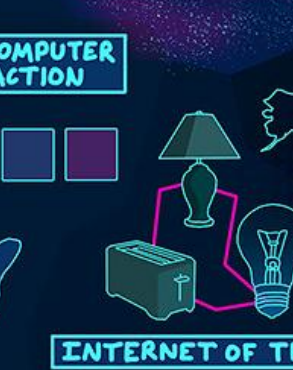
APPLICATIONS



VIRTUAL REALITY



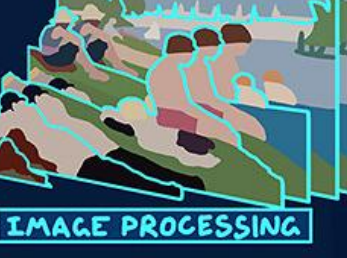
SIMULATION



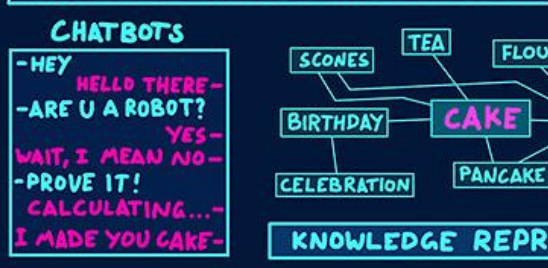
BIG DATA



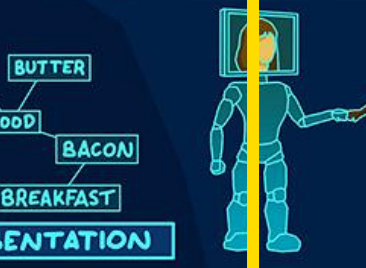
IMAGE PROCESSING



NATURAL LANGUAGE PROCESSING



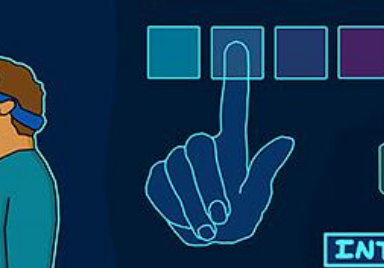
TELEPRESENCE



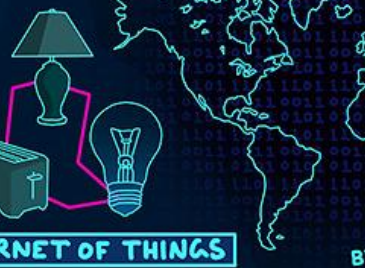
AUGMENTED REALITY



HUMAN COMPUTER INTERACTION



INTERNET OF THINGS



HACKING



The 4th and the biggest industrial revolution



1st Industrial Revolution WATER & STEAM

Steam and water power
replace human and animal power
with machines.

1784



2nd Industrial Revolution ELECTRICITY

Electricity, internal combustion
engines, airplanes, telephones,
cars, radio, and mass production.

1870



3rd Industrial Revolution AUTOMATION

Electronics, the internet and IT
used to further the automation
of mass production.

1969



4th Industrial Revolution CYBER-PHYSICAL SYSTEMS

Driverless cars, smart robotics,
materials that are lighter and
tougher, and a manufacturing
process built around 3D printing.

Now or future ?

History of A.I – important points

- Efforts to create intelligent machines started as early as 1642
 - First mechanical calculating machine – Blaise Pascal
- Turing test was introduced in 1950
- In 1955 we coined the term, “Artificial Intelligence”

A SHORT HISTORY OF AI...

1955

The term “artificial intelligence” is coined at Dartmouth conference and AI is founded as an academic discipline.

1956-1974

Golden years of AI enjoy government funding in promising, logical-based problem-solving approaches.

1987-1993

The second "AI winter" starts with a collapse in the specialized hardware industry. The AI hype brings negative perceptions by governments and investors.

1980-1987

The rise of knowledge-based expert systems brings new successes and a change in focus of research funding towards this form of AI.

1974-1980

Overly high expectations and limited capacities of AI programs leads to the first "AI winter" with reduced funding and interest.

1993-2011

Optimism about AI returns, marked with the help of increased computational power and AI becomes data-driven.

2012-TODAY

Increased availability of data, connectedness and computational power allow for breakthroughs in machine learning, mainly neural networks and deep learning.

WHY ?

Connectedness -> Internet / IOT

Ease of use of A.I applications

2012-TODAY

Increased availability of data, connectedness and computational power allow for breakthroughs in machine learning, mainly neural networks and deep learning.

More Data

Cloud computing

Powerful chips / processors

Machine learning, deep learning

Natural language processing

Can A.I exist on its own ?

Question:

- Can you name a company which is purely an AI company ?
- A.I helps other software services do their job better. e.g:
 - Voice recognition and intelligent search used in A.I assistants
 - Natural Language processing used in Translation services



Examples of A.i in our daily lives



Self driving cars



Image / video analysis



Voice and chat assistants

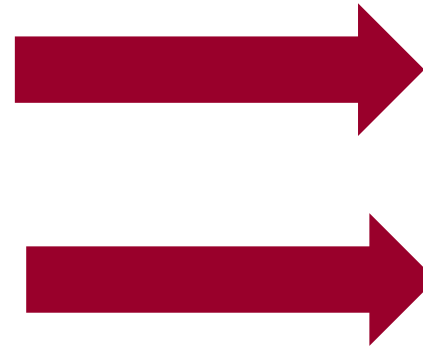
Examples of A.I in our daily lives



Maps

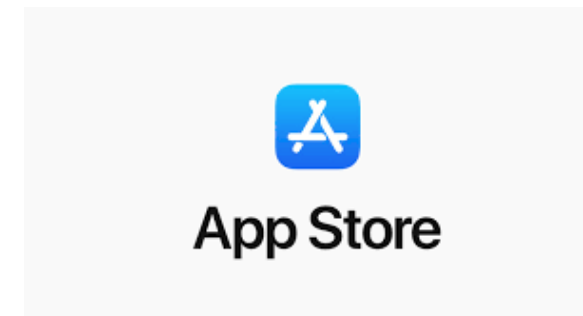
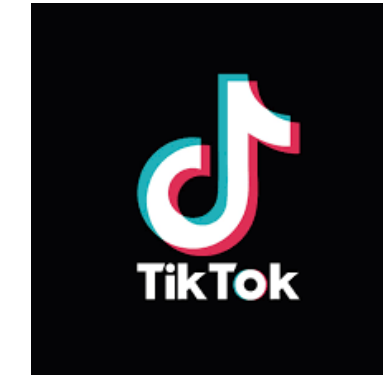
SKETCH <

Examples of A.I in our daily lives



Content recommendation

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Types of A.I

3 Types of A.I



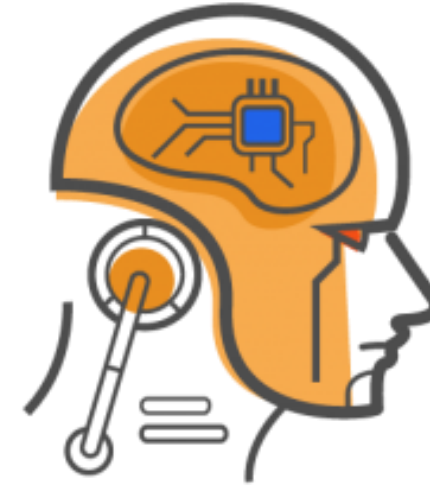
Narrow AI

Dedicated to assist with or take over specific tasks.



General AI

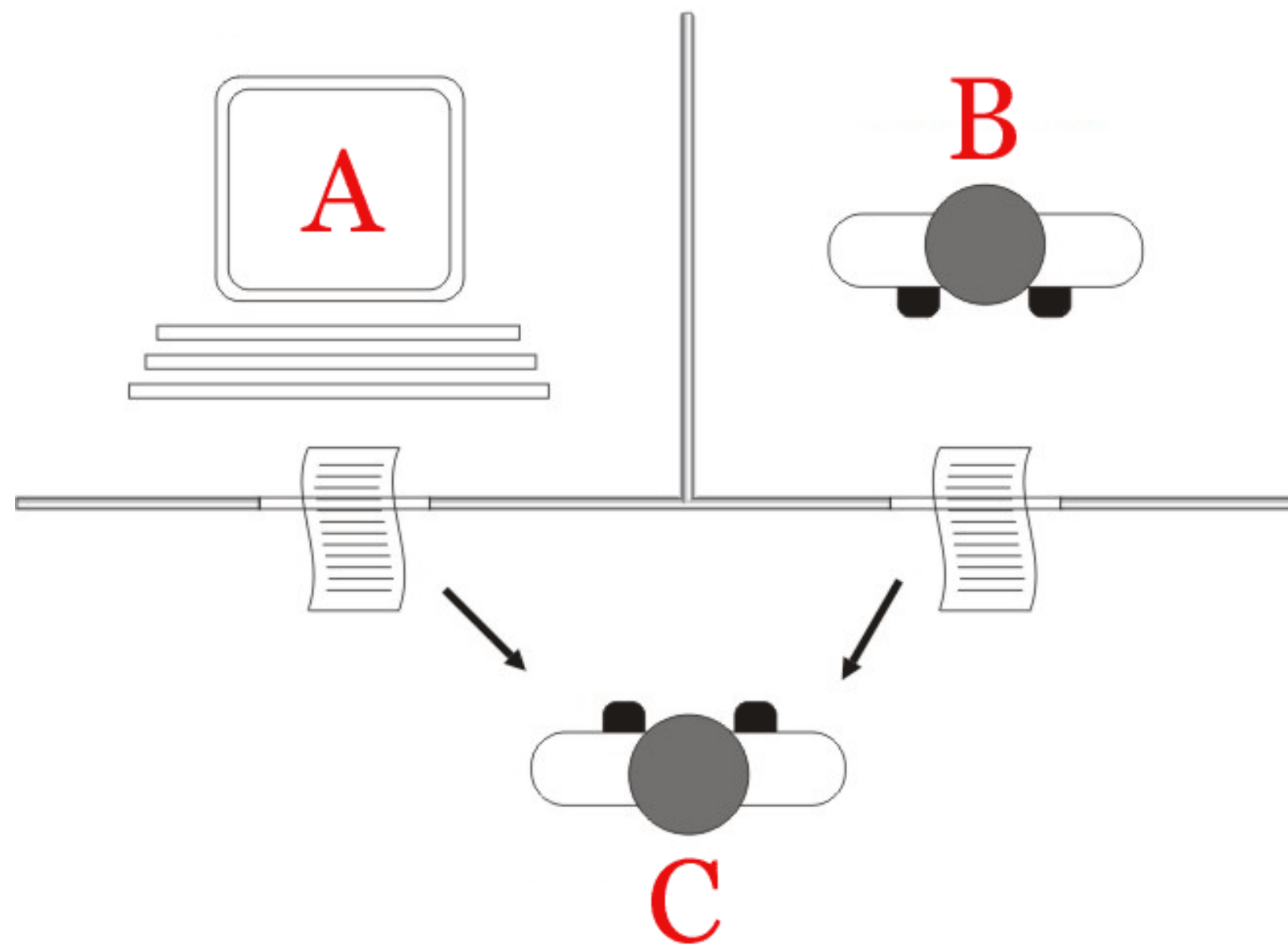
Takes knowledge from one domain, transfers to other domain.



Super AI

Machines that are an order of magnitude smarter than humans.

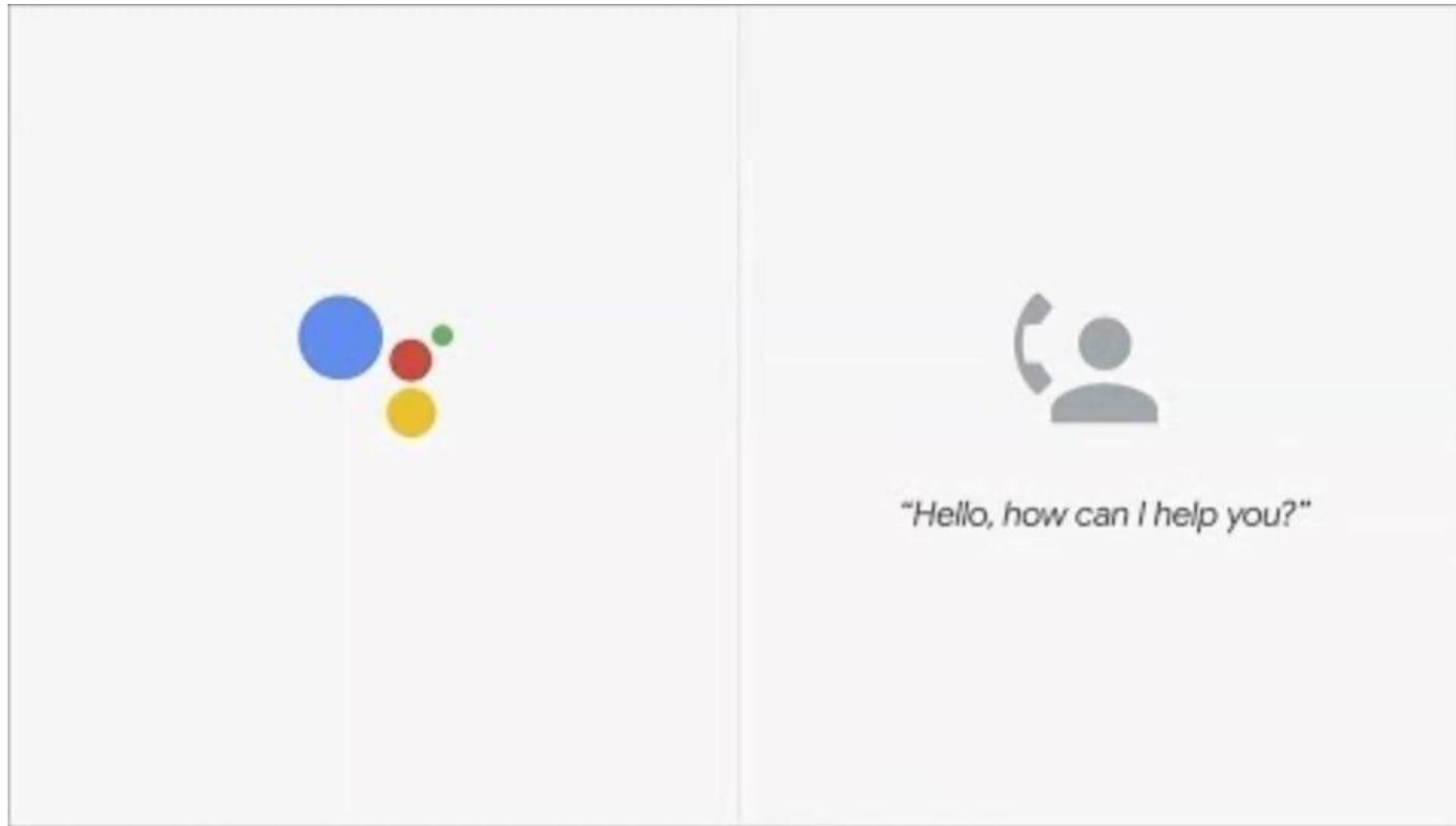
Turing Test – General AI



Can modern AI assistants pass the turing test ?



Google Duplex passed the turing test in 2018



Branches of A.I

ROBOTICS

ARTIFICIAL INTELLIGENCE

Programs with the ability to learn and reason like humans

MACHINE LEARNING

Algorithms with the ability to learn without being explicitly programmed

DEEP LEARNING

Subset of machine learning in which artificial neural networks adapt and learn from vast amounts of data

NATURAL
LANGUAGE
PROCESSING

DATA
SCIENCE

VISION

SPEECH

Skillset needed to work with A.I

Math

- the theoretical background necessary to conduct and apply AI research

Statistics

- empirical skills needed to fit and measure the impact of AI models

Machine Learning

- skills needed to build self learning models like deep learning and other supervised models that power most AI applications today

Statistical Programming

- programming skills needed to implement AI models such as in python and related packages like sci-kit learn and pandas

Software Engineering

- programming skills needed to design and scale AI powered applications

A.I buzz created a lot of negativity

- FOMO
 - Fear of missing out
- FUD
 - Fear, uncertainty and doubt
- Feuds
 - When people with their knowledge of A.I fight with each other
 - Ref:<https://techcrunch.com/2017/07/25/elon-musk-mark-zuckerberg-artificial-intelligence/>



A.I buzz is also helping to solve many problems

- Human trafficking
- Money Laundering
- Terrorism
- Covid19 research
- etc ..

