



Introduction to Artificial Intelligence and Machine Learning

Data Predictive Analytic Team
Group Strategic Information Technology (GSIT)



BCA

HELLO!

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Informatics / Computer Science Graduate from ITB
(2019)



william-sutanto



TABLE OF CONTENTS

01 What is Artificial Intelligence?

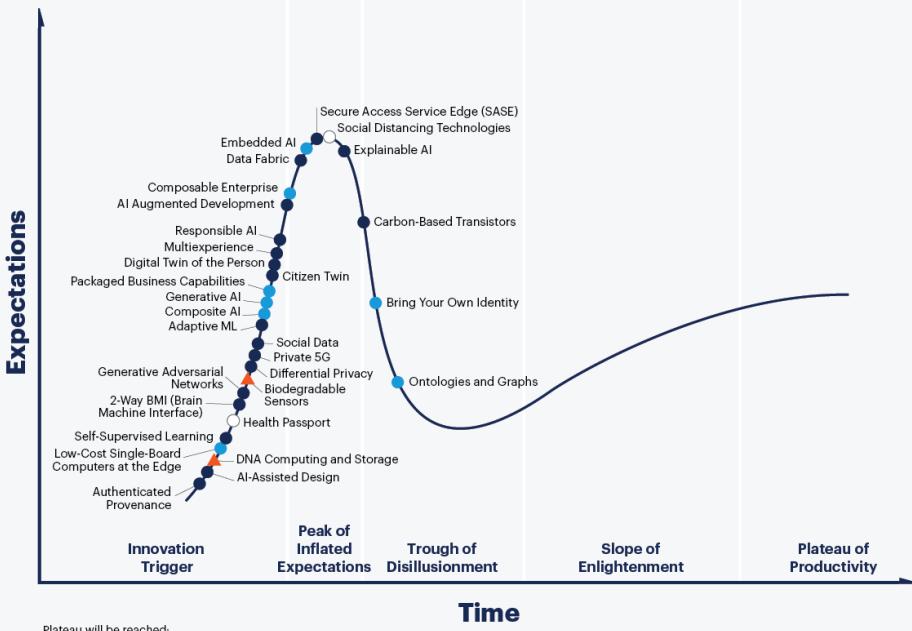
02 Why Artificial Intelligence is growing faster?

03 Artificial Intelligence Usage

04 Machine Learning Definition

05 ML project in BCA

Hype Cycle for Emerging Technologies, 2020



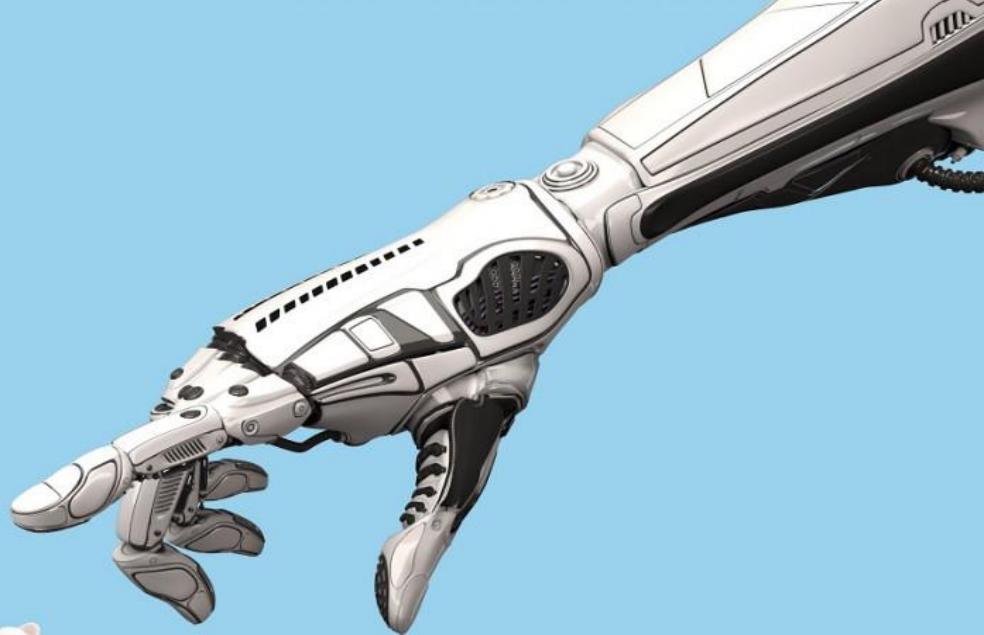
gartner.com/SmarterWithGartner

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Gartner

What is AI?

Intelligence agent (machine) that perceive environments and takes actions that maximize its chance of successfully achieving its goal



“Thinking and acting
humanly”

WHY NOW?

A DAY IN DATA

The exponential growth of data is undisputed, but the numbers behind this explosion - fuelled by internet of things and the use of connected devices - are hard to comprehend, particularly when looked at in the context of one day

 500m
tweets are sent every day
Twitter

 4PB
of data created by Facebook, including
350m photos
100m hours of video watch time
Facebook Research

DEMYSTIFYING DATA UNITS

From the more familiar "bit" or "megabyte", larger units of measurement are more frequently used to explain the masses of data

Unit	Value	Size
b	bit	0 or 1
B	byte	8 bits
KB	kilobyte	1,000 bytes
MB	megabyte	1,000 ² bytes
GB	gigabyte	1,000 ³ bytes
TB	terabyte	1,000 ⁴ bytes
PB	petabyte	1,000 ⁵ bytes
EB	exabyte	1,000 ⁶ bytes
ZB	zettabyte	1,000 ⁷ bytes
YB	yottabyte	1,000 ⁸ bytes

*A lowercase "b" is used as an abbreviation for bits, while an uppercase "B" represents bytes.

 294bn
billion emails are sent
Radical Group

 3.9bn
people use emails
Statista

 320bn
emails to be sent each day by 2021
Statista

 306bn
emails to be sent each day by 2020
Statista

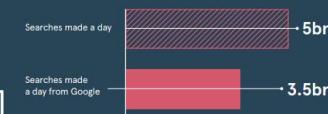
 4TB
of data produced by a connected car
Intel



ACCUMULATED DIGITAL UNIVERSE OF DATA



 65bn
messages sent over WhatsApp and two billion minutes of voice and video calls made
Facebook

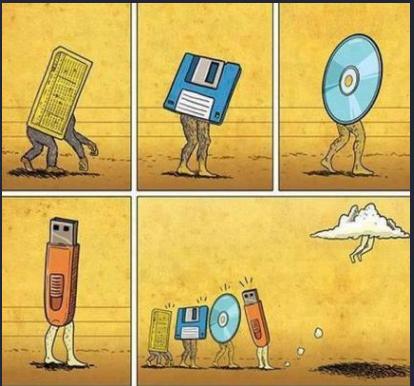


 463EB
of data will be created every day by 2025
IDC

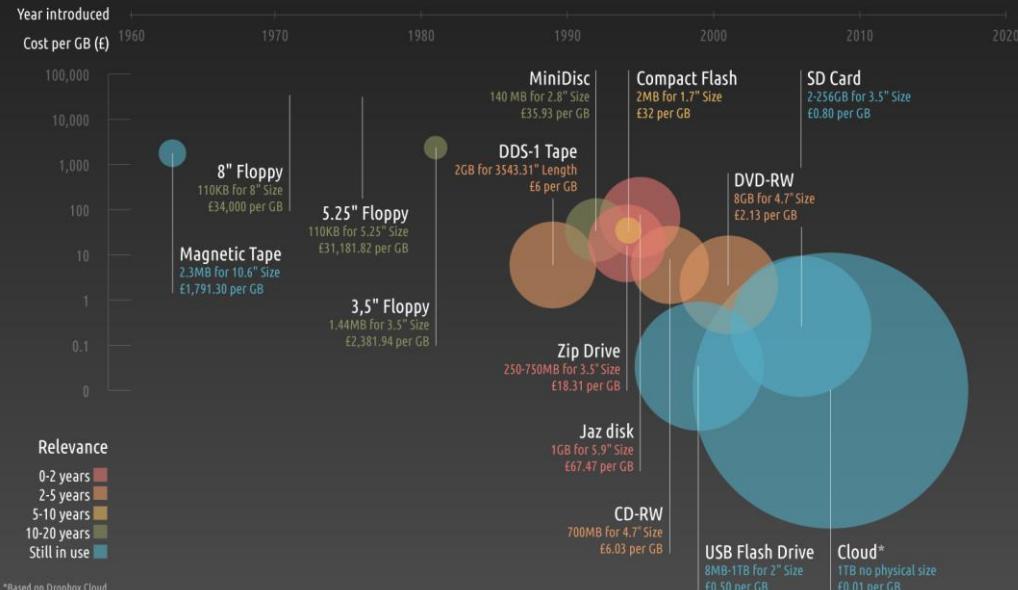
 95m
photos and videos are shared on Instagram
Instagram Business

 28PB
to be generated from wearable devices by 2020
Statista

WHY NOW?



The Evolution of Data Storage



NimbusHosting

Sources	https://www.cs.auckland.ac.nz/historidisplays/FifthFloor/MagneticDataStorage/MagneticTapes.php - http://www.radioshackcatalogs.com/html/1985/rh177.html - https://en.wikipedia.org/wiki/CD-RW - https://en.wikipedia.org/wiki/Floppy_disk#3.25_inch_Floppy_disk - https://en.wikipedia.org/wiki/Zip_drive - http://www.ebay.com/itm/178/fb1/usb-flash-drive - http://www.zetta.net/history-of-computer-storage - http://royalfilm.com/2008/the-history-of-computer-data-storage-in-pictures/ - http://www.coolinfographics.com/post/2018/12/the-lifespan-of-storage-media.html - https://en.wikipedia.org/wiki/Floppy_disk - http://www.wm1.com/flashdrive.htm - http://www.pcmag.com/article/2.81/2017.905379.000.asp - http://www.wm1.com/flashdrive.htm - http://www.iromountain.com/Knowledge_Center/Reference/Library/View-by-Document/Type/PDF/General-Articles/T/The-History-of-Magnetic-Tape-and-Computing-A-65-Year-Old-Marriage-Continues-to-Evolve.aspx - https://books.google.co.uk/books?id=BfJyAAAMAAJ&pg=PA13&dq=compact+floppy+mb+original+cost+msrp+source&hl=&ots=y_45KRB&sig=_eyjQaKHQ51xGpCwT8rD0newhl=en&sa=X&ved=0AhUkFwfuM0MqMhC4XK4HhB0_006AF6A&qid=1481084806&ref_=compSearchProd20%20mb%20in+0.1%20%20%20&saS=false
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WHY NOW?

1 The accelerating pace of change ...

Agricultural Revolution ↔ 8,000 years Industrial Revolution ↔ 120 years Light-bulb ↔ 90 years Moon landing

World Wide Web ↔ 22 years Human genome sequenced

2045
 10^{16}
Surpasses brainpower equivalent to that of all human brains combined

2 ... and exponential growth in computing power ...

Computer technology, shown here climbing dramatically by powers of 10, is now progressing more each hour than it did in its entire first 90 years

COMPUTER RANKINGS

By calculations per second per \$1,000



Analytical engine
Never fully built, Charles Babbage's invention was designed to solve computational and logical problems



Colossus

The electronic computer, with 1,500 vacuum tubes, helped the British crack German codes during WW II



UNIVAC I

The first commercially marketed computer, used to tabulate the U.S. Census, occupied 943 cu. ft.



Apple II

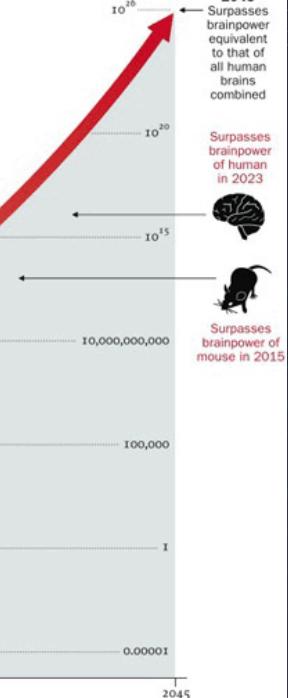
At a price of \$1,298, the compact machine was one of the first massively popular personal computers

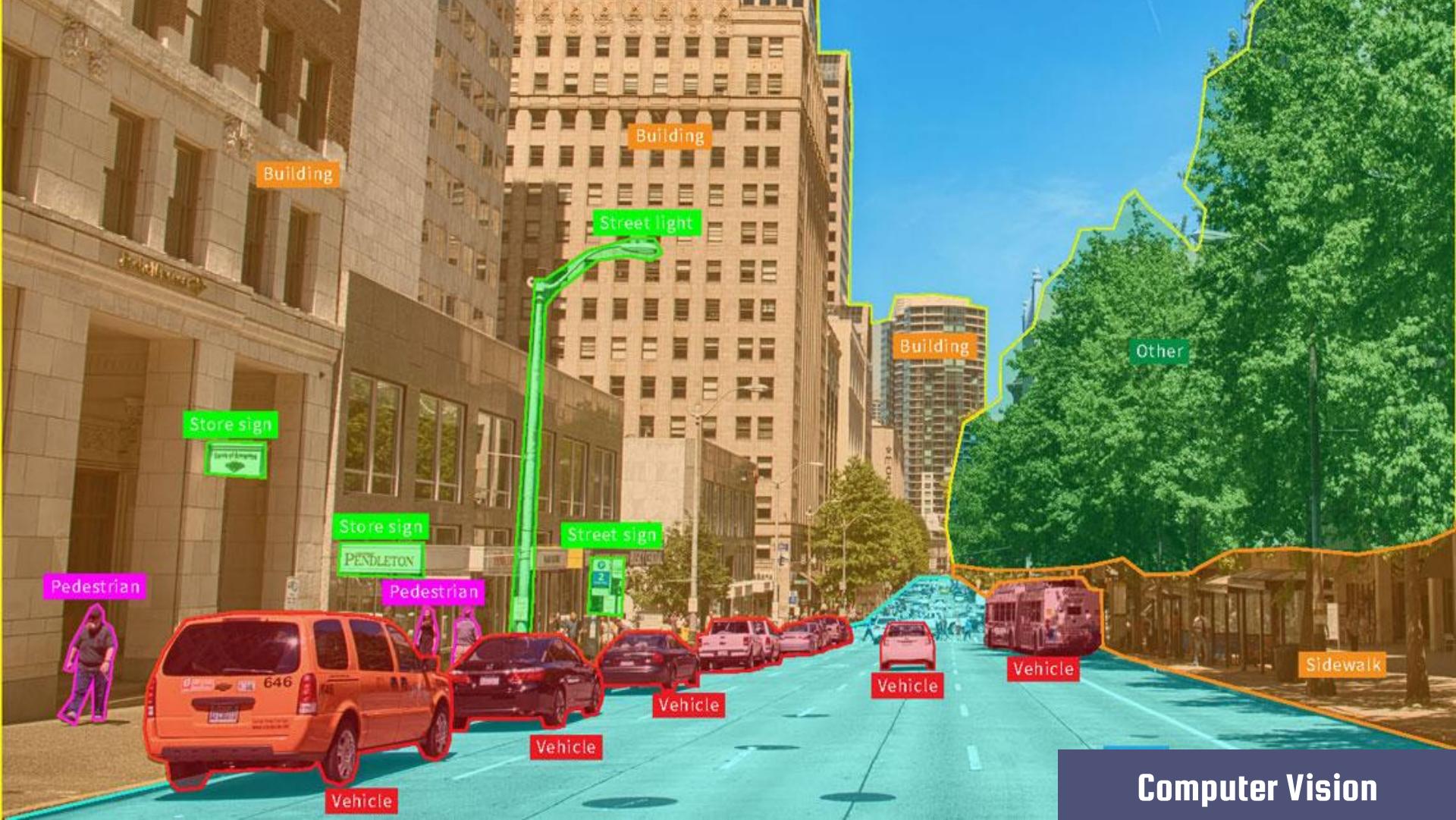


Power Mac G4

The first personal computer to deliver more than 1 billion floating-point operations per second

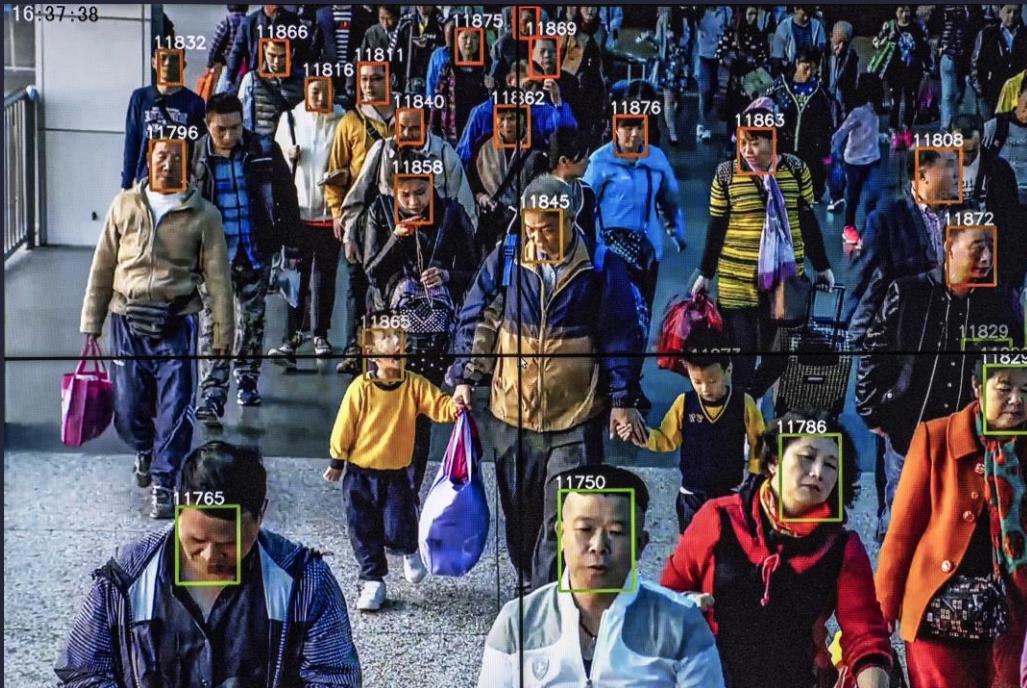
3 ... will lead to the Singularity





Computer Vision

Computer Vision – Face Authentication



Computer Vision – Face Recognition



Computer Vision – Autonomous Driving



Computer Vision – Face Filter

Human vs Machine: Lung Tumor

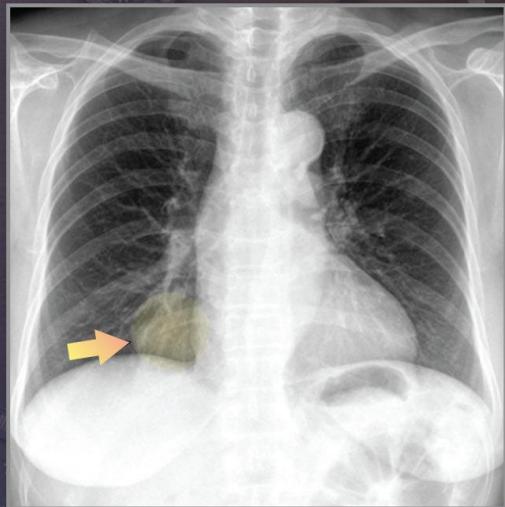
Chest X-Rays image the lungs, heart, blood vessels, and bones. AI has been used to read and understand them.

Example:

Lung Tumor

Computers:
Score: 0.291

Doctors:
2/15 Detected



Clearvue Health

Hwang et al

Human vs Machine: Pneumonia

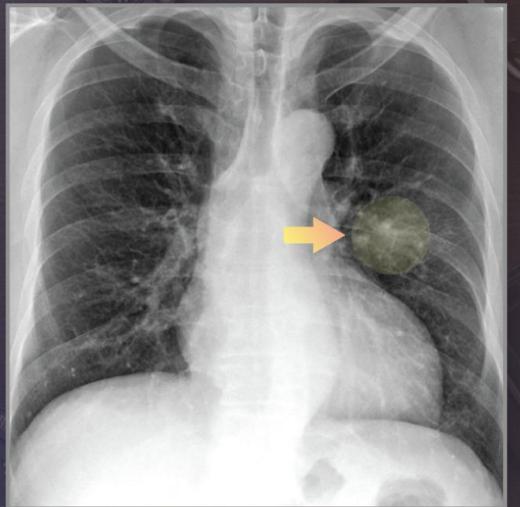
Chest X-Rays image the lungs, heart, blood vessels, and bones. AI has been used to read and understand them.

Example:

Pneumonia

Computers:
Score: 0.371

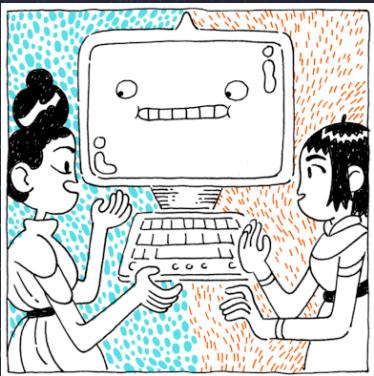
Doctors:
0/15 Detected



Clearvue Health

Hwang et al

Natural Language Processing



Nancy Perez

Paid Media Manager, Qualzen

What a great first day! Can't wait for the networking event tonight.



20

78

Sentiment Analysis

The image shows a comparison between two screenshots of Google Translate. The left screenshot, labeled 'Before', shows a single English translation for the Turkish phrase 'o bir doktor' ('he is a doctor'). The right screenshot, labeled 'After', shows both the female ('she is a doctor (feminine)') and male ('he is a doctor (masculine)') translations, indicating that the system now considers gender specificity.

Translation



Chatbot

Speech Recognition



Google Home

Voice-activated speaker



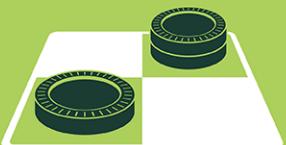
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING DIFFERENCE?

Machine that perceive environments and takes actions that maximize its chance of successfully achieving its goal

"Thinking and acting humanly"

ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



MACHINE LEARNING

Machine learning begins to flourish.



DEEP LEARNING

Deep learning breakthroughs drive AI boom.



1950's 1960's 1970's 1980's 1990's 2000's 2010's

Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

Give computer ability to learn without explicitly programmed

Traditional Programming

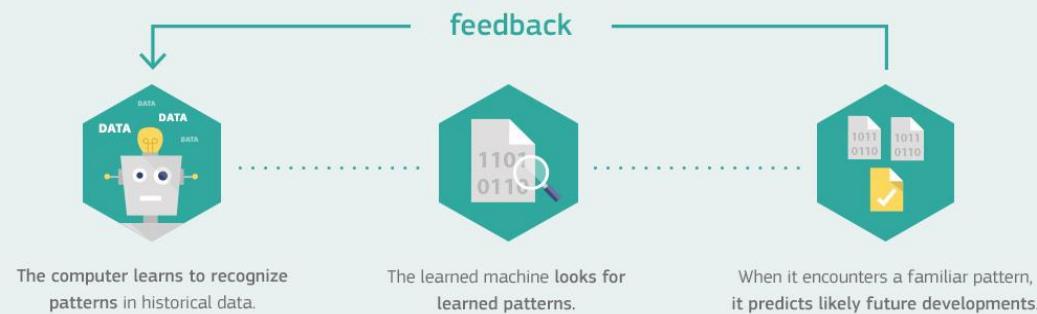


Machine Learning



machine is trained to
learn from it's past
experience

The past experience is
developed through the
data collected



Example

Gender	Age	Malaria
Male	13	Yes
Male	36	Yes
Female	27	No
Female	39	No



IF Gender=Male THEN Yes
ELSE No

Gender	Age	Weight	Malaria
Male	13	50	No
Male	36	70	Yes
Female	27	58	Yes
Female	39	63	No
Female	19	48	Yes



MACHINE LEARNING IN **BCA**



1

Fraud Detection

Protect BCA customer's account by applying technology to detect and prevent account takeover, card skimming, etc.

Utilizing Machine Learning to let the machine find the fraudulent activity pattern.



2

Credit Scoring

A numeric expression measuring people's creditworthiness.

Machine Learning algorithm help banking to support the decision making about credit applications

3

Recommendation Engine

Used to identify those most likely to respond to an offer based on the customer's characteristics



Property Appraisal

Predict Property value by learning from statistical data the relationship between parameters and the property price.

e.g: Land Area, Building Area, Postal Code, Road Width, Number of Floors, Facing, etc.



THANKS

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