

Dr. Achmad Solichin, SKom, MT.I

TOP 10

Artificial
INTELLIGENCE

TECHNOLOGY & RESEARCH TRENDS

IN 2021



artificial intelligence

“the designing and building of **intelligent agents** that receive **percepts** from the **environment** and take **actions** that affect that environment”

Russel & Norvig, 2016 “Artificial Intelligence: A Modern Approach”

● Artificial intel...
Search term

● machine lear...
Search term

● deep learning
Search term

+

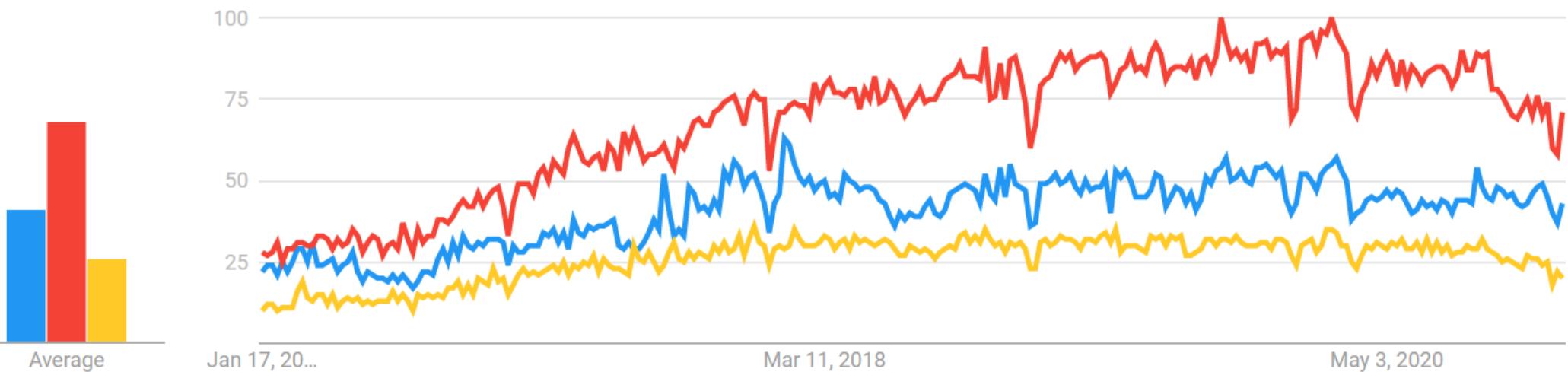
Worldwide ▾

Past 5 years ▾

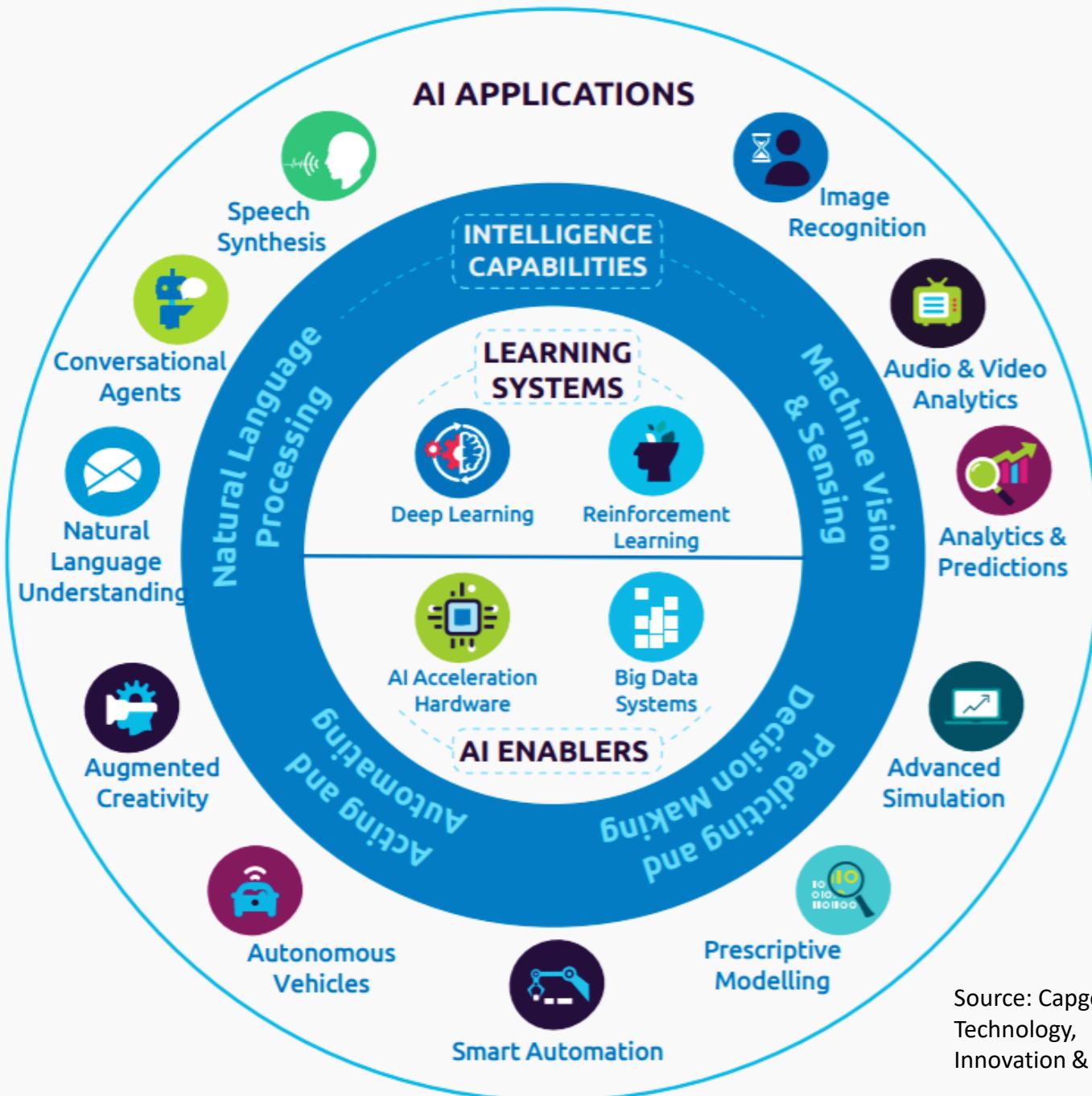
All categories ▾

Web Search ▾

Interest over time ?



AI Taxonomy



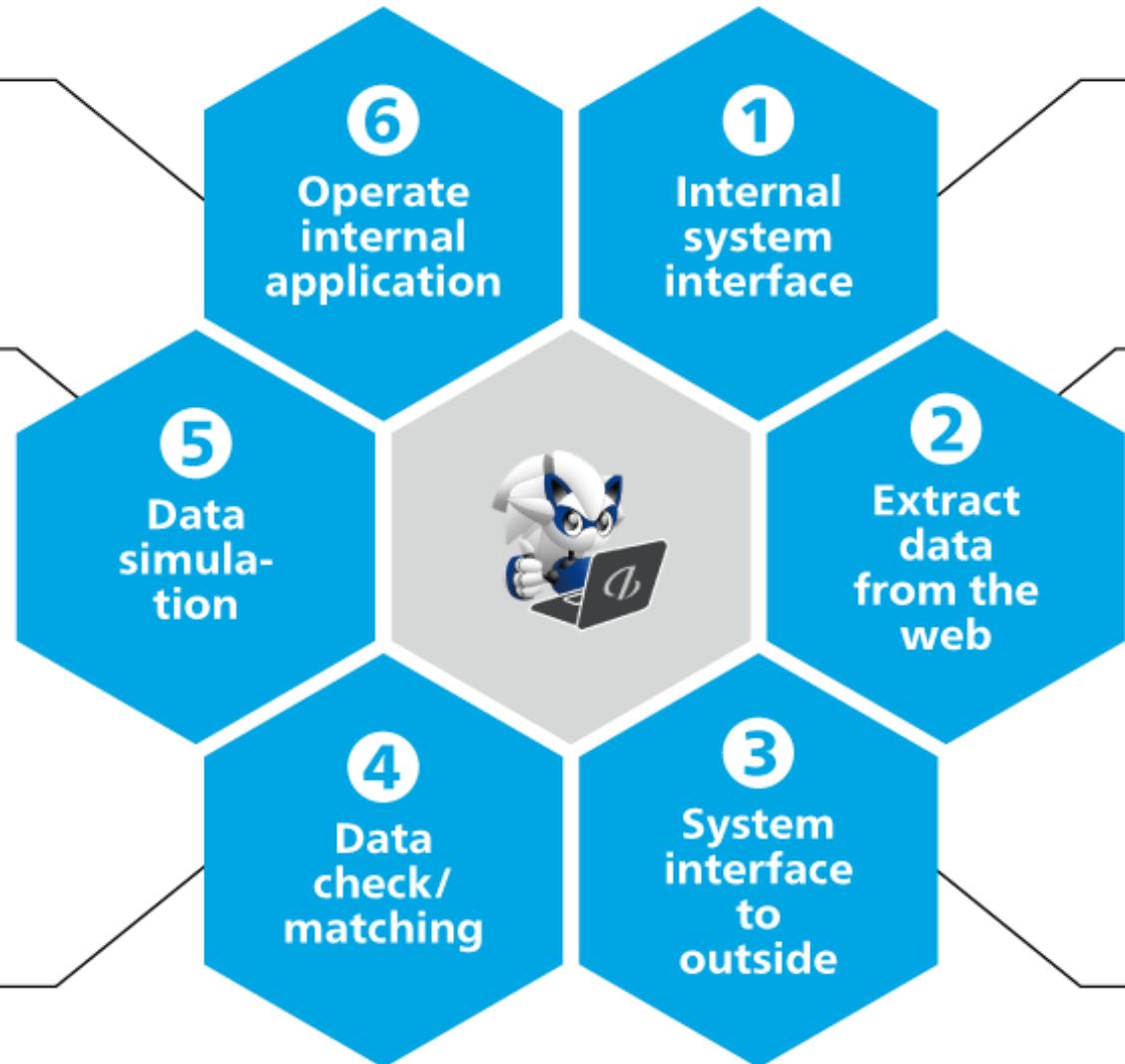
Source: Capgemini
Technology,
Innovation & Ventures

#1

ROBOTIC PROCESS AUTOMATION

Robotic Process Automation (RPA) is a technology that allows anyone to configure computer **software**, or a “**robot**” to emulate and integrate the actions of a human interacting within digital systems to **execute a business process**.

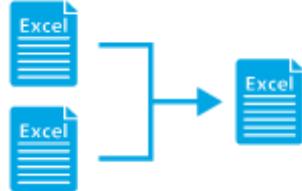
6 common functions of RPA



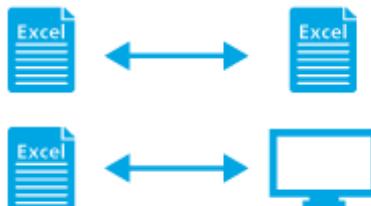
- Work Flow execution
- Send email
- Search data with specific logic



- Simulate data and reporting
- Merge multiple reports and modify



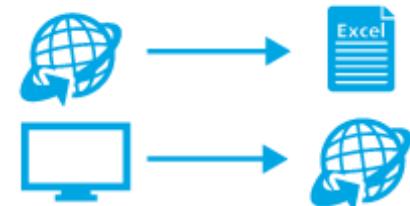
- Check the unusual result
- Contents check based on the rule



- Interface data from legacy system to front system

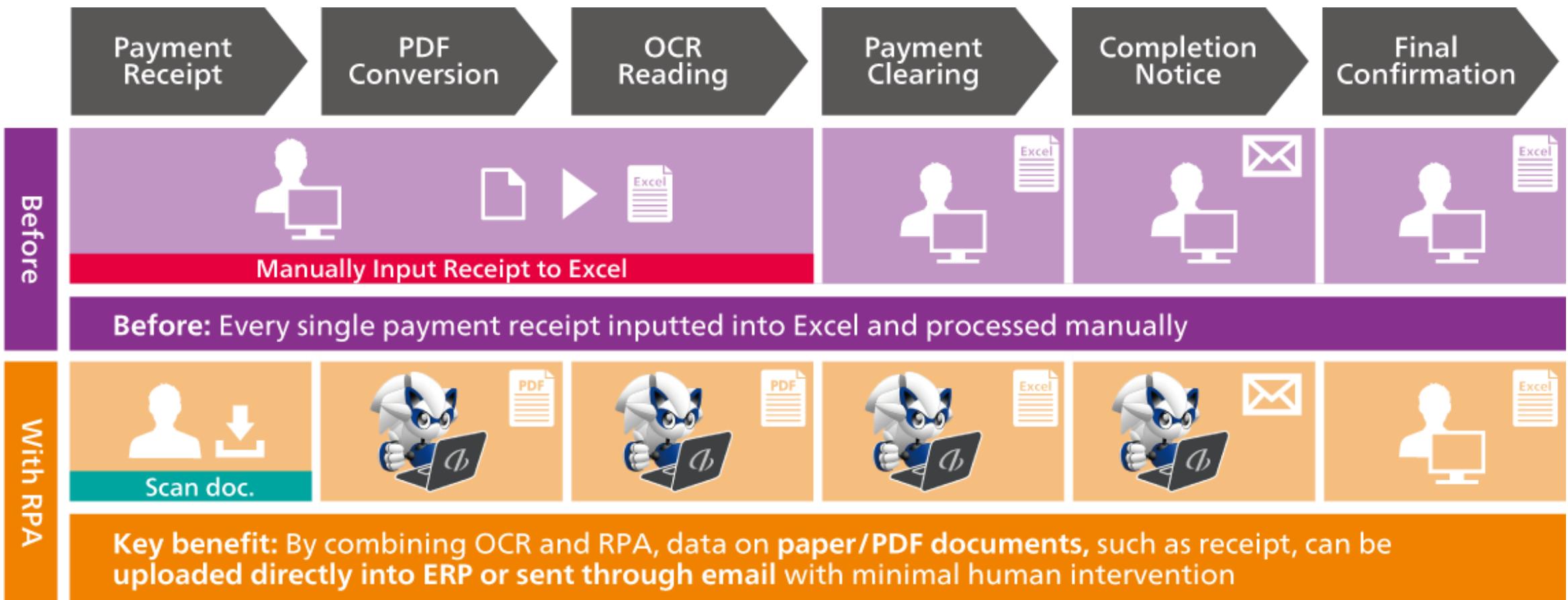


- Competitor research
- Stock price check
- Update the data on intranet



- Interface to EDI
- Operate Web Banking of Bank
- Data interface among group company

Before and After Using RPA



#2

SMART HEALTH

What is Smart Health?

Provision of **health-related services** using a network of context-aware **intelligent agents**.

AI in Healthcare Systems

- Today's healthcare systems have recognized the advantages of smart technology that can **improve healthcare quality**, thereby turning traditional technologies into smart health care.
- Smart medical technology can define **better monitors, diagnostic tools for patient treatment**, and devices to improve the quality of life.
- Key smart health concepts include **eHealth** and **mHealth** services, **electronic record management**, **smart home medical services**, and **connected smart medical devices** using the latest IoT (internet of things) and **wearable** computing technologies

Patient monitoring system for wearable devices

(Cho, 2019)



Typical screen of patient monitor and related functions

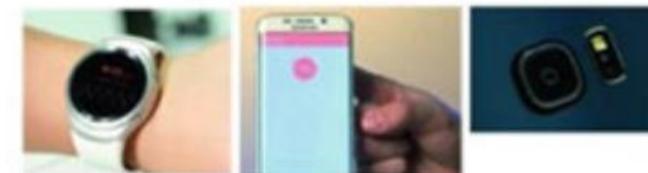
- ECG/arrhythmia
- Pulse rate/SpO₂/respiration
- Body temperature
- Noninvasive/invasive blood pressure

ECG/arrhythmia analysis



Smartphone accessory/ECG patch

Pulse rate/SpO₂/respiration measurement

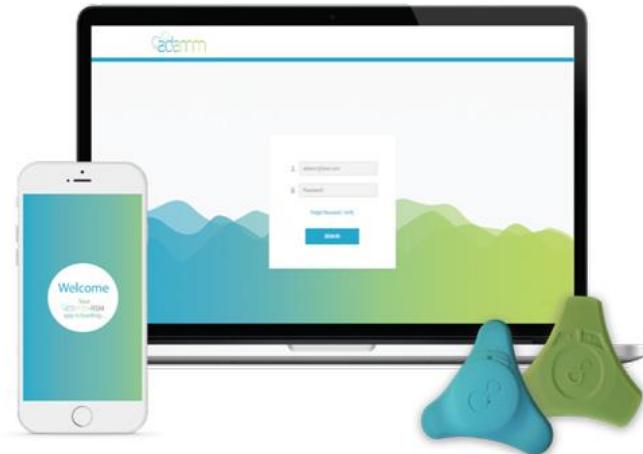


Smart watch/smartphone sensor

Body temperature measurement



Smartphone accessory/patch



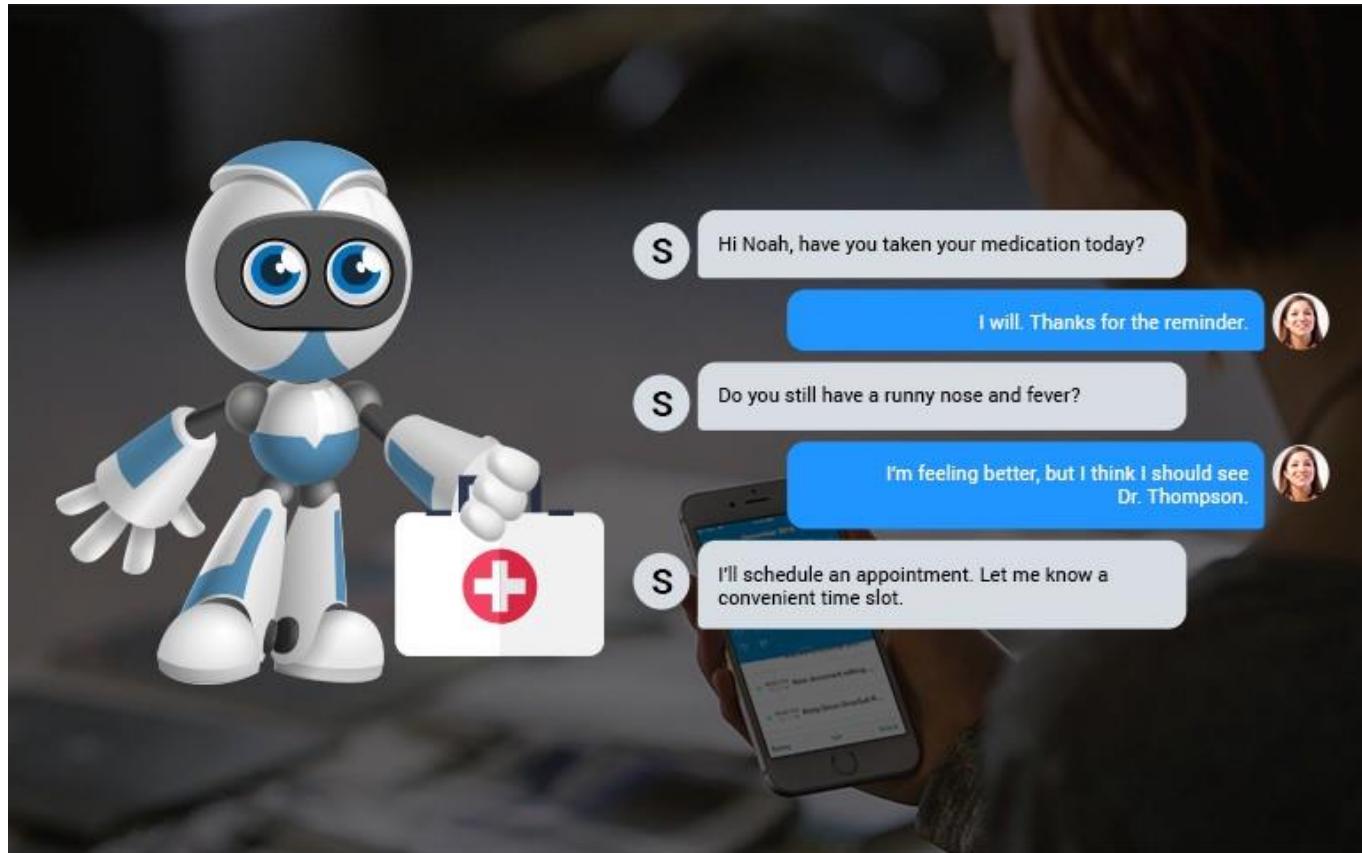
ADAMM : Intelligent Asthma Management

A small, flexible, device that uses medical grade adhesives to adhere to the user's upper torso. Wirelessly monitors respiratory symptoms, and transfers data via bluetooth to the users' device.



Wearable Flexible Sensors (WFS)

A wearable sweat-sensing device mounted on the back of the hand transmits perspiration data and skin temperature back to a smartphone. (*John Rogers Research Group*)

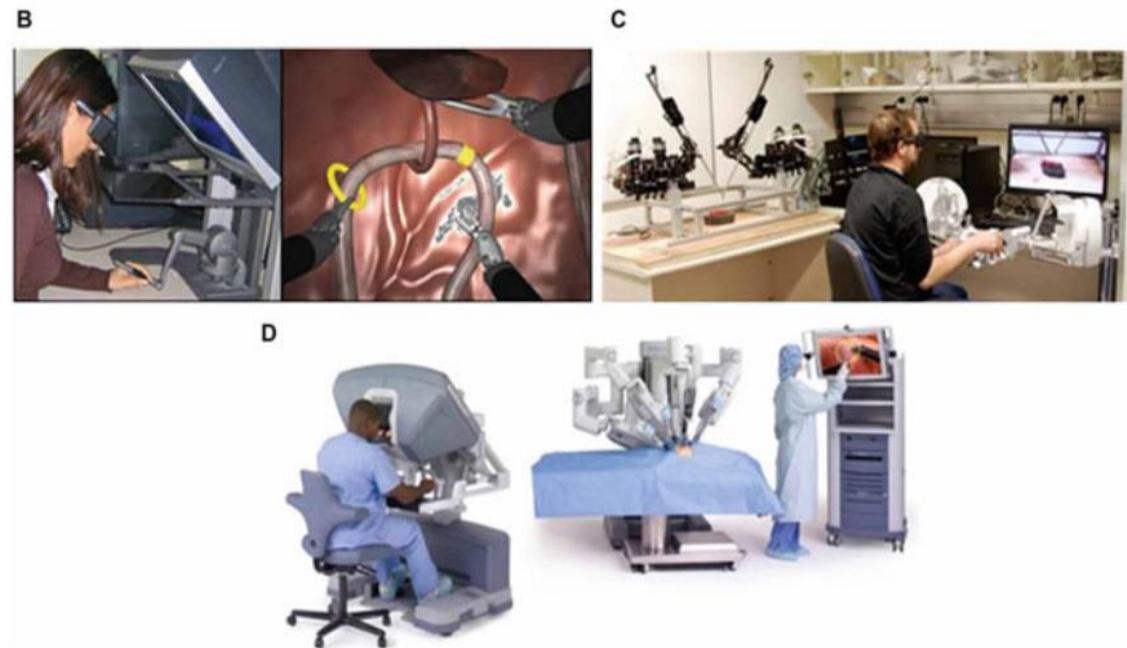
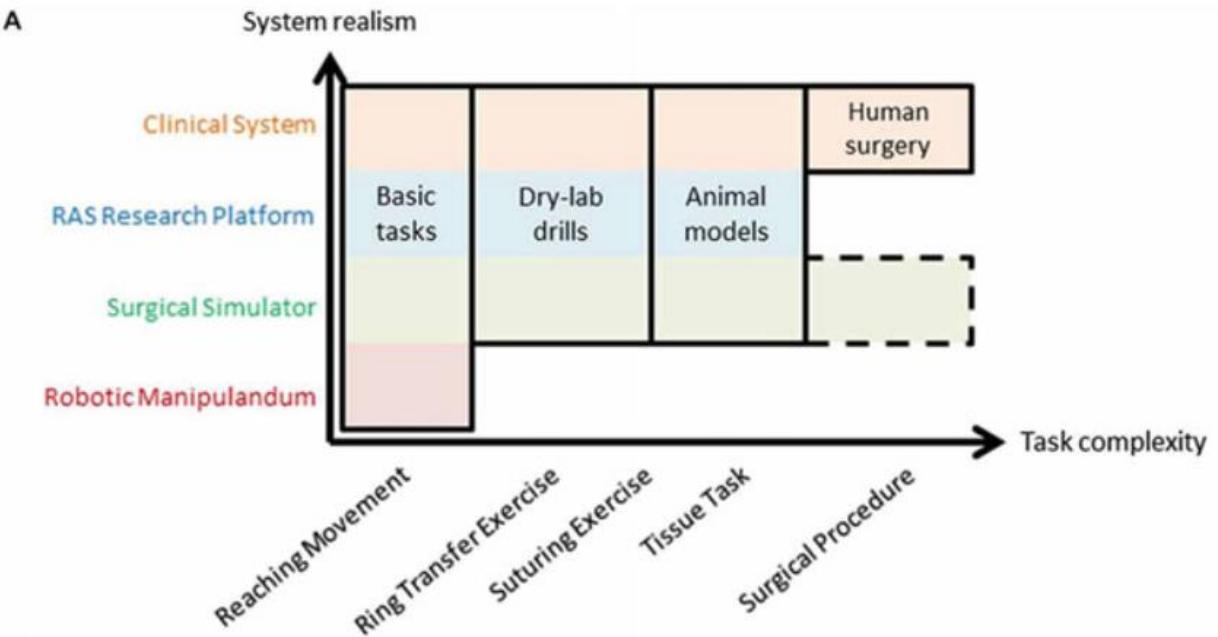


Health Chatbot

1. OneRemission
2. Youper
3. Safedrugbot
4. Babylon Health
5. Florence
6. GYANT
7. etc

Robot-Assisted Surgery (RAS) Technology

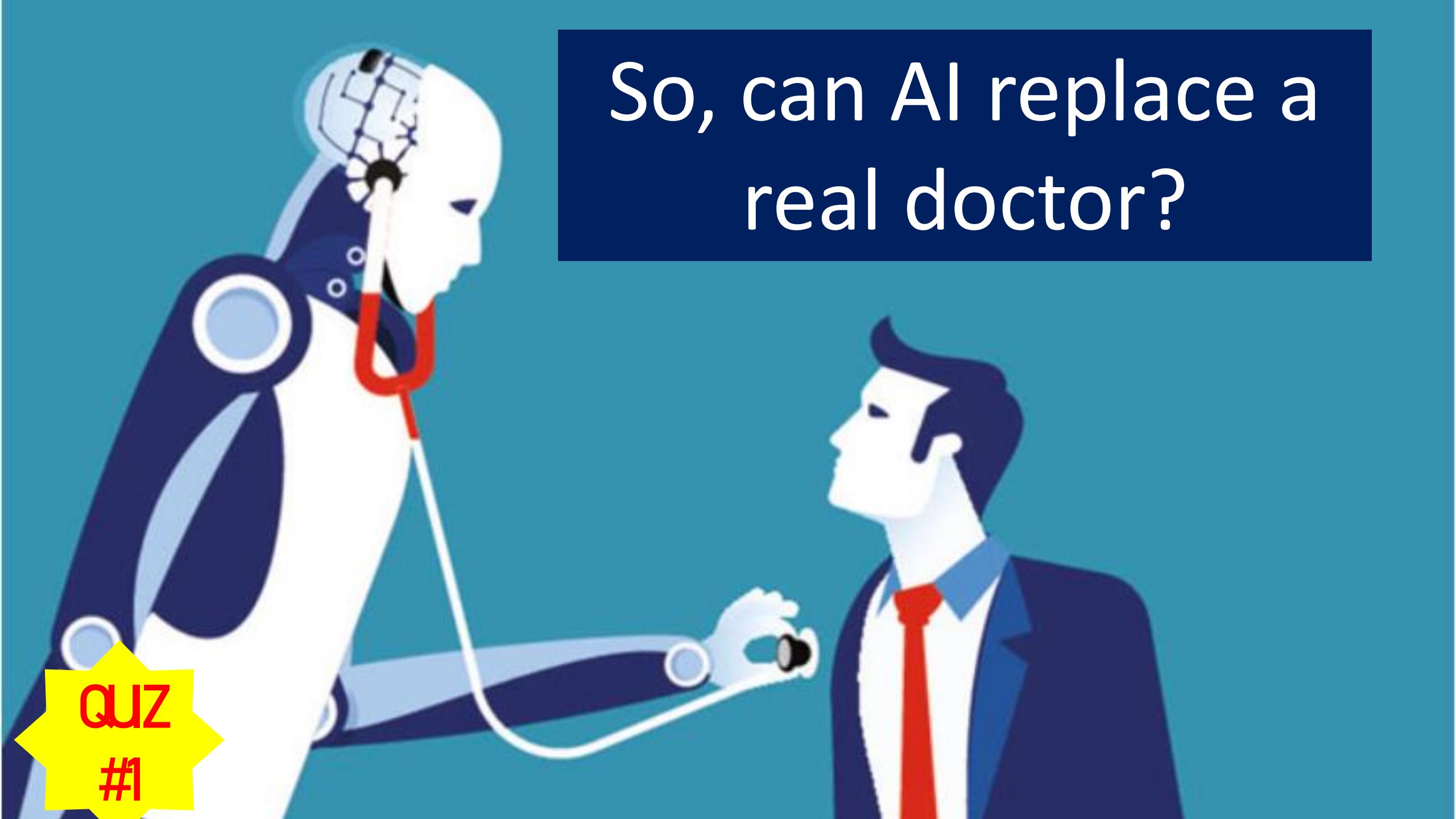
(Jarc and Nisky, 2015)



GeNose: AI-based Detection for Covid-19



- **GeNose** identifies the corona virus by detecting Volatile Organic Compound (VOC).
- It does not detect the virus directly. What they detect are gas metabolites when a person is infected with the virus
- The composition of the gas in the human breath can also distinguish one disease from another. To track this composition, the UGM team uses **artificial intelligence (AI)** because it has to check thousands of gas compositions.

A stylized illustration of a doctor and a patient. The doctor, on the left, is depicted with a white head and shoulders, wearing a blue suit jacket over a white shirt and red tie. He has a large, red, U-shaped stethoscope around his neck. His head is shown in profile, facing right, with a white brain visible inside, featuring several cracks and a central black eye-like structure. The patient, on the right, is shown from the side, looking up at the doctor. He has dark hair and is wearing a dark blue suit jacket, a light blue shirt, and a red tie.

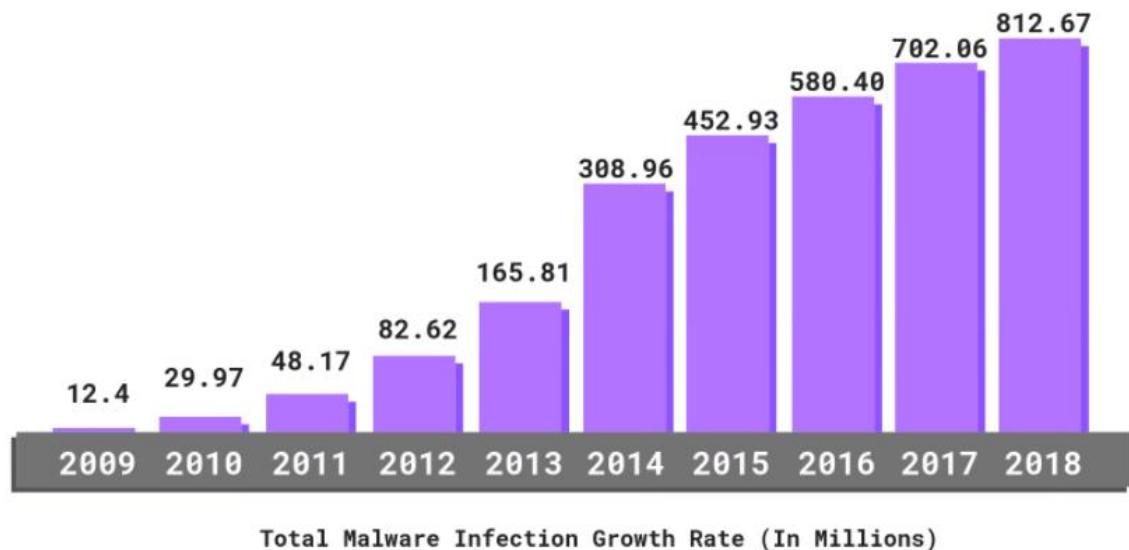
So, can AI replace a
real doctor?

QUIZ
#1

#3

AI FOR CYBERSECURITY & DATA BREACHES

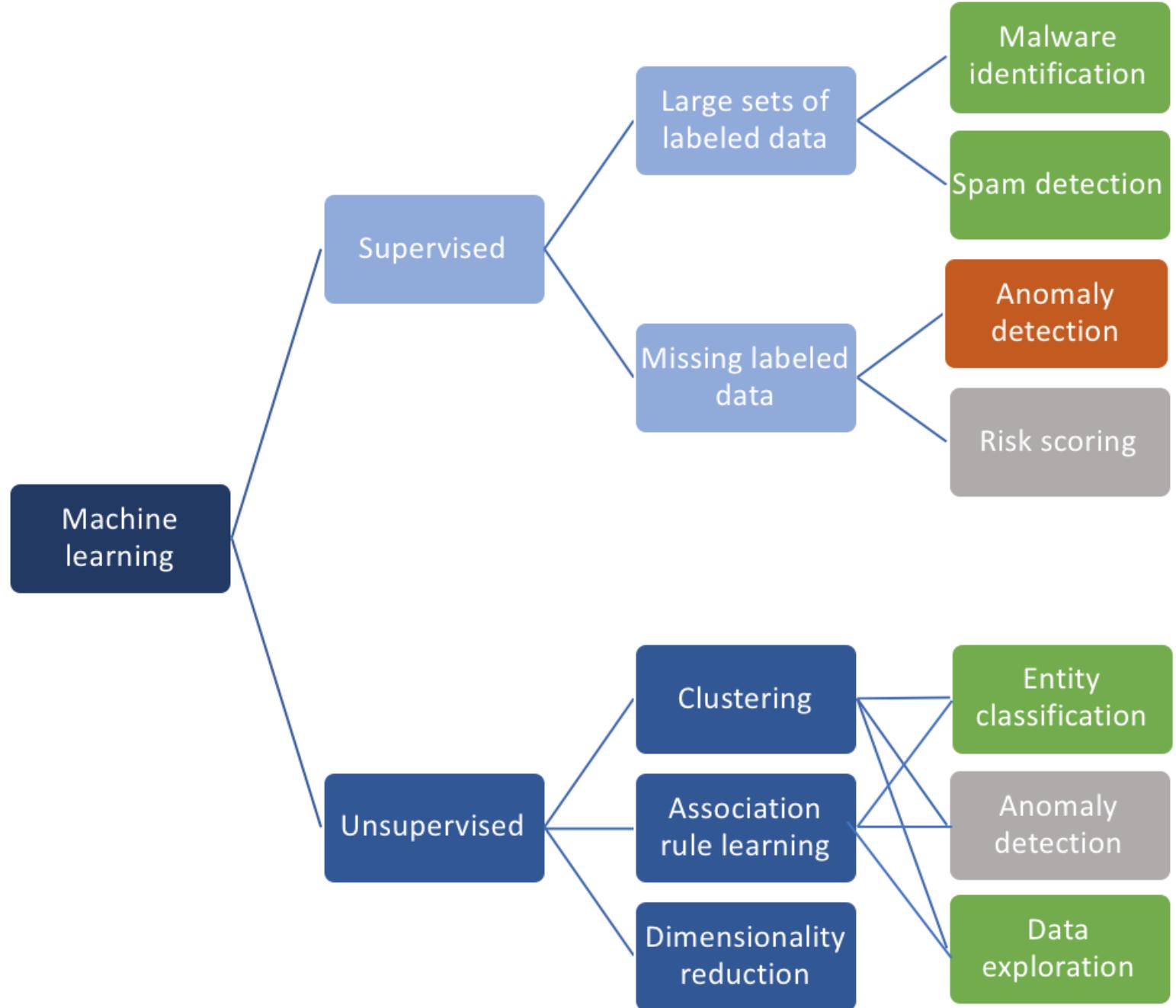
Cybercrime Up 600% Due To
COVID-19 Pandemic



AI for Cybersecurity & Data Breaches

- In 2021 and beyond, digital data will be at **more risk to be hacked** and vulnerable to phishing attacks.
- **AI and advanced technologies** will provide support to the security department against malicious activities in every field.
- AI will help to **prevent cybercrimes** in future with enhanced enterprise cybersecurity measures.
- The AI-supported system will spot **fake digital activity** or transactions that follow criminal patterns.

Machine Learning in Cybersecurity



Data mining processes in MITRE's intrusion detection system

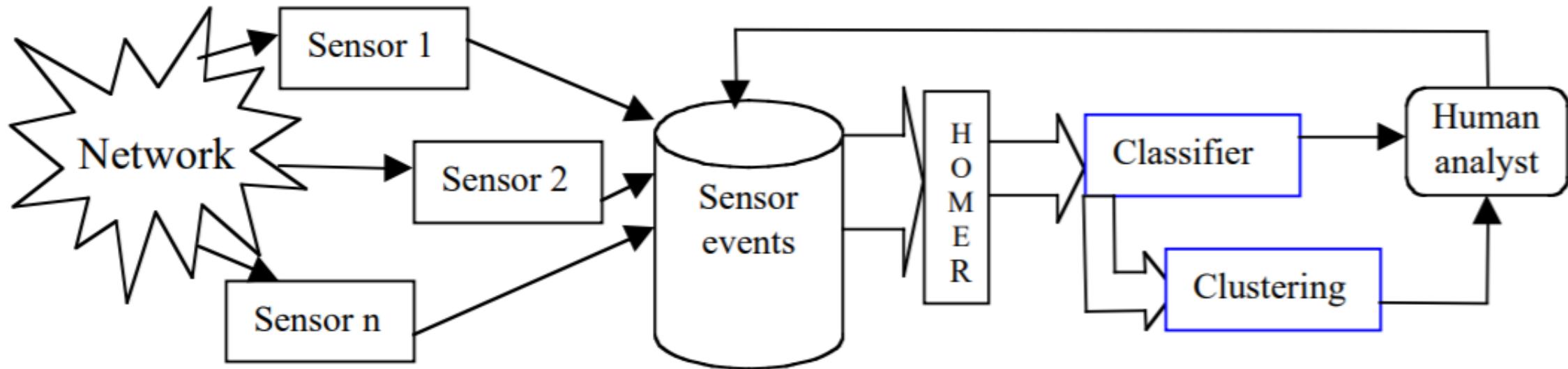


Figure 1. How sensors feed into overall intrusion detection system

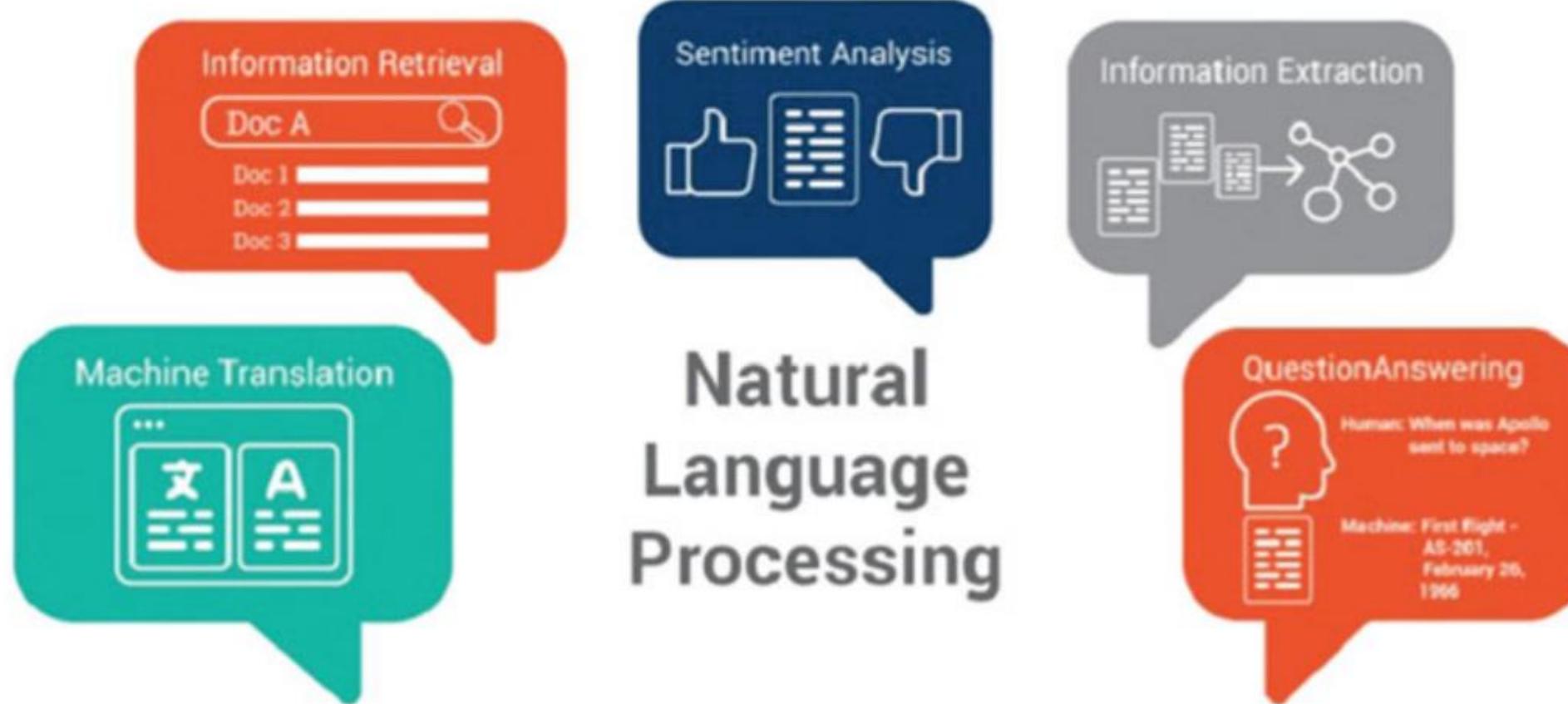
#4

NATURAL LANGUAGE PROCESSING

What is Natural language processing (NLP)?

Subfield of **linguistics, computer science, and artificial intelligence** concerned with the interactions between computers and human language, in particular how to program computers to **process and analyze large amounts of natural language data**.

Natural Language Processing (NLP)



Natural Language **Understanding** ← → Natural Language **Generation**

Understanding the process of building an NLP Pipeline

London is the capital and most populous city of England and the United Kingdom. Standing on the River Thames in the south east of the island of Great Britain, London has been a major settlement for two millennia. It was founded by the Romans, who named it Londinium. London's ancient core, the City of London, largely retains its 1.12-square-mile (2.9 km²) medieval boundaries.

Google

- how to maks
- how to make google form
- how to make instagram filter
- how to make pancake
- how to make buttermilk
- how to make fried rice
- how to make a website
- how to make co host in zoom
- how to make gif
- how to make money online

Google Translate

ENGLISH



JAVANESE

how to cook rice



16 / 5000

carane masak sega



Send feedback

One day, will AI be able to
understand animal language?
Your opinion?



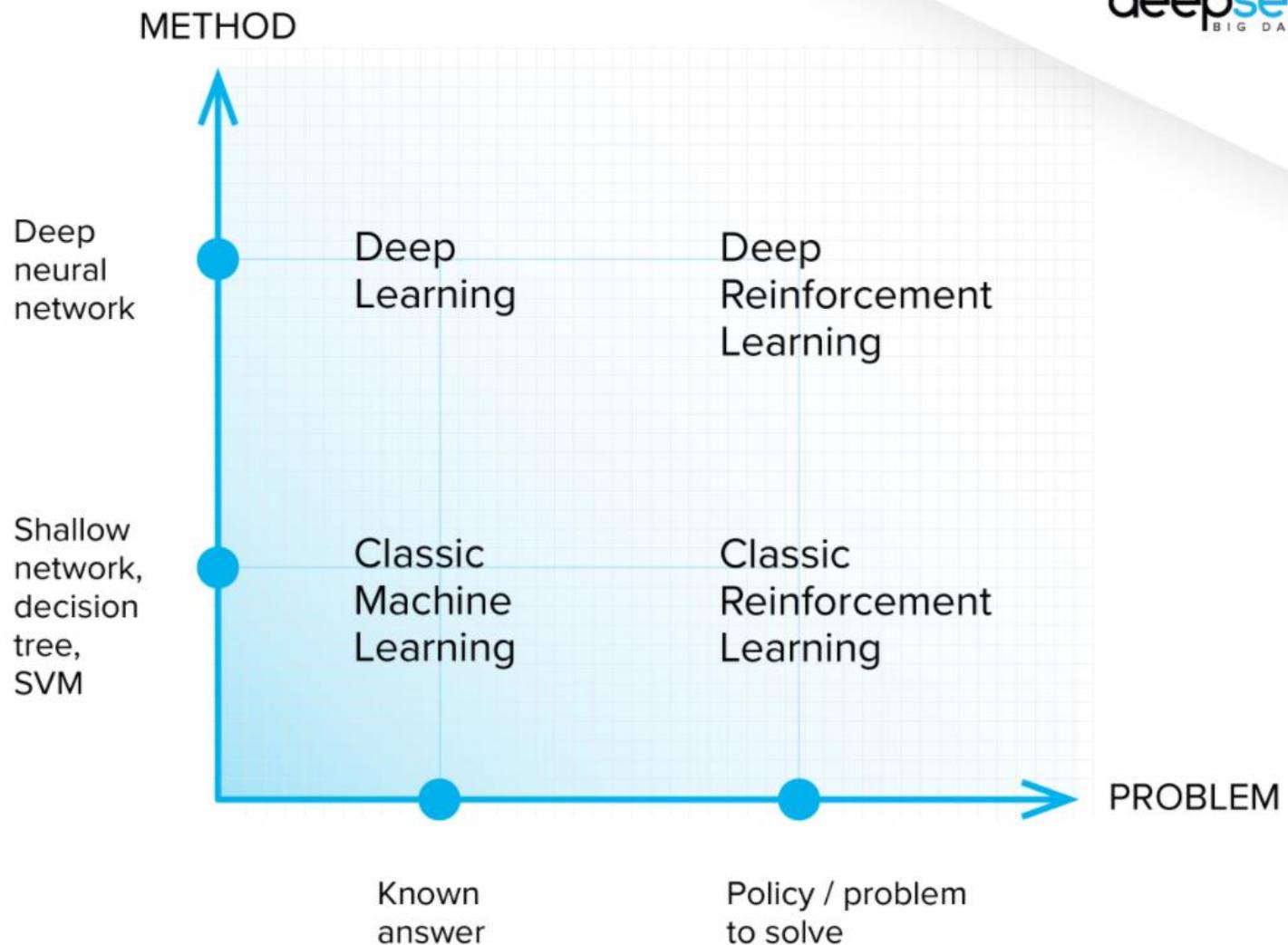
QUIZ
#2

#5

REINFORCEMENT LEARNING

What is Reinforcement Learning?

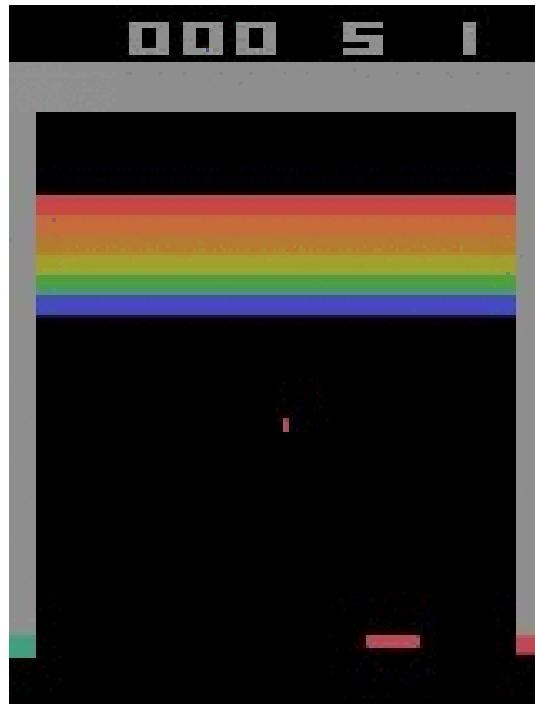
Reinforcement learning (RL) is an area of **machine learning** concerned with how intelligent agents ought to **take actions** in an **environment** in order to maximize the notion of cumulative reward.



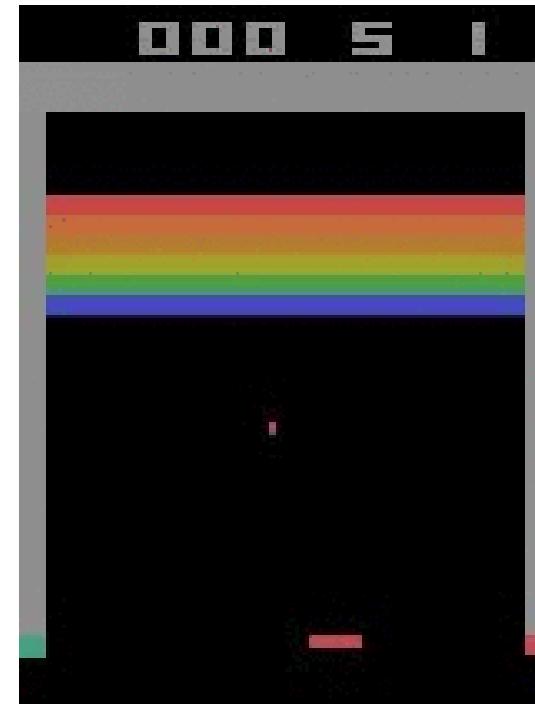
Reinforcement Learning

Reinforcement Learning: Breakout Game

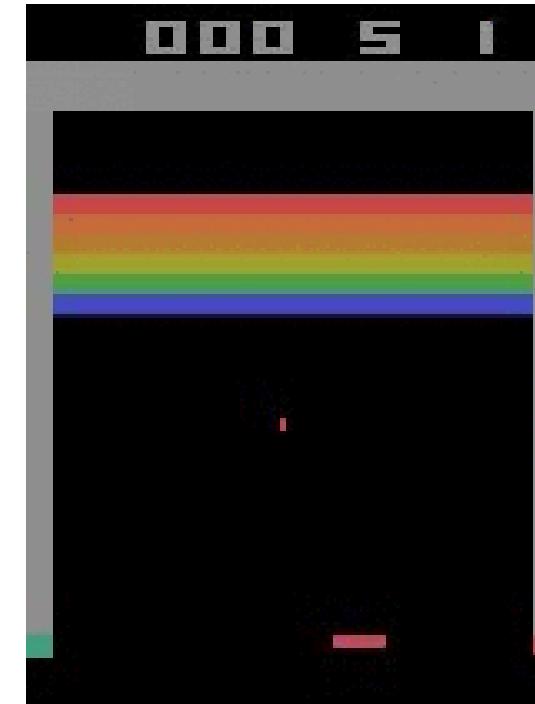
Initial performance



After 15 minutes of training



After 30 minutes of training



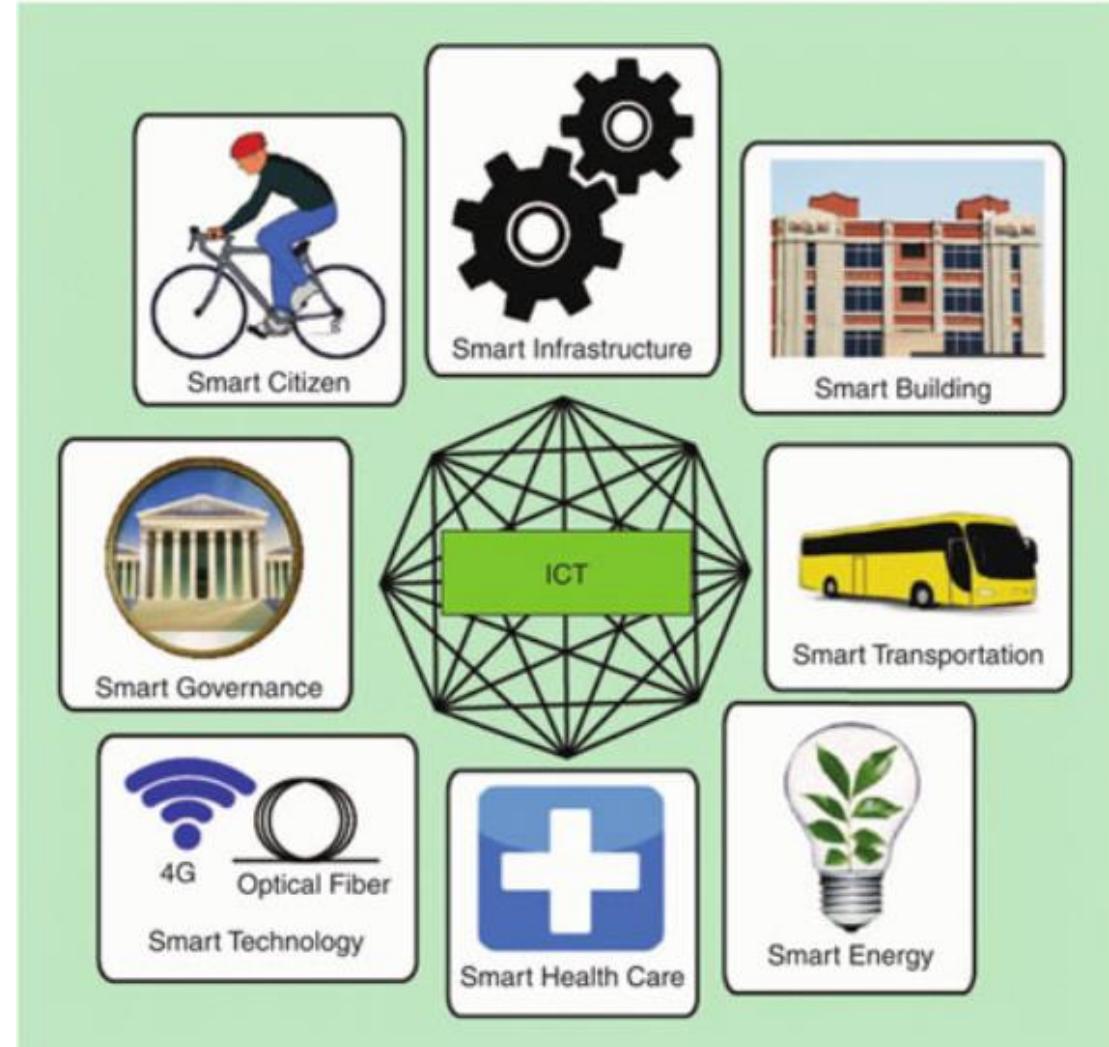
#6

SMART CITY

What is Smart City?

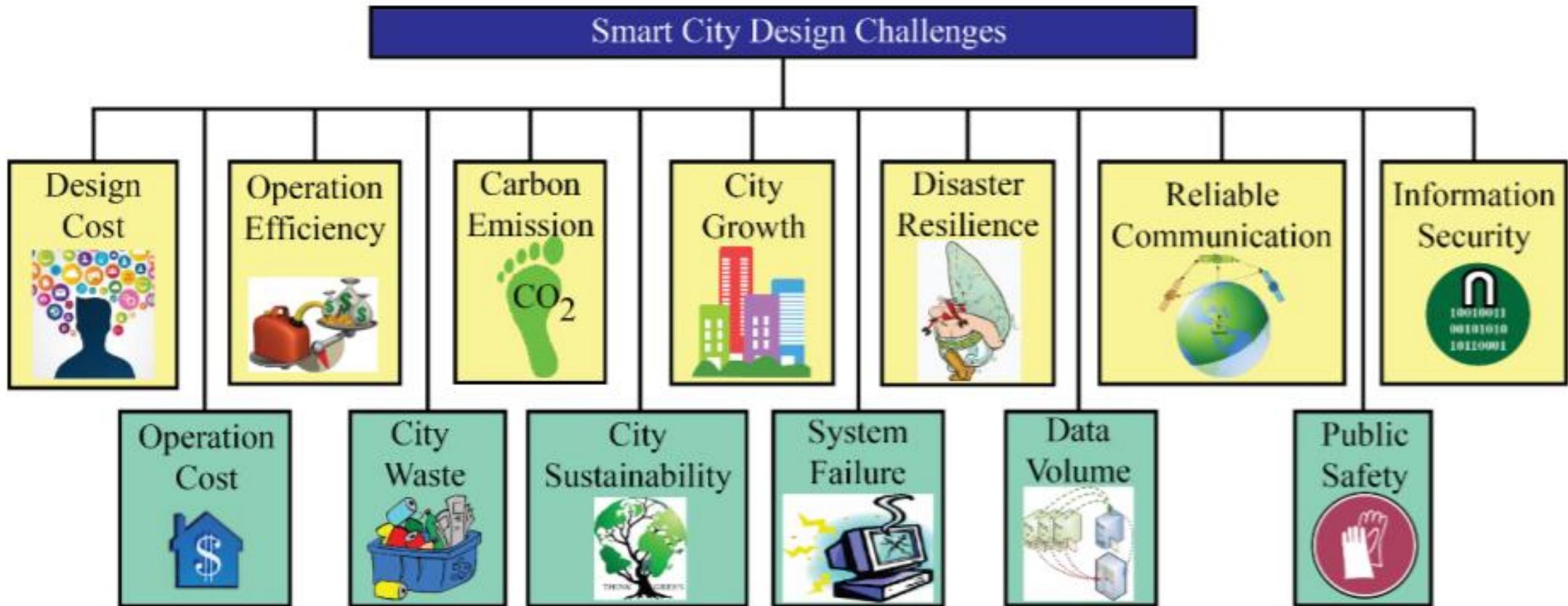
A smart city is a place with the **integration** of latest **5G, Internet-of-Things (IoT), and AI technology**, where networks and services are more flexible, efficient, and sustainable with the use of information, digital, and telecommunication technologies to improve operations and provide an entirely new horizon of living and working environment for its inhabitants.

#6 SMART CITY



The IoT is the technical backbone of smart cities

Smart City Design Challenges



#7

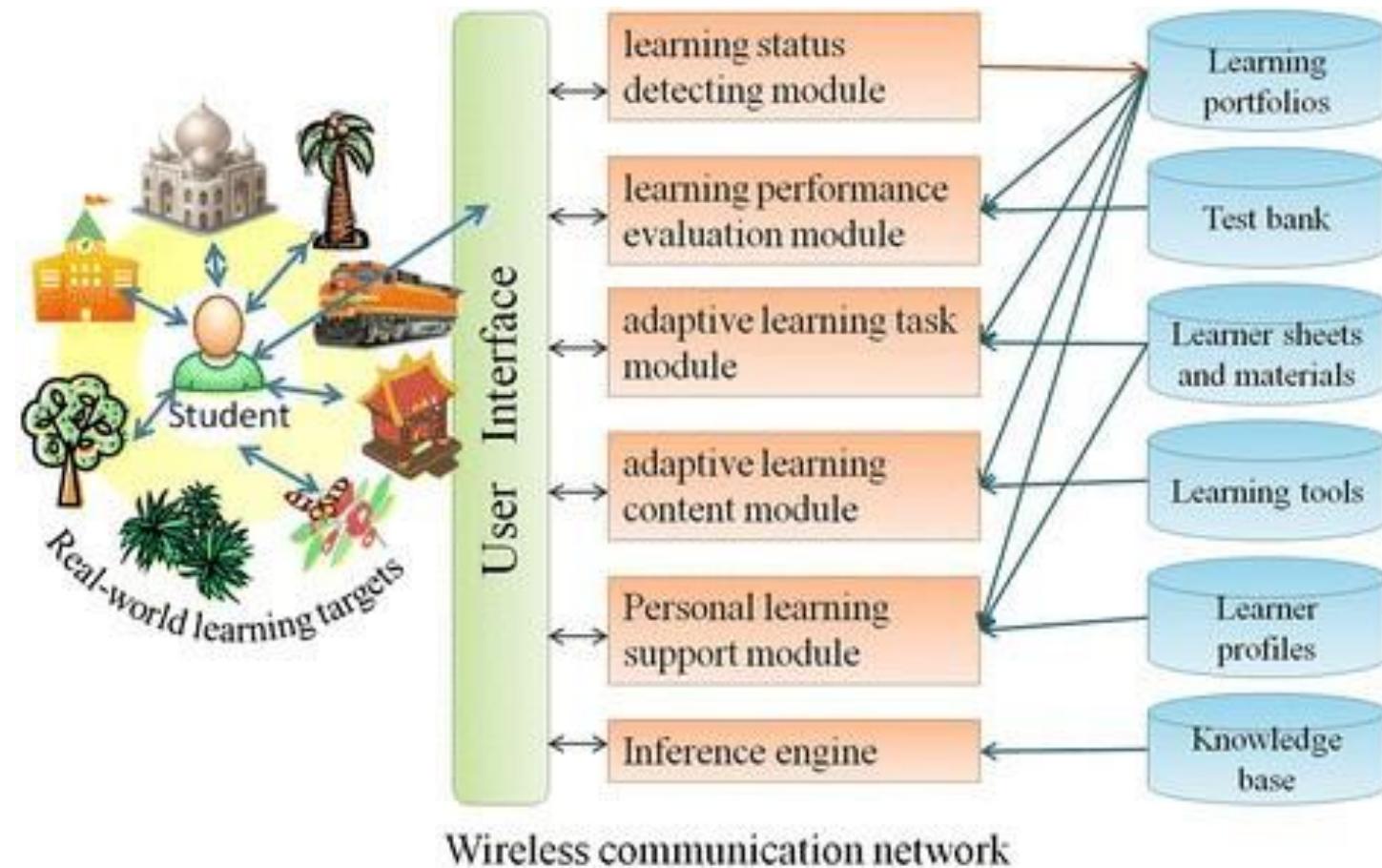
SMART EDUCATION

What is Smart Education?

Intelligent education is a term describing education and learning in the new AI era and the digital age which has attracted the attention of many researchers.

The goal of smart education (and smart learning) is to train smart learners by adopting the latest IT, communication, and AI technologies to meet the work and life needs of the twenty-first century.

Smart Education Framework



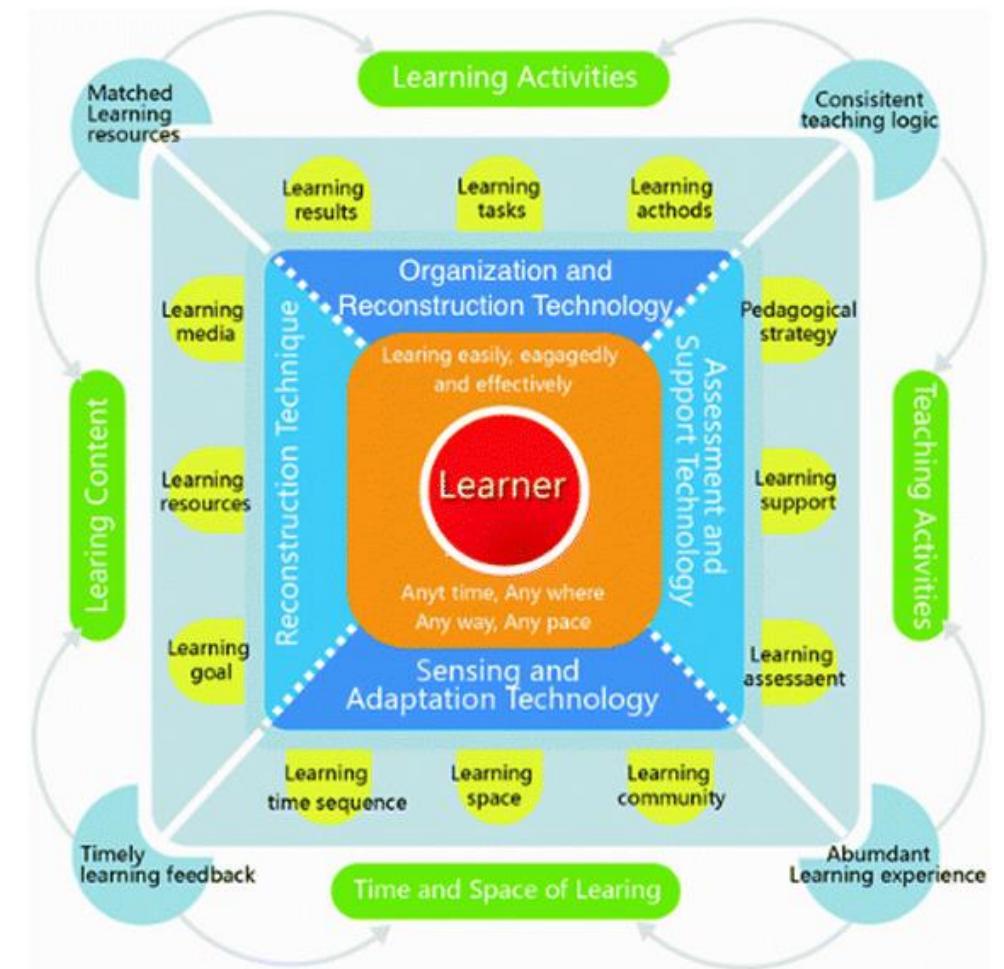
Framework of a smart learning environment (Hwang, 2014)

Smart Education Framework

Smart education proposed by Kim et al. (2013)



Framework of smart learning (Liu et al., 2017)



How is the implementation of a
smart campus in Indonesia?
Is there any?

QUIZ
#3

#8

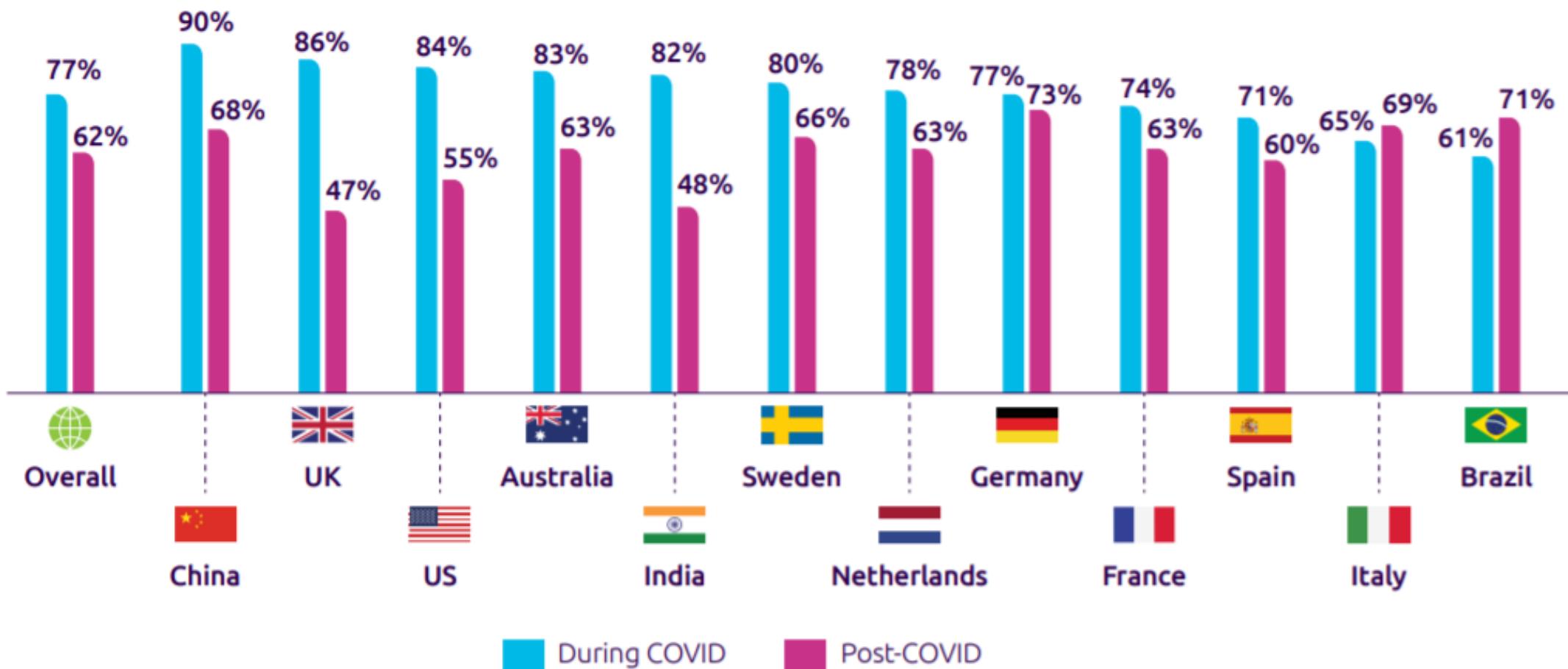
TOUCHLESS TECHNOLOGY

Touchless Technology

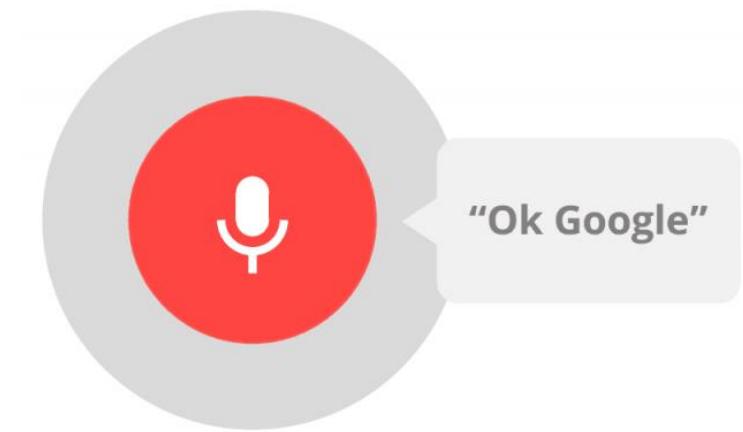
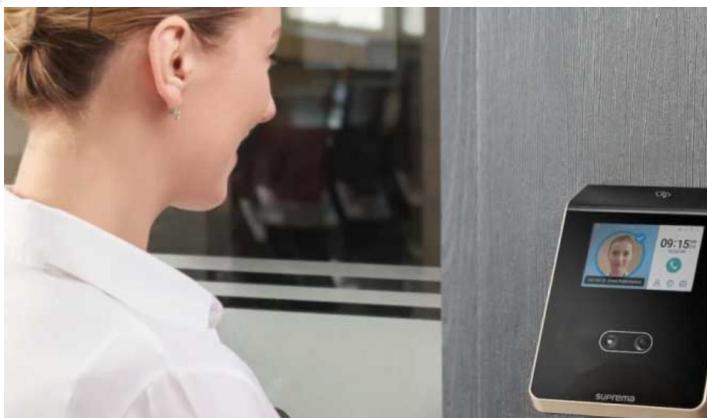
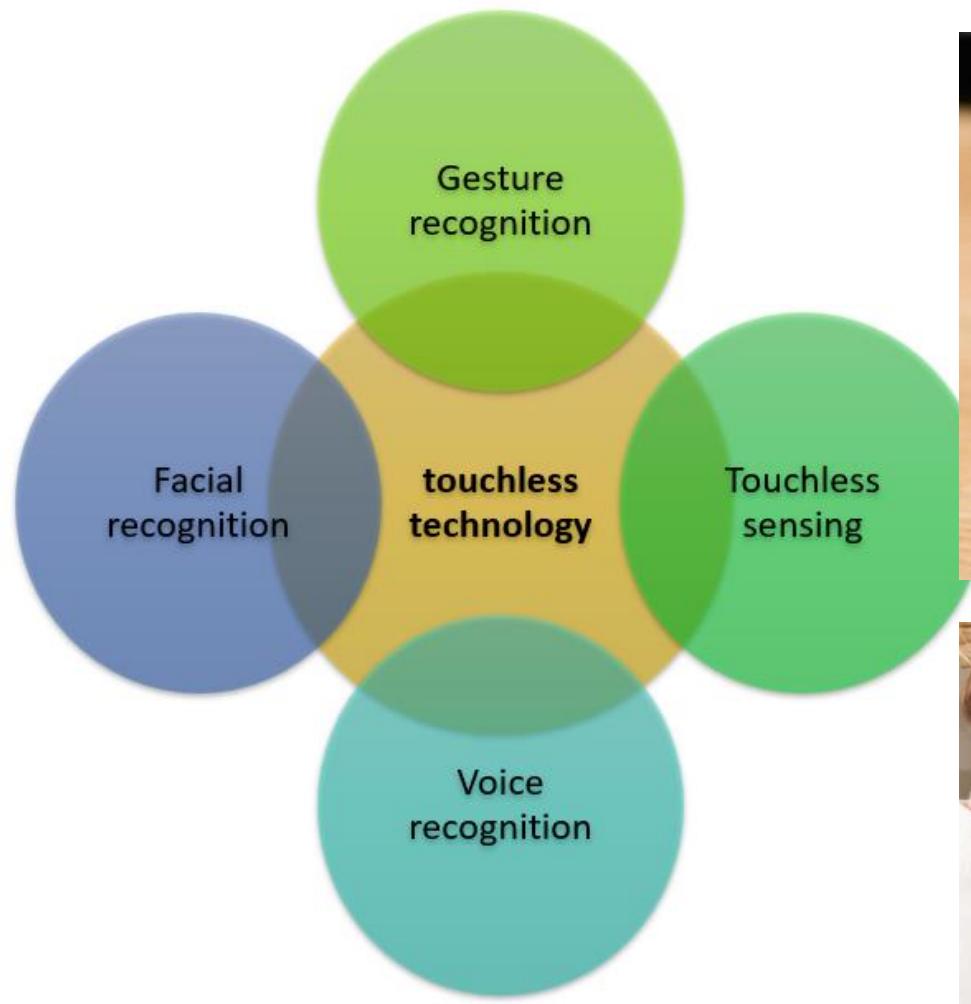
A ‘**no-touch touchscreen**’ developed for use in cars could also have widespread applications in a post-COVID-19 world, by reducing the risk of transmission of pathogens on surfaces (*Sarah Collins, University of Cambridge*)

As a result of COVID-19, customers are increasingly looking for digital, **no-touch connections** with organizations, given the constraints and concerns about physical interactions in a new-normal, socially distanced world. (*Capgemini Research Institute*)

"I expect to increase my use of touchless interactions, through voice assistants, facial recognition, or apps, to avoid human interactions and touchscreens"



Source: Capgemini Research Institute, AI in Customer Experience Customer Survey, April–May 2020, N=4,818.



Can you find any examples/ideas of technology that might be replaced by touchless technology?



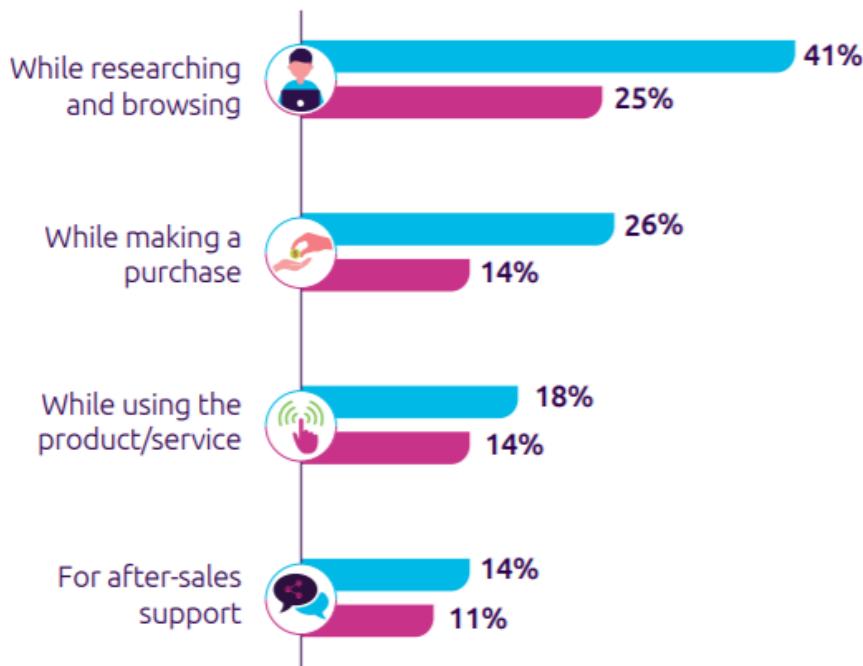
#9

AI-POWERED BUSINESS PROCESSING, FORECASTING, AND ANALYSIS

AI-powered tools for business

AI-powered tools help in redefining business processing and functioning strategies with real-time updates. The researchers coupled hyper-automation with cognitive automation process for understanding business needs deeply. Content intelligent technologies, along with AI-supportive processes, will help the digital worker to get exceptional skills. These skills will help them to deal with natural language automation, judgement, creating context, reasoning, and offer data-related insights.

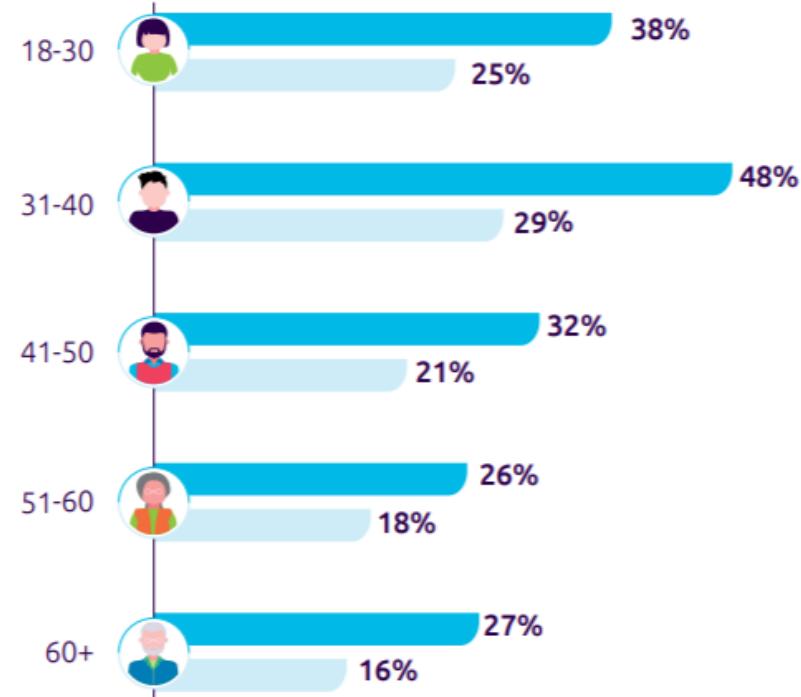
Percentage of customers preferring AI-only interactions with organizations (2020 compared to 2018)



■ % of customers preferring AI-only interactions in 2020

■ % of customers preferring AI-only interactions in 2018

Percentage of customers preferring AI-only interactions in 2020 - by age



■ % of customers preferring AI-only interactions for researching and browsing (2020)

■ % of customers preferring AI-only interactions for making a purchase (2020)

Source: Capgemini Research Institute, AI in Customer Experience Customer Survey, April–May 2020, N=5,300.

#10

QUANTUM AI

What is Quantum AI?

Quantum artificial intelligence (QAI) is an interdisciplinary field that focuses on building quantum algorithms for improving computational tasks within artificial intelligence, including sub-fields like machine learning (*Wikipedia*).

Quantum AI

Advanced businesses will start using quantum supremacy to quantify the Qubits for use in supercomputers. Quantum computers solve problems at a faster rate than classic computers do because of quantum bits. Moreover, they help in analyzing data and then predict several unique patterns.



Quantum AI

<https://quantumai.google/>
<https://ibm-q4ai.mybluemix.net/>

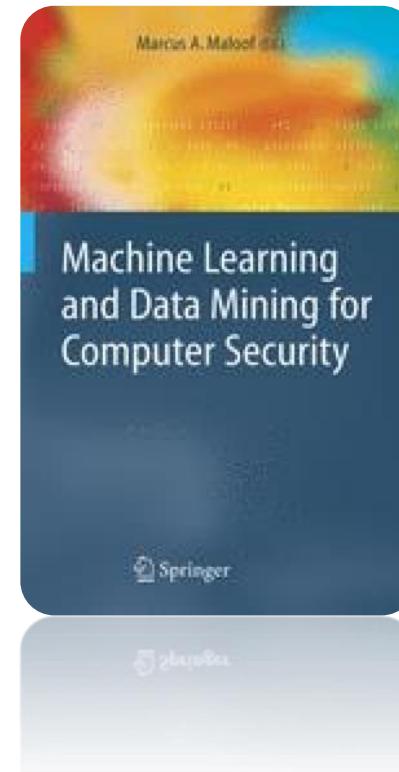
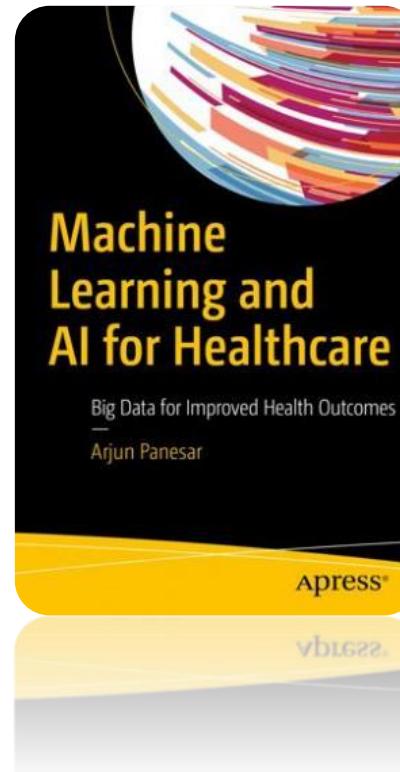
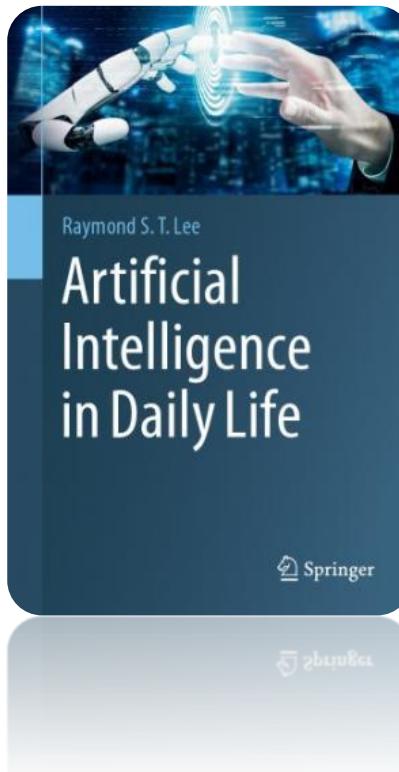
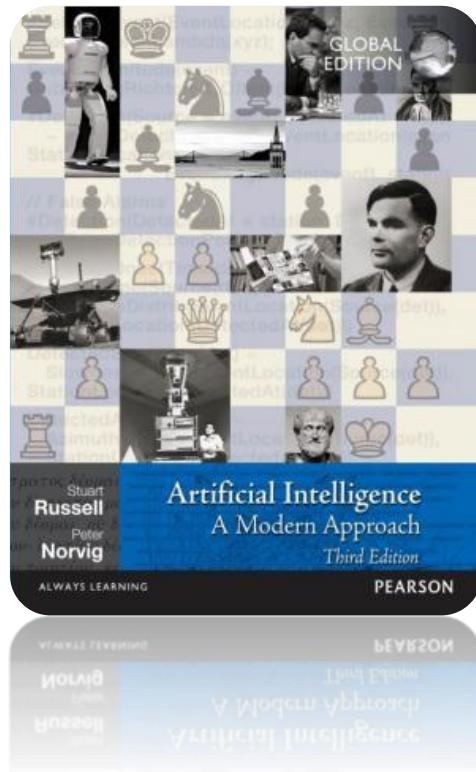
In Your Opinion, will AI one day equal or surpass human intelligence?
Should there be rules or laws limiting the development of AI?



QUIZ

#5

Books and References



References

- <https://thinkml.ai/top-10-ai-trends-to-watch-in-2021/>
- https://www.researchgate.net/figure/AN-OVerVieW-OF-NOTABLE-APPRAOCHeS-AND-DiSCiPLiNeS-iN-Ai-AND-MACHiNe-LeArNiNg-101_fig5_316983844
- https://www.abeam.com/id/en/service_line/RPA
- <https://www.latimes.com/science/sciencenow/la-sci-sn-wearable-sweat-sensor-20190128-story.html>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4455232/>
- <https://towardsdatascience.com/ai-and-machine-learning-in-cyber-security-d6fbee480af0>
- https://www.mitre.org/sites/default/files/pdf/bloedorn_datamining.pdf
- <https://helloyubo.com/how-does-nlp-work-a-detailed-guide-to-make-an-nlp-pipeline/>
- <https://deepsense.ai/what-is-reinforcement-learning-the-complete-guide/>
- <https://ieeexplore.ieee.org/document/7539244>
- <https://link.springer.com/article/10.1186/s40561-014-0004-5>
- https://link.springer.com/chapter/10.1007/978-3-642-37285-8_18
- <https://link.springer.com/article/10.1186/s40561-018-0052-3#Abs1>
- <https://www.cam.ac.uk/research/news/ai-based-no-touch-touchscreen-could-reduce-risk-of-pathogen-spread-from-surfaces>
- https://www.capgemini.com/wp-content/uploads/2020/07/AI-in-CX_CRI-Report_16072020_V4.pdf
- <https://quantumai.google/>

INGIN BELAJAR ARTIFICIAL INTELLIGENCE?



**UNIVERSITAS
BUDI LUHUR**

S1 Teknik Informatika

Peminatan:

1. Programming Expert
2. Cyber Security
3. Artificial Intelligence

S2 Ilmu Komputer

S3 Ilmu Komputer

Coming Soon... in 2021

Achmad Solichin | Achmatim

"Ikatlah ilmu dengan menuliskannya, lipatgandakan ilmu dengan berbagi"



@achmatim



/achmatim



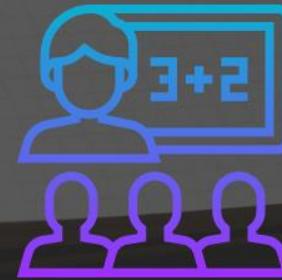
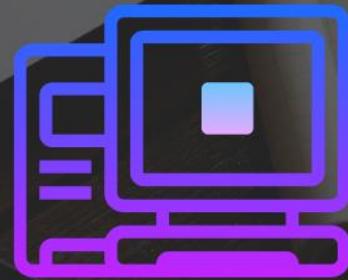
Achmad Solichin



@achmatim



achmatim@gmail.com



TERIMA KASIH | SEMOGA BERMANFAAT