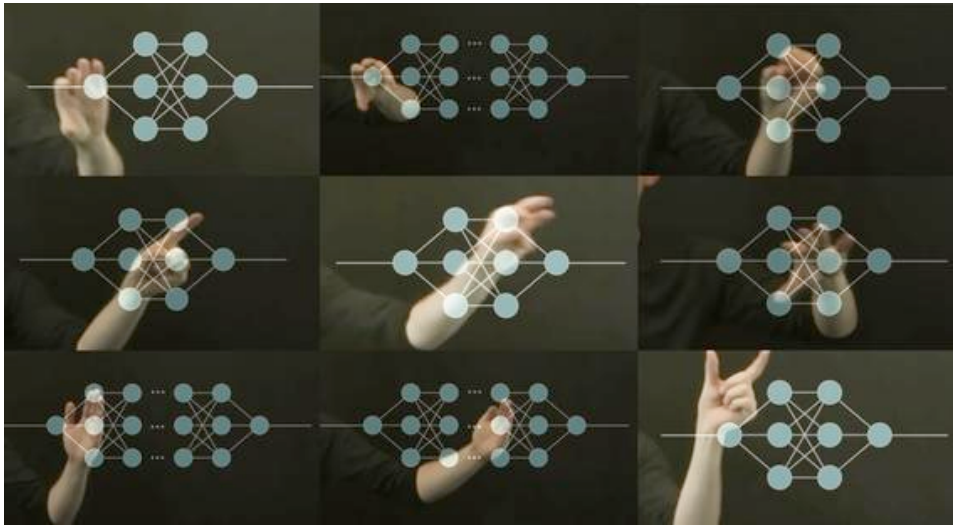
ARTIFICIAL INTELLIGENCE



Manuel Rojas V.
Dir. Estratégica Operaciones
manuelrojas@uchile.cl
Universidad de Chile

¿Qué piensan cuando escuchan Inteligencia Artificial —AI—?

Go to **www.menti.com** and use the code **3195 8500**

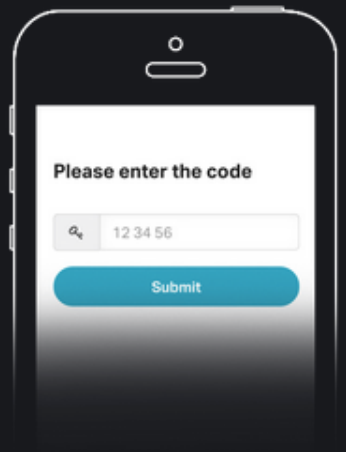
1

Grab your phone

www.menti.com

2

Go to www.menti.com



3

Enter the code **3195 8500&** vote!

HISTORIA: EVOLUCIONES

01

Revolución: Mecanización y energía a vapor.

Migración hacia zonas urbanas y paso desde ámbitos agrícolas a mecanización. (antes 1800)

02

Revolución: Electricidad y producción en masa.

Desarrollo de la energía en las ciudades y crecimiento de nuevas fábricas industrializadas. (1880-1914)

03

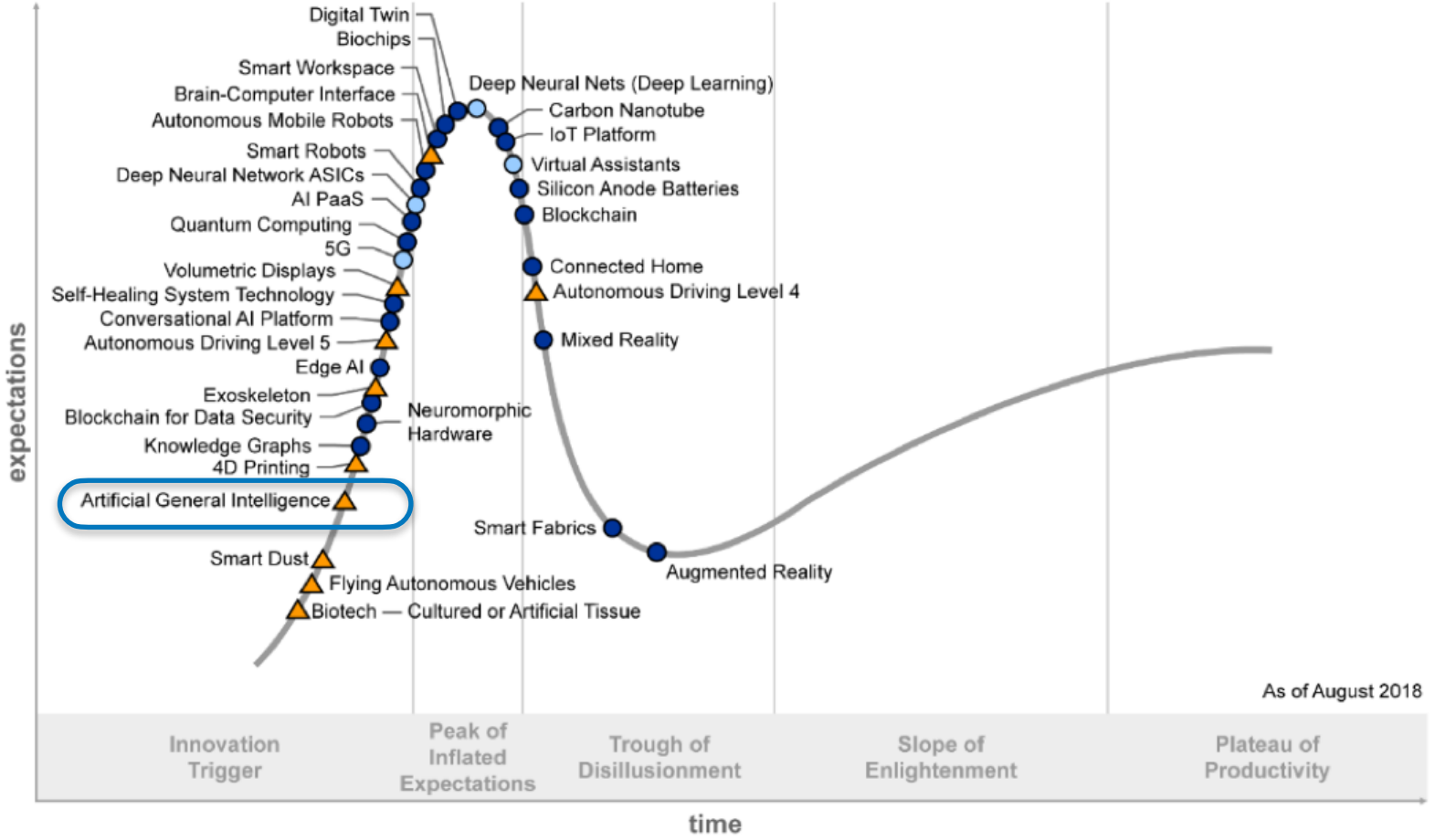
Revolución: computación y automatización.

Desarrollo de computación, permitiendo el proceso de automatización de sectores industriales.(1969-adelante)

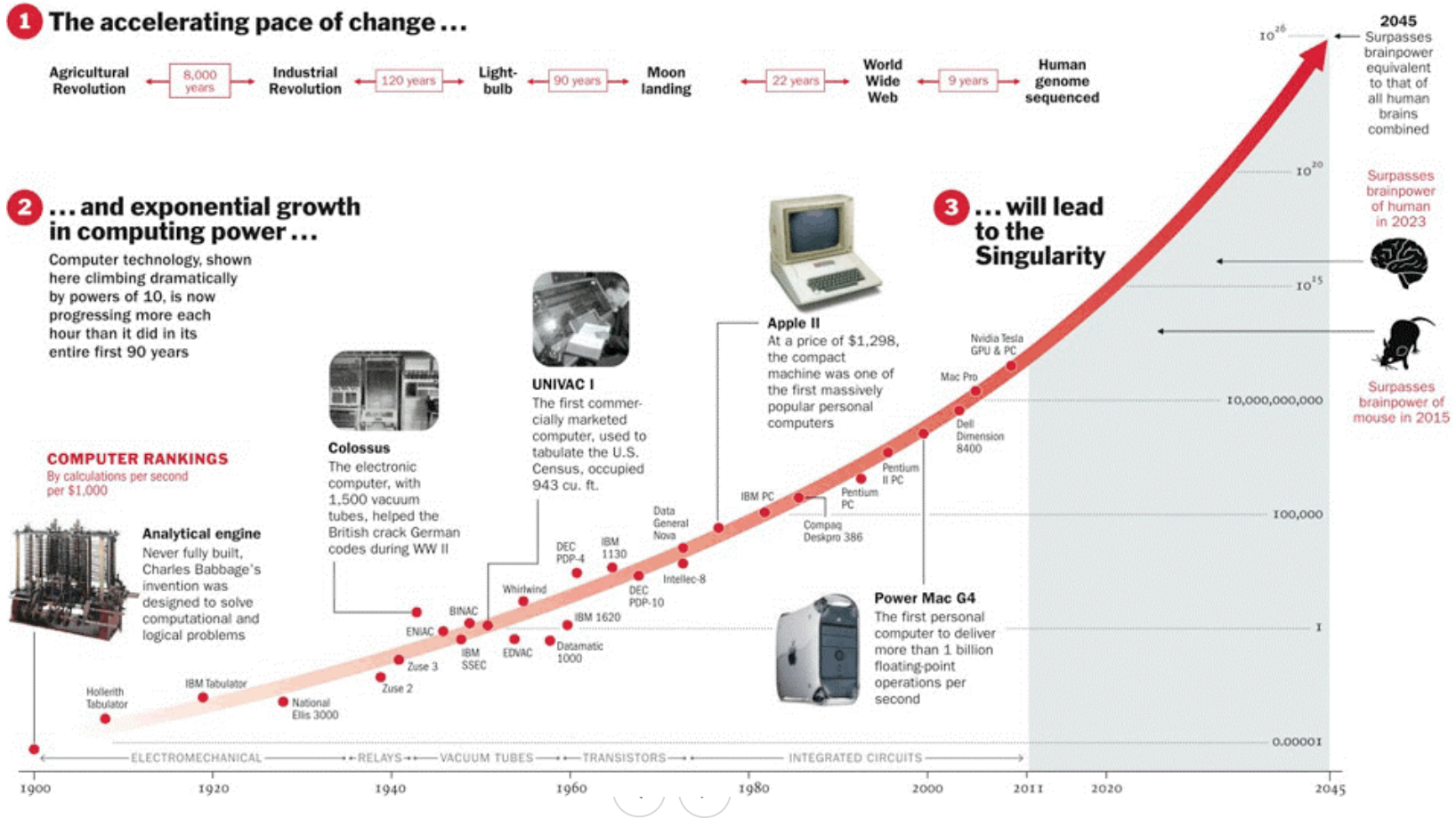
04

Revolución: Sistemas físicos Digitales.

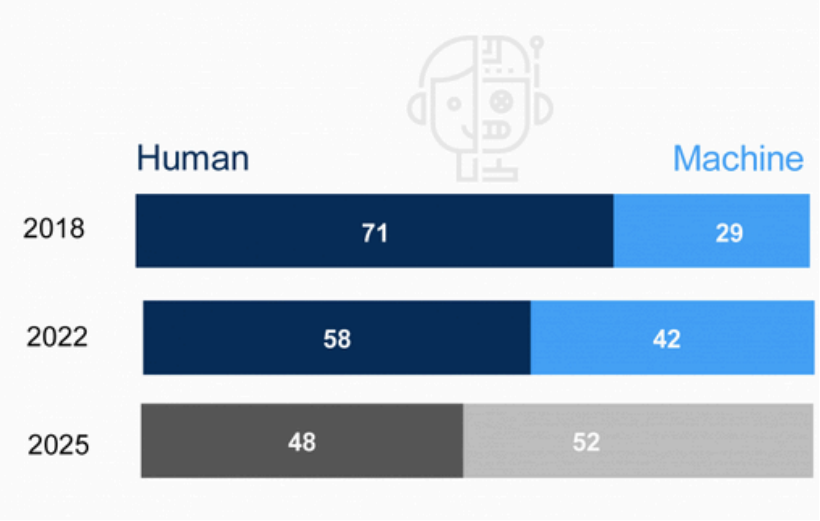
Internet es base de la comunicación, desarrollo de sistemas digitales Cloud, AI, IoT, CRISPR, Blockchain, C.Cuántica, Realidad Virtual, Robótica,etc.(futuro)

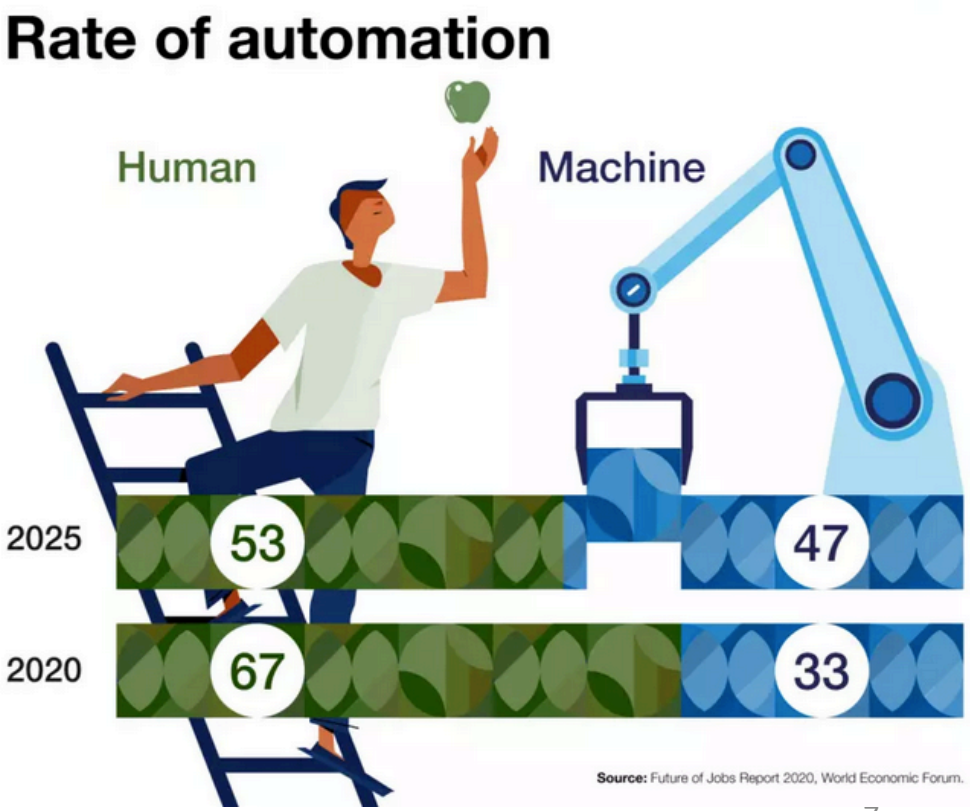


ARTIFICIAL INTELLIGENCE ¿POR QUÉ?



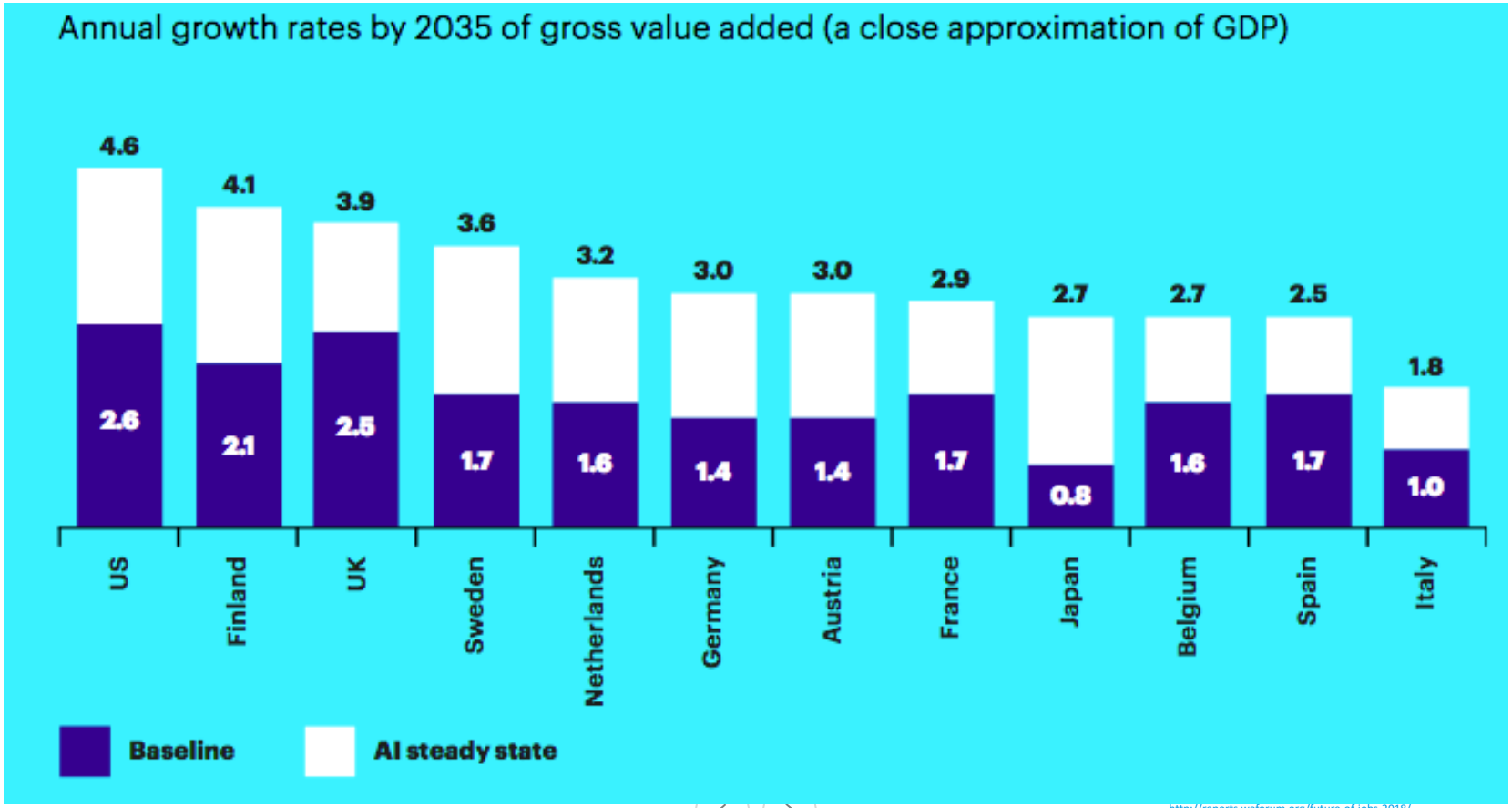
ARTIFICIAL INTELLIGENCE ¿POR QUÉ?





https://www.weforum.org/reports/the-future-of-jobs-report-2020
https://www.weforum.org/agenda/2019/01/robots-aren-t-wiping-out-jobs-yet-according-to-the-world-bank-s-chief-economist
https://www.weforum.org/agenda/2018/08/here-s-how-vulnerable-to-automation-your-job-is

ARTIFICIAL INTELLIGENCE ¿POR QUÉ?



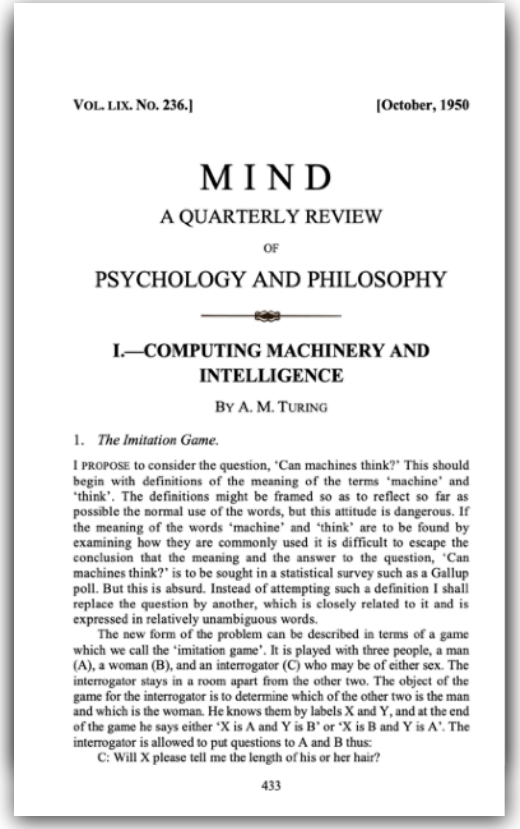
http://reports.weforum.org/future-of-jobs-2018/
https://www.weforum.org/agenda/2019/01/robots-aren-t-wiping-out-jobs-yet-according-to-the-world-bank-s-chief-economist
https://www.weforum.org/agenda/2018/08/here-s-how-vulnerable-to-automation-your-job-is


Photo by jj ying on Unsplash

ARTIFICIAL INTELLIGENCE

No existe consenso.

Corresponde a un **concepto amplio** que involucra el aprendizaje de las máquinas, donde pueden realizar labores características de la inteligencia humanas. "***la capacidad de aprender sin estar explícitamente programada***" *(John McCarthy, Marvin Minsky 1956 Dartmouth Conference, Arthur Samuel 1959 IBM)*



VOL. LIX. NO. 236.] [October, 1950

MIND

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY

I.—COMPUTING MACHINERY AND INTELLIGENCE

BY A. M. TURING

1. *The Imitation Game.*

I PROPOSE to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions might be framed so as to reflect so far as possible the normal use of the words, but this attitude is dangerous. If the meaning of the words 'machine' and 'think' are to be found by examining how they are commonly used it is difficult to escape the conclusion that the meaning and the answer to the question, 'Can machines think?' is to be sought in a statistical survey such as a Gallup poll. But this is absurd. Instead of attempting such a definition I shall replace the question by another, which is closely related to it and is expressed in relatively unambiguous words.

The new form of the problem can be described in terms of a game which we call the 'imitation game'. It is played with three people, a man (A), a woman (B), and an interrogator (C) who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the other two is the man and which is the woman. He knows them by labels X and Y, and at the end of the game he says either 'X is A and Y is B' or 'X is B and Y is A'. The interrogator is allowed to put questions to A and B thus:

C: Will X please tell me the length of his or her hair?

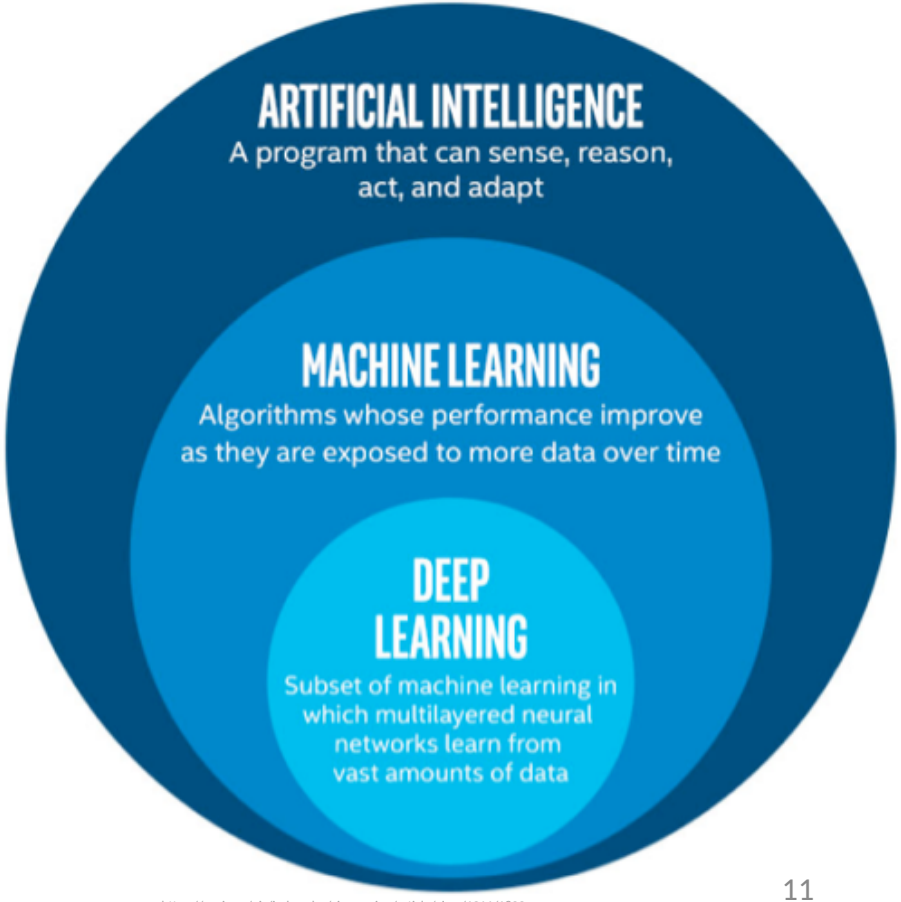
433

https://aaai.org/ojs/index.php/aimagazine/article/view/1911/1809

ARTIFICIAL INTELLIGENCE

"***Se considera que una máquina (computador, robot u otro ente sintético) es inteligente si exhibe un comportamiento a nivel humano en una tarea o contexto dado***".

*(Jocelyn Dunstan, Alejandro Maass, Felipe Tobar, "**Una mirada a la era de los datos**", Editorial universitaria 2022, pág 32)*



https://aaai.org/ojs/index.php/aimagazine/article/view/1911/1809

MACHINE LEARNING

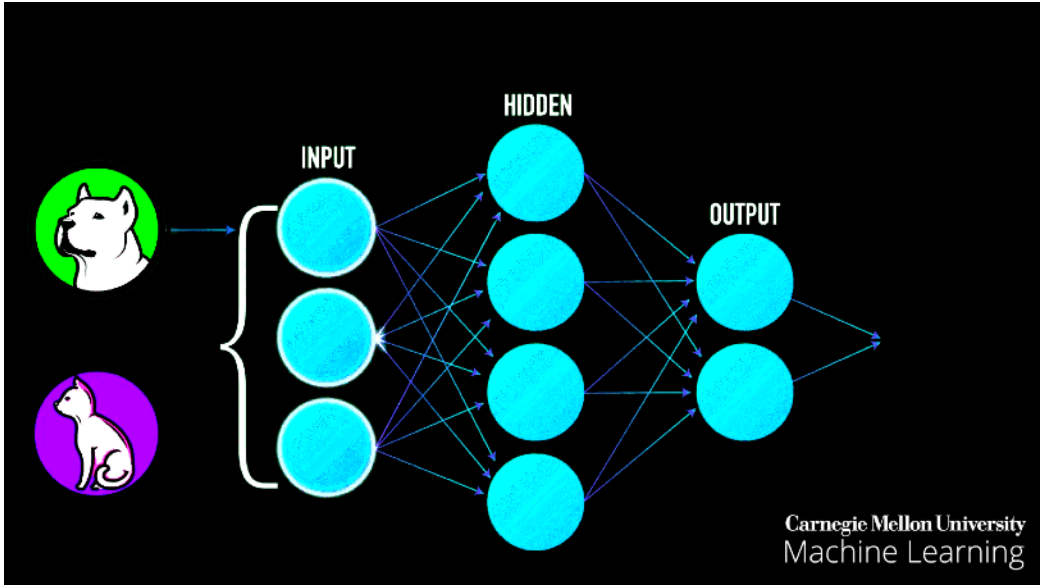
Es un mecanismo para obtener Artificial Intelligence particular, esto se logra mediante la **aplicación e implementación de algoritmos** como: Linear/logistic Regression, Support Vector Machines, Decision Tree, Random Forest, Naives Bayes, K-NN, Neural Networks, Convolutional Neural Network, RNN, Transformers, etc.

https://en.wikipedia.org/wiki/Machine_learning

DEEP LEARNING

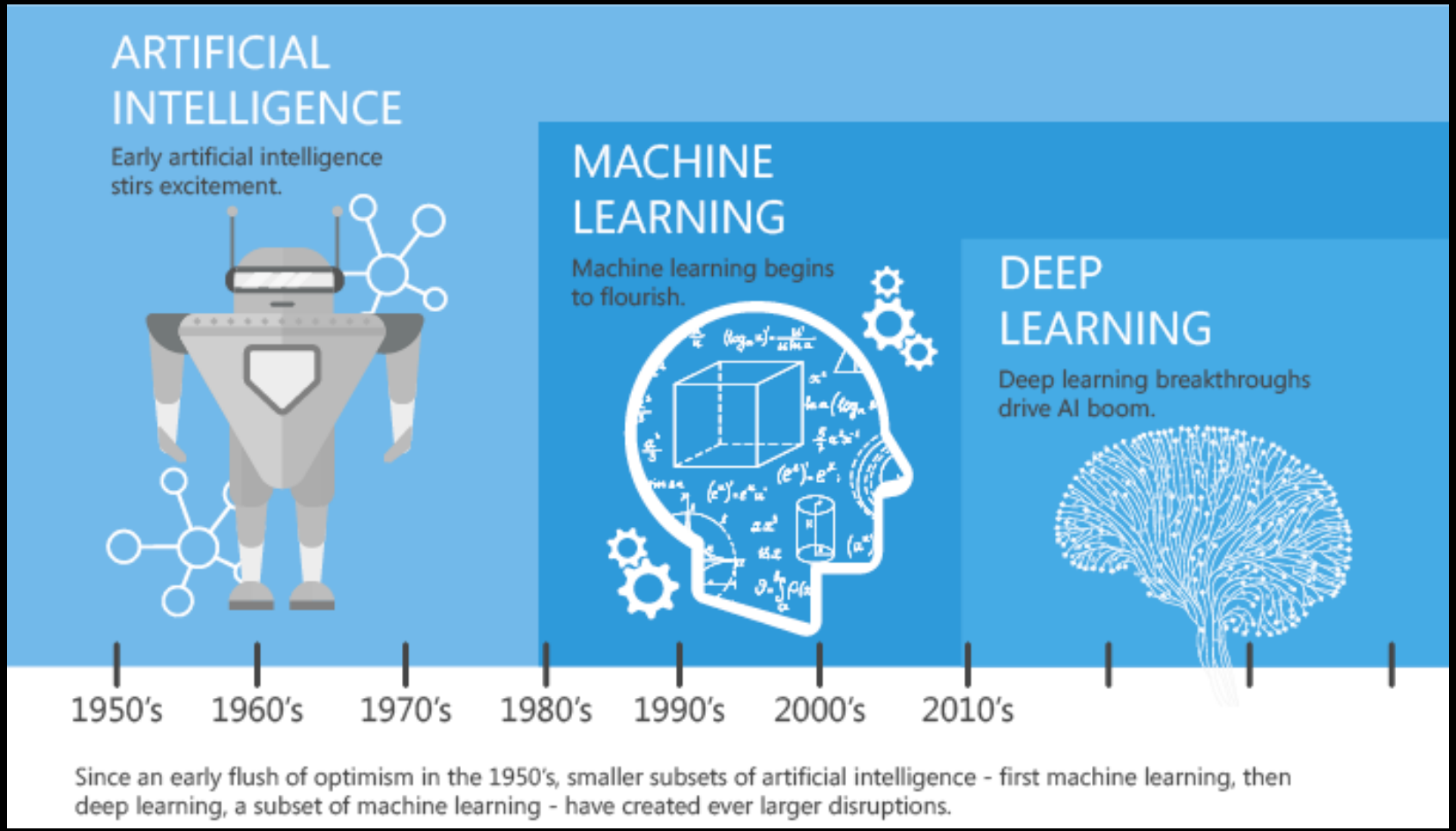
Es una área de Artificial Intelligence, que se vale del uso de **Redes Neuronales para imitar el mecanismo del cerebro humano** en el procesamiento de datos, para tomar decisiones y hacer predicciones.

Visión por computador, reconocimiento de voz, traducción, procesamiento de lenguaje natural, etc. son campos habituales de utilización.



https://aaai.org/ojs/index.php/aimagazine/article/view/1911/1809

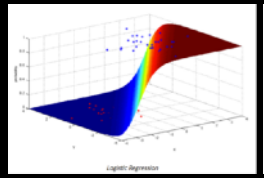
ARTIFICIAL INTELLIGENCE



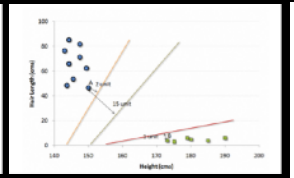
MACHINE LEARNING ALGORITMOS

SUPERVISED LEARNING.

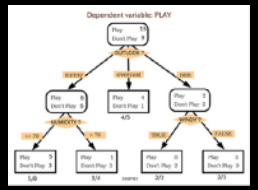
Linear/Logistic Regression.



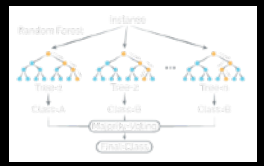
Support vector Machine.



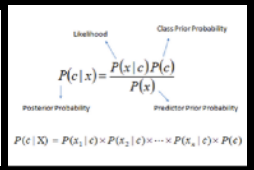
Decision Tree.



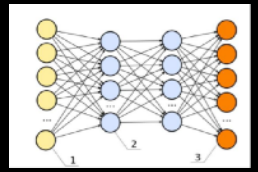
Random Forest.



Naives Bayes.

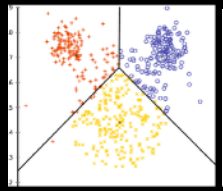


Neural Networks.

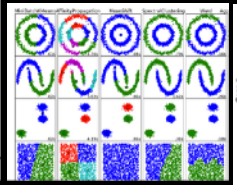


UNSUPERVISED LEARNING.

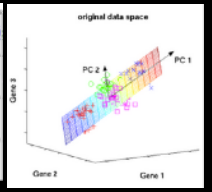
K-Means.



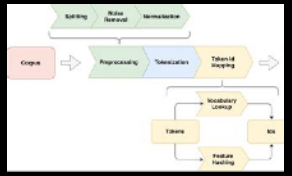
Clustering Algorithms.



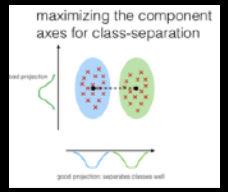
PCA/TSNE



Natural Language Processing NLP

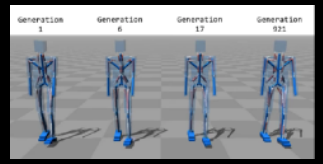


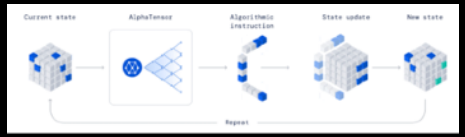
Linear Discriminant Analysis LDA



REINFORCEMENT LEARNING.

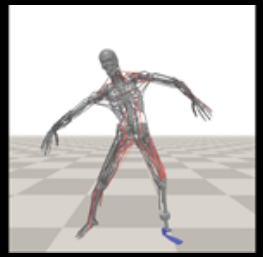
Genetic Algorithm



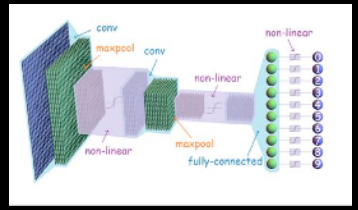


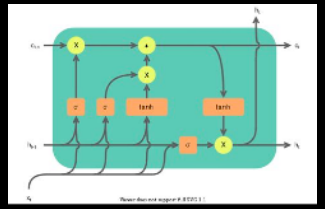
https://www.deepmind.com/blog/discovering-novel-algorithms-with-alphatensor

MACHINE LEARNING ALGORITMOS

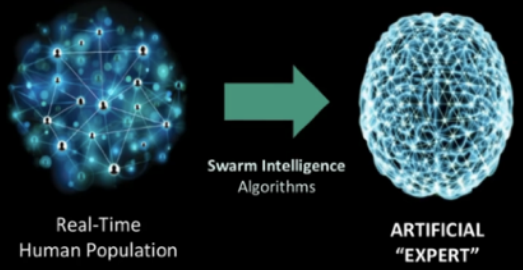


Algoritmos Intelligence Evolutivos/Genéticos



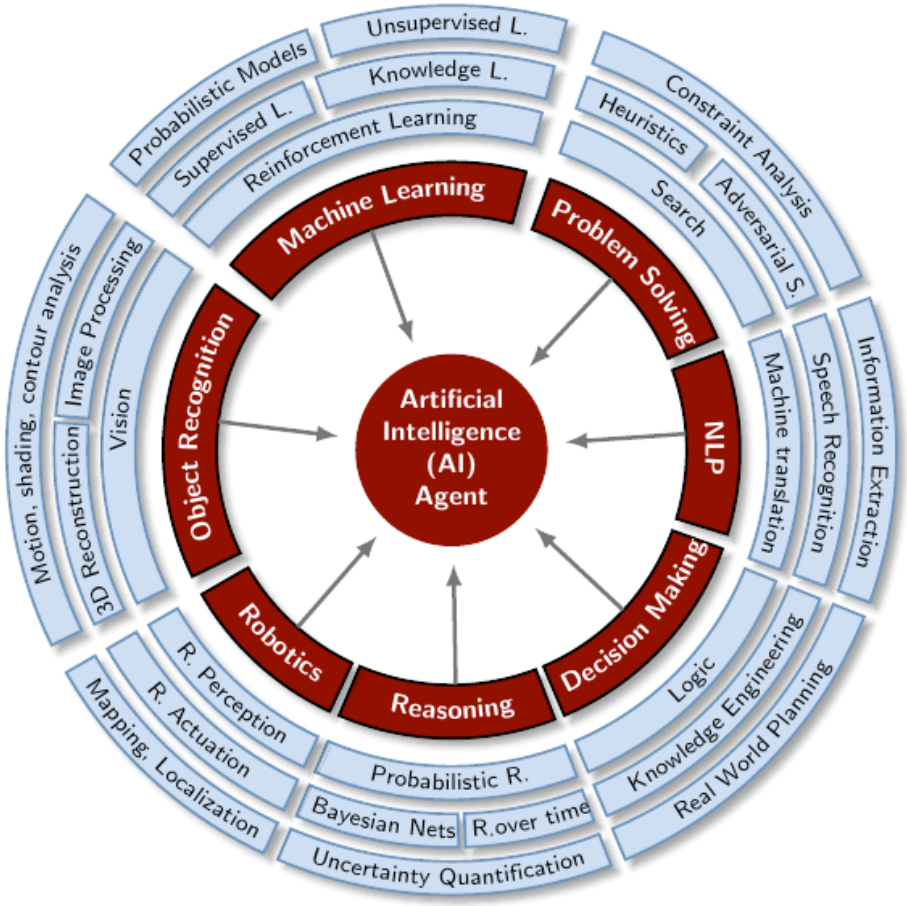


Convolutional Neural Networks
Recurrent Neural Networks



Algoritmos Intelligence Enjambre
(Experimental)

https://en.wikipedia.org/wiki/Genetic_algorithm
http://mrl.snu.ac.kr/research/ProjectScalable/Page.htm
https://research.cs.queensu.ca/TechReports/Reports/2012-585.pdf



Source: *"Artificial Intelligence: A Modern Approach"* by Peter Norvig and Stuart Russell. 2010.

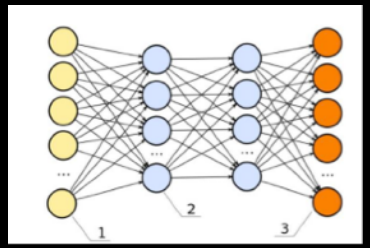
ient. SSRN Electronic Journal. 10.2139/ssrn.3201337.

https://research.nvidia.com/sites/default/files/pubs/2017-10_Progressive-Growing-of/karras2018iclr-paper.pdf

https://arxiv.org/abs/1812.04948
https://arxiv.org/pdf/1812.04948.pdf

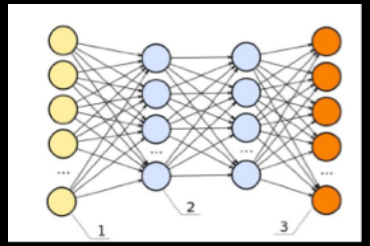
GAN's GENERATIVE ADVERSIAL NETWORK

Dos redes neuronales se enfrentan *(2014 Ian Goodfellow, Universidad Montreal)*

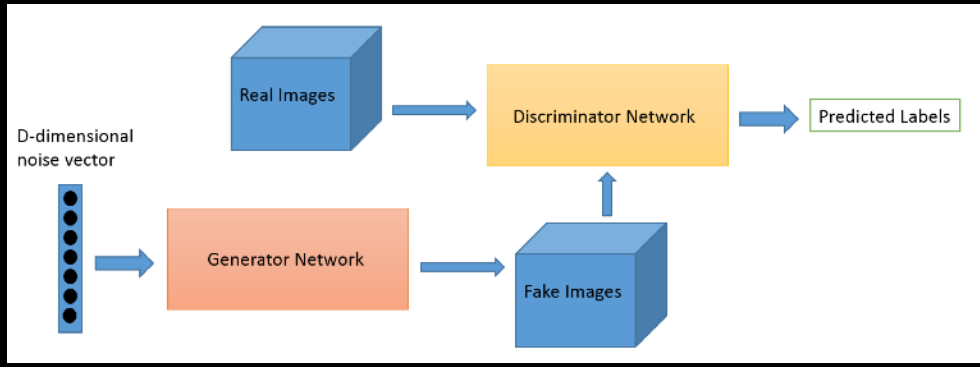


Neural Networks A.

V/S



Neural Networks B.



Network Generator.

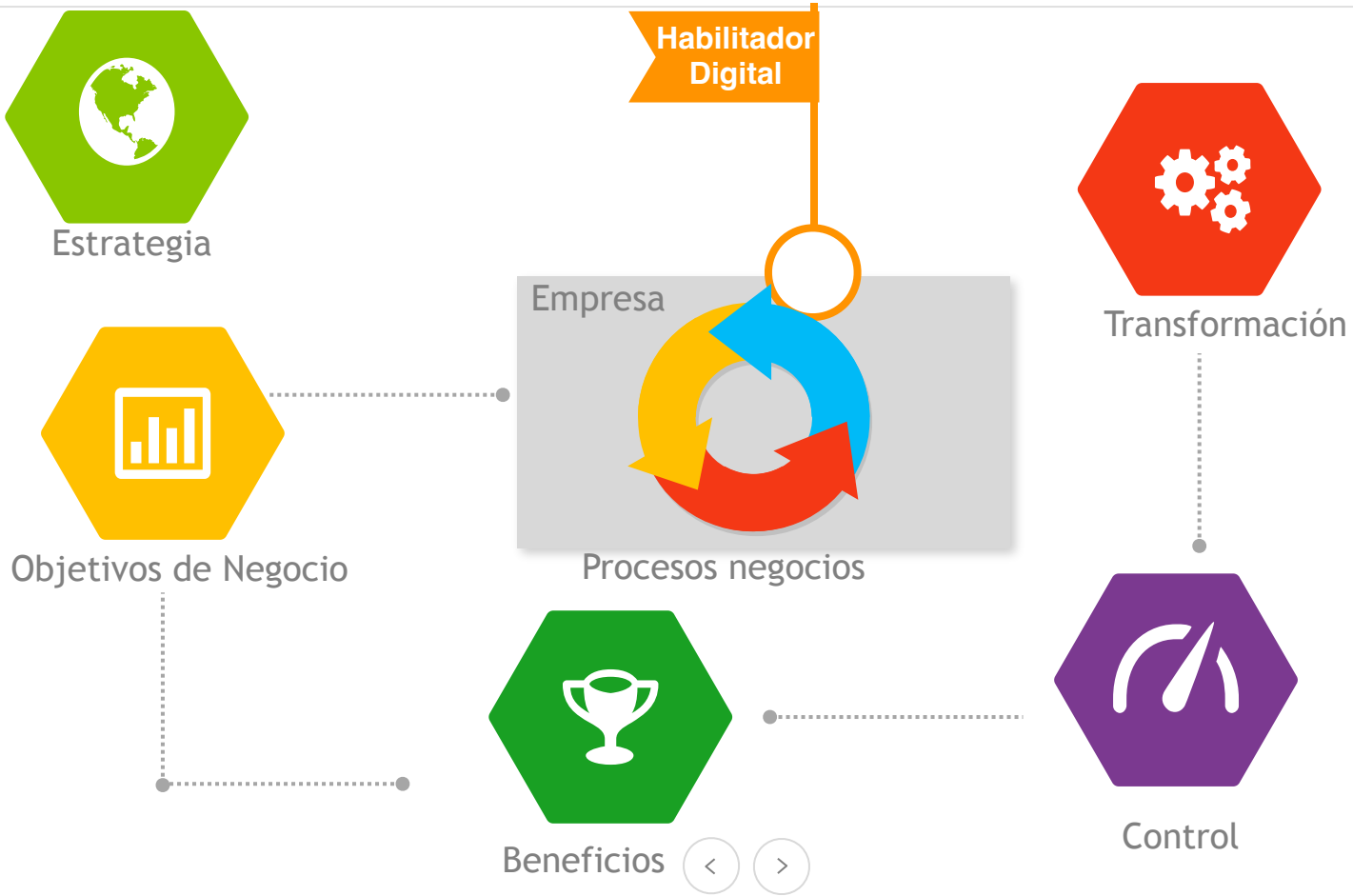
V/S

Network Discriminator.

https://arxiv.org/abs/1406.2661

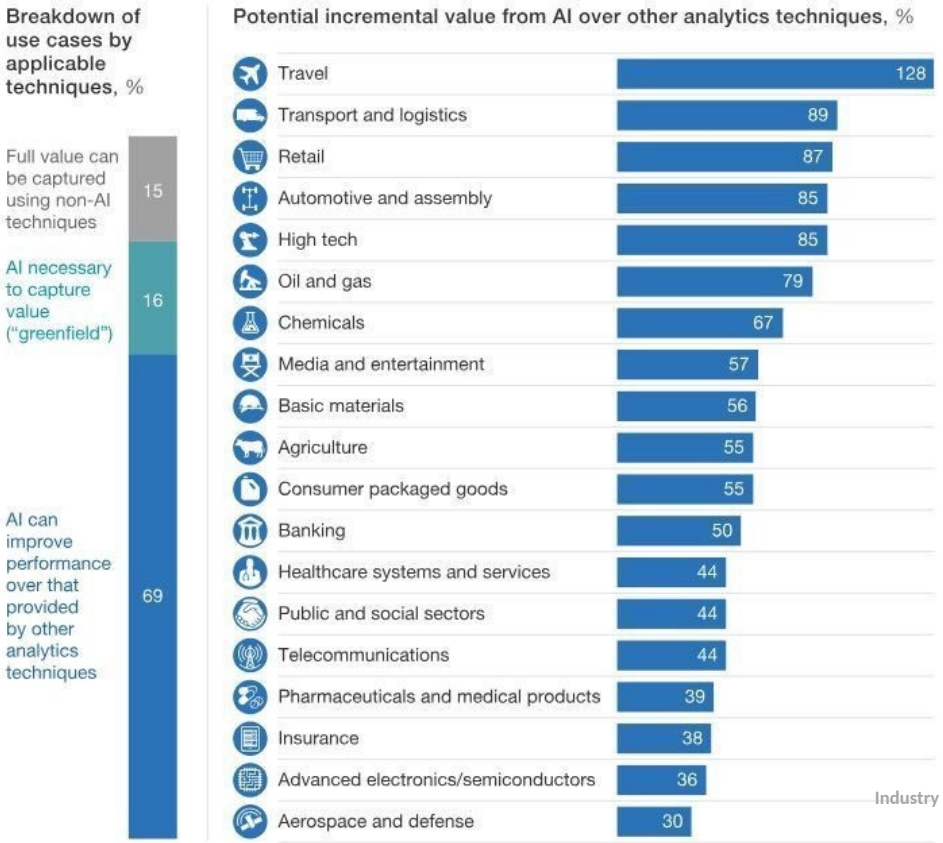
Photo by Hening Witzel on Unsplash

ESTRATEGIAS & OPERACIONES



MACHINE LEARNING & OPERACIONES

In more than two-thirds of our use cases, artificial intelligence (AI) can improve performance beyond that provided by other analytics techniques.

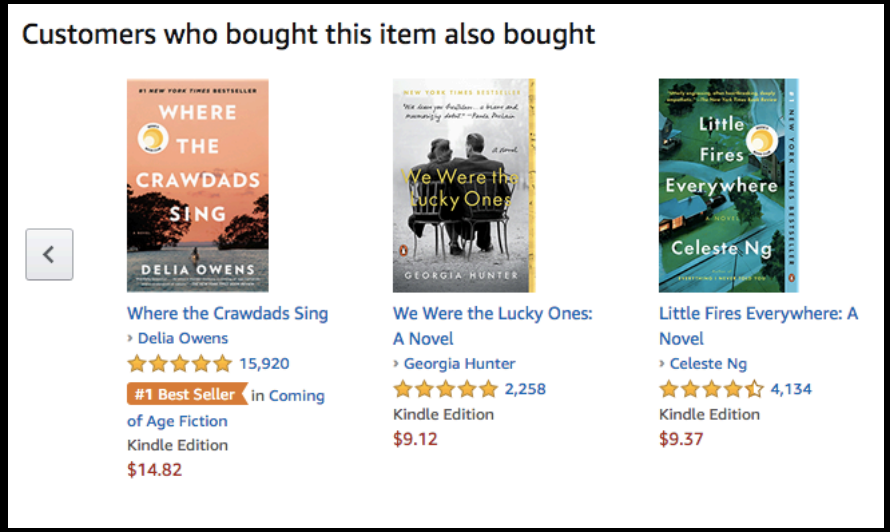


Industry is where the real potential of AI lies, WEF 2019


Hi!

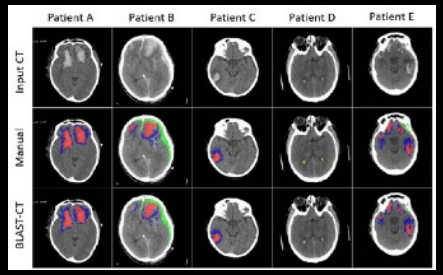
ARTIFICIAL INTELLIGENCE & OPERATIONS

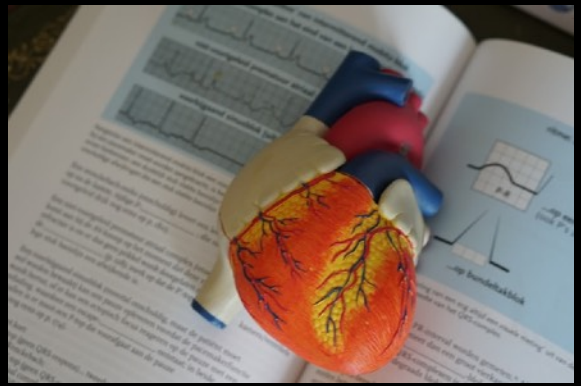
Photo by rawpixel on Unsplash
https://experiments.withgoogle.com/collection/ai



Amazon & Amazon Rekognition
https://aws.amazon.com/rekognition/?blog-cards.sort-by=item.additionalFields.createdDate&blog-cards.sort-order=desc

ARTIFICIAL INTELLIGENCE & OPERATIONS





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https://www.cam.ac.uk/research/news/ai-successfully-used-to-identify-different-types-of-brain-injuries
https://www.technologyreview.com/f/613924/ai-deepfakes-gans-medical-cancer-diagnosis/

https://www.weforum.org/agenda/2020/01/ai-breast-cancer-detection-accuracy/
https://www.csail.mit.edu/news/using-machine-learning-estimate-risk-cardiovascular-death
https://news.mit.edu/2021/new-algorithms-show-accuracy-reliability-gauging-unconsciousness-under-general-anesthesia-0526

Photo by Simon Noh on Unsplash
https://futurism.com/a-new-ai-can-write-music-as-well-as-a-human-composer
Aiva "Genesis"
https://soundcloud.com/user-95265362/symphonic-fantasy-in-a-minor-op-21-genesis-1?in=user-95265362/sets/genesis
Alva Technologies 2016

ARTIFICIAL INTELLIGENCE & OPERATIONS

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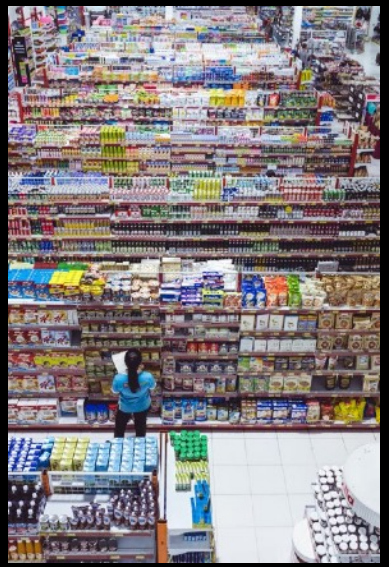
https://www.technologyreview.com/s/613738/artificial-intelligence-sees-construction-site-accidents-before-they-happen/

Photo by Barret Ward on Unsplash
https://www.mckinsey.com/featured-insights/artificial-intelligence/global-ai-survey-ai-proves-its-worth-but-few-scale-impact

ARTIFICIAL INTELLIGENCE & OPERATIONS



https://www.ing.uc.cl/en/boletines/desarrollan-primer-robot-chileno-inteligencia-artificial-trabajar-supermercados/
https://www.businessinsider.com/amazon-doubled-the-number-of-kiva-robots-2015-10

Photo by Bernard Hermant on Unsplash

ARTIFICIAL INTELLIGENCE & OPERATIONS

Photo by Eleventh Wave on Unsplash
Aprender caminar solo
https://www.technologyreview.com/2021/05/27/1025453/artificial-intelligence-learning-create-itself-agi/
Aprender lenguaje
https://www.technologyreview.com/2021/05/20/1025135/ai-large-language-models-bigscience-project/

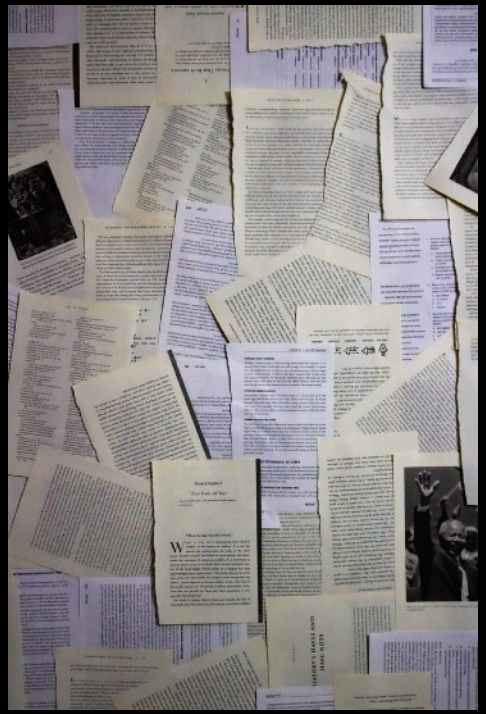


Photo by Reagan Freeman on Unsplash
https://openai.com/ & GPT-3
https://blog.google/technology/ai/lamda/ & LaMDA
https://www.baai.ac.cn/en & WuDao BAAI

ARTIFICIAL INTELLIGENCE & OPERATIONS

DALL-E 2

Open-AI

LaMDA

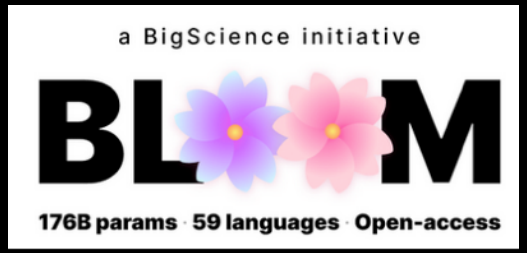
Google

Gato

DeepMind

https://openai.com/dall-e-2/
https://blog.google/technology/ai/lamda/
https://www.deepmind.com/publications/a-generalist-agent

ARTIFICIAL INTELLIGENCE & OPERATIONS



GPT-3 (May 202o)
Photo by Open AI
https://openai.com/blog/gpt-3-apps/
https://arxiv.org/abs/2005.14165

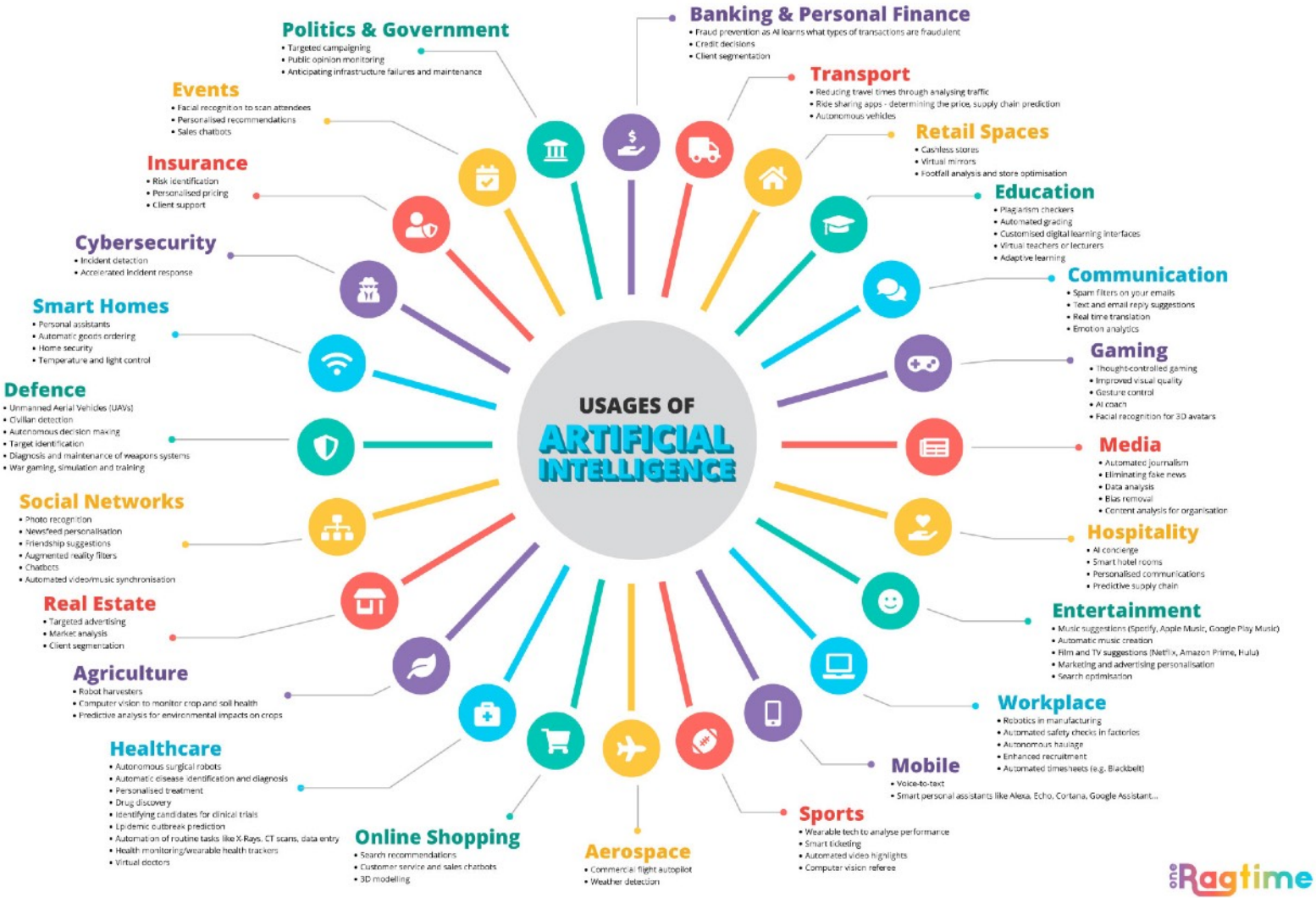
BLOOM (June 2022)
Photo by BigScience Research Workshop

https://huggingface.co/bigscience/bloom

DALL-E 2 (Jan 2022)
Photo by Open AI
https://arxiv.org/abs/2204.06125

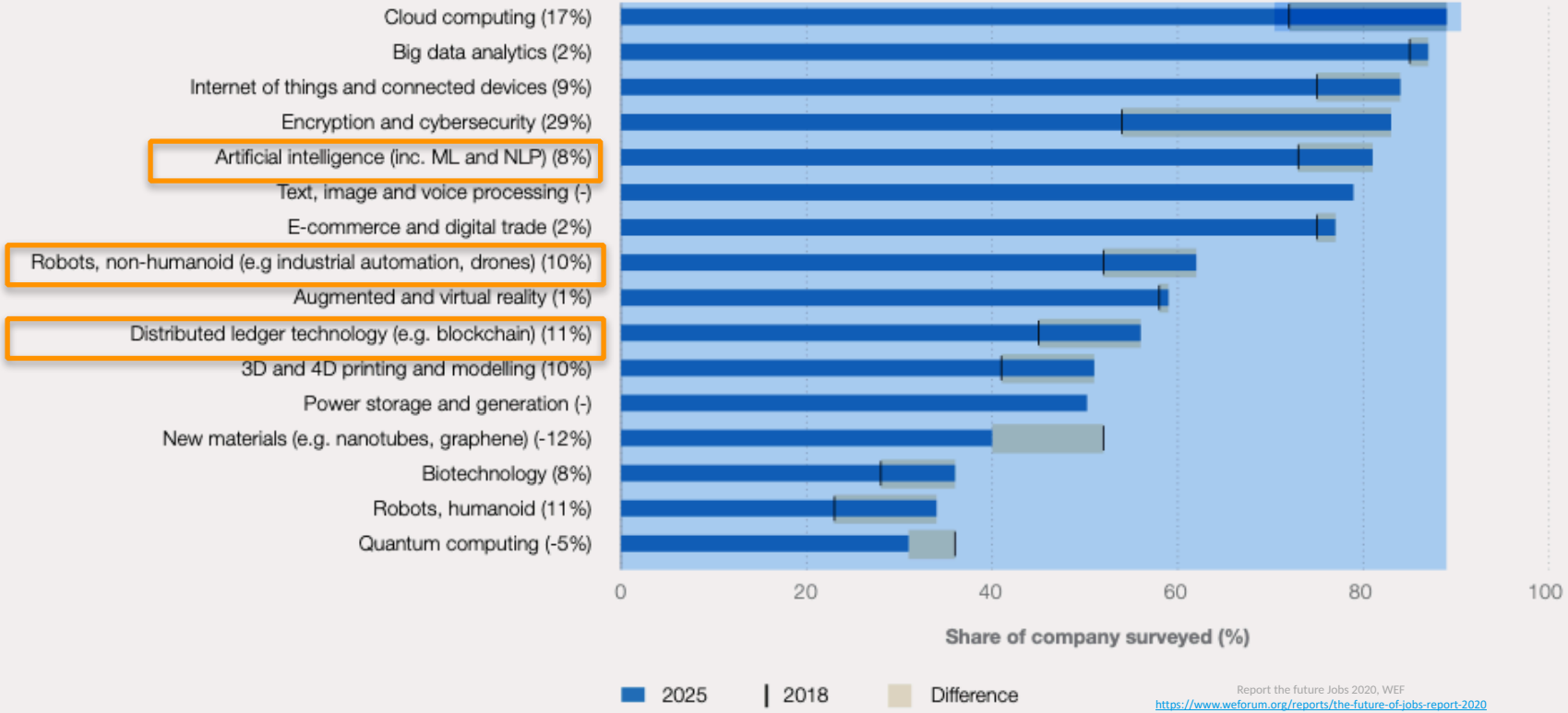
Stable Diffusion (sept 2022)
Photo by Stability AI

https://stability.ai/blog/stable-diffusion-v2-release
https://huggingface.co/spaces/stabilityai/stable-diffusion (Demo)
https://github.com/Stability-AI/stablediffusion


USAGES OF
ARTIFICIAL INTELLIGENCE
Politics & Government
• Targeted campaigning
• Public opinion monitoring
• Anticipating infrastructure failures and maintenance
Banking & Personal Finance
• Fraud prevention as AI learns what types of transactions are fraudulent
• Credit decisions
• Client segmentation
Events
• Facial recognition to scan attendees
• Personalised recommendations
• Sales chatbots
Transport
• Reducing travel times through analysing traffic
• Ride sharing apps - determining the price, supply chain prediction
• Autonomous vehicles
Insurance
• Risk identification
• Personalised pricing
• Client support
Retail Spaces
• Cashless stores
• Virtual mirrors
• Footfall analysis and store optimisation
Cybersecurity
• Incident detection
• Accelerated incident response
Education
• Plagiarism checkers
• Automated grading
• Customised digital learning interfaces
• Virtual teachers or lecturers
• Adaptive learning
Smart Homes
• Personal assistants
• Automatic goods ordering
• Home security
• Temperature and light control
Communication
• Spam filters on your emails
• Text and email reply suggestions
• Real time translation
• Emotion analytics
Defence
• Unmanned Aerial Vehicles (UAVs)
• Civilian detection
• Autonomous decision making
• Target identification
• Diagnosis and maintenance of weapons systems
• War gaming, simulation and training
Gaming
• Thought-controlled gaming
• Improved visual quality
• Gesture control
• AI coach
• Facial recognition for 3D avatars
Media
• Automated journalism
• Eliminating fake news
• Data analysis
• Bias removal
• Content analysis for organisation
Social Networks
• Photo recognition
• Newsfeed personalisation
• Friendship suggestions
• Augmented reality filters
• Chatbots
• Automated video/music synchronisation
Hospitality
• AI concierge
• Smart hotel rooms
• Personalised communications
• Predictive supply chain
Real Estate
• Targeted advertising
• Market analysis
• Client segmentation
Entertainment
• Music suggestions (Spotify, Apple Music, Google Play Music)
• Automatic music creation
• Film and TV suggestions (Netflix, Amazon Prime, Hulu)
• Marketing and advertising personalisation
• Search optimisation
Agriculture
• Robot harvesters
• Computer vision to monitor crop and soil health
• Predictive analysis for environmental impacts on crops
Workplace
• Robotics in manufacturing
• Automated safety checks in factories
• Autonomous haulage
• Enhanced recruitment
• Automated timesheets (e.g. Blackbelt)
Healthcare
• Autonomous surgical robots
• Automatic disease identification and diagnosis
• Personalised treatment
• Drug discovery
• Identifying candidates for clinical trials
• Epidemic outbreak prediction
• Automation of routine tasks like X-Rays, CT scans, data entry
• Health monitoring/wearable health trackers
• Virtual doctors
Mobile
• Voice-to-text
• Smart personal assistants like Alexa, Echo, Cortana, Google Assistant...
Online Shopping
• Search recommendations
• Customer service and sales chatbots
• 3D modelling
Sports
• Wearable tech to analyse performance
• Smart ticketing
• Automated video highlights
• Computer vision referee
Aerospace
• Commercial flight autopilot
• Weather detection

ARTIFICIAL INTELLIGENCE & COMPANYS

En cuatro años, aproximadamente, ¿Cuáles tecnologías serán más adoptadas en Empresas?



Report the future Jobs 2020, WEF
https://www.weforum.org/reports/the-future-of-jobs-report-2020

A finales del año 2021 se ha publicado la primera política Nacional de Inteligencia Artificial.

https://minciencia.gob.cl/uploads/filer_public/bc/38/bc389daf-4514-4306-867c-760ae7686e2c/documento_politica_ia_digital_.pdf


Photo by Ryoji Iwata on Unsplash

ARTIFICIAL INTELLIGENCE & RIESGOS

https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/confronting-the-risks-of-artificial-intelligence
https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/risk/lu-ai-and-risk-management.pdf

ARTIFICIAL INTELLIGENCE & RIESGOS

Data: Garbage In Garbage Out (GIGO)

Photo by Alex Fu on Pexel

Data: Quality, Homogeneous, Compliance issues

Photo by Dennis Kummer on Unsplash

ARTIFICIAL INTELLIGENCE & RIESGOS

BlackBox, OpexSource, Ethical

Photo by Jacek Dylag on Unsplash

Bias In the Web
https://dl.acm.org/doi/10.1145/3209581
MIT “Minory”
https://www.technologyreview.com/s/612775/algorithms-criminal-justice-ai/

Overfitting & Interpretation

Photo by Lucas from Pexels

Interpretation
https://imfd.cl/en/destacada-participacion-del-instituto-milenio-fundamentos-de-los-datos-en-congreso-futuro/

Overfitting
https://www.researchgate.net/publication/322626856_Classification_error_Bias_and_variance_Underfitting_and_Overfitting

ARTIFICIAL INTELLIGENCE & RIESGOS ÉTICOS Y SOCIALES

- *Acceso a Información (Sesgos,Prejuicios, Inequidad, Racismo)*
- *Investigación Sesgada (EEUU, ASIA Oriental y EUROPA 86% 2018)*
- *Decisiones de Artificial Intelligence o Human Machine (ética/moral)*
- *Proliferación de armamento autónomo. (Drones, Robot, Tesla)*

Photo by Tachina Lee//胡 卓亨/ Anton Darius on Unsplash

ARTIFICIAL INTELLIGENCE & RIESGOS DE SEGURIDAD Y CONTROL

- *Obtención de datos y vulneración de Privacidad.*
- *Intromisión cibernética y "rebelión" de la IA*
- *Riesgos Puestos de Trabajo y Concentración de Poder.*

Photo by Better images for AI.
https://betterimagesofai.org/i
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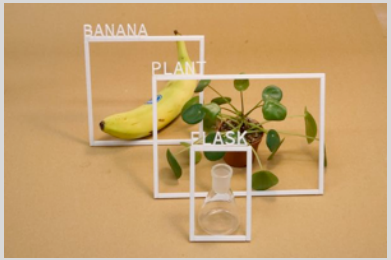
Photo by Drew Beamer on Unsplash

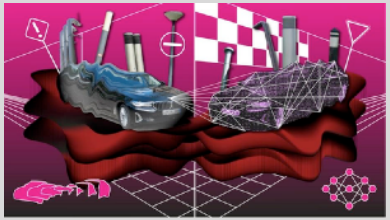
ARTIFICIAL INTELLIGENCE & ETAPAS

AI INTERNET

AI EMPRESAS



AI PERCEPCIÓN



AI AUTÓNOMA

Superpotencias de la Inteligencia Artificial, Kai-fu Lee, Deusto

Photo by Better images of AI

DEEP LEARNING: ¿Cuál imagen es real?

(A)

(B)

More:
https://www.whichfaceisreal.com/index.php
https://www.thispersondoesnotexist.com/

ARTIFICIAL INTELLIGENCE & RIESGOS: ¿Cuál imagen es real?

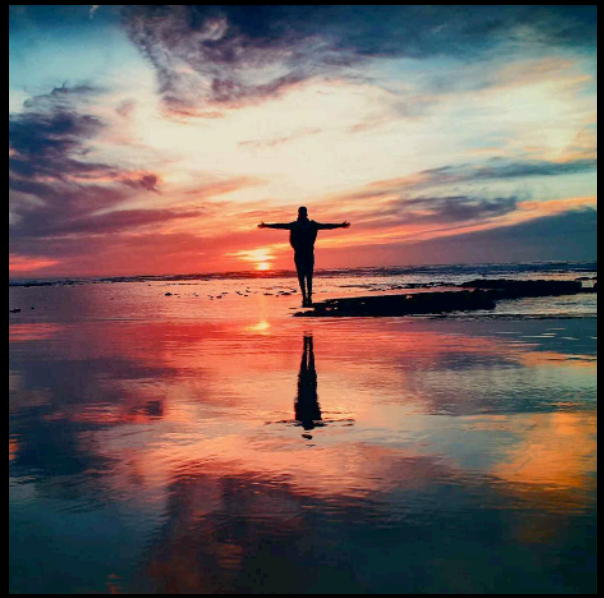
(A)

(B)

More:
https://www.whichfaceisreal.com/index.php
https://www.thispersondoesnotexist.com/

DEEP LEARNING: ¿Cuál imagen la creó un humano?

🤖 (A) 👩‍🎨



🤖 (B) 👩‍🎨

More:
https://thisimagedoesnotexist.com/

ARTIFICIAL INTELLIGENCE & RIESGOS: ¿Cuál imagen la creó un humano?

🤖 (A) 👩‍🎨

🤖 (B) 👩‍🎨

More:
https://thisimagedoesnotexist.com/

MACHINE LEARNING: ¿QUÉ HACER? APRENDER

COURSERA (gratis)

Nuevos Conocimiento Python & R.

https://www.coursera.org/specializations/python

Inicio & Teoría en Machine Learning.

https://www.coursera.org/learn/machine-learning

Incrementa en Machine Learning & Deep Learning.

https://www.coursera.org/specializations/deep-learning

Profundización en CNN, NLP & Others. **

https://www.coursera.org/professional-certificates/tensorflow-in-practice

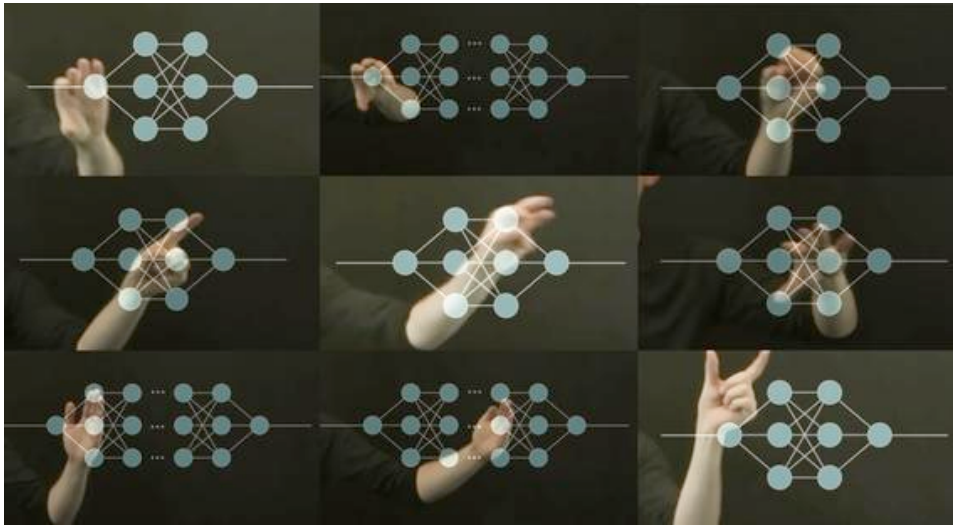
Especialización en CNN, GAN & Others. **

https://www.coursera.org/specializations/tensorflow-advanced-techniques

https://www.coursera.org/specializations/machine-learning-engineering-for-production-mlops

** Requiere de tiempo, conocimientos de programación y constancia

ARTIFICIAL INTELLIGENCE



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