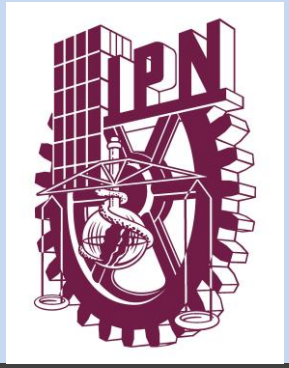
Congreso Mexicano de Inteligencia Computacional (COMIA 2019)

Junio 4-7, 2019

TEPIC, Nayarit

Machine Learning: The Driving Force of Artificial Intelligence



Juan Humberto SOSSA AZUELA

E-mail: hsossa@cic.ipn.mx and humbertososSa@gmail.com

http://sites.google.com/site/cicvision/

¡¡ THE BRAIN !!

Our brain occupies approximately 2% of our body.

¡The human brain is a mass of nervous tisue about 1,200 cubic centimeters and about 1,400 grams!

It is composed of some **86 thousand millions**
of neurons!

¡And some 10^{14} synapsis! (some 170,000 Km of nervous fibers)

¡¡¡The brain is what **makes us** intelligent!!!

For decades, man has dreamed to build machines with **brains like ours**:

Doing this, requires solving some of **the most complex computational problems** that we can imagine.

Problems that our brains solve somehow in some milliseconds…!!!

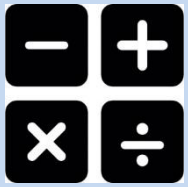
To attain this goal, we **need to develop** radically different ways to program a computer, **using new or known techniques, but in new ways**…

The limits of traditional computing:

Why there certain problems that are very difficult to solved by a computer?

Traditional cumputation programs are designed to do two things well:

1) **To carry out** artihmetic operations is **a very fast way**, and



2) **Follow**, in an **explicit way**, a list of instructions.

```
/**
 * Simple HelloButton() method.
 * @version 1.0
 * @author john doe <doe.j@example.com>
 */
HelloButton()
{
  JButton hello = new JButton( "Hello, wor
  hello.addActionListener( new HelloBtnList

  // use the JFrame type until support for t
  // new component is finished
  JFrame frame = new JFrame( "Hello Button"
  Container pane = frame.getContentPane();
  pane.add( hello );
  frame.pack();
  frame.show();           // display the fra
}
```

¡¡For example, if we want to process **big quantities of financial data**, we are lucky!!!

A traditional computing program can do the job.

Let us analyze a slightly different problem…

MNIST data base.

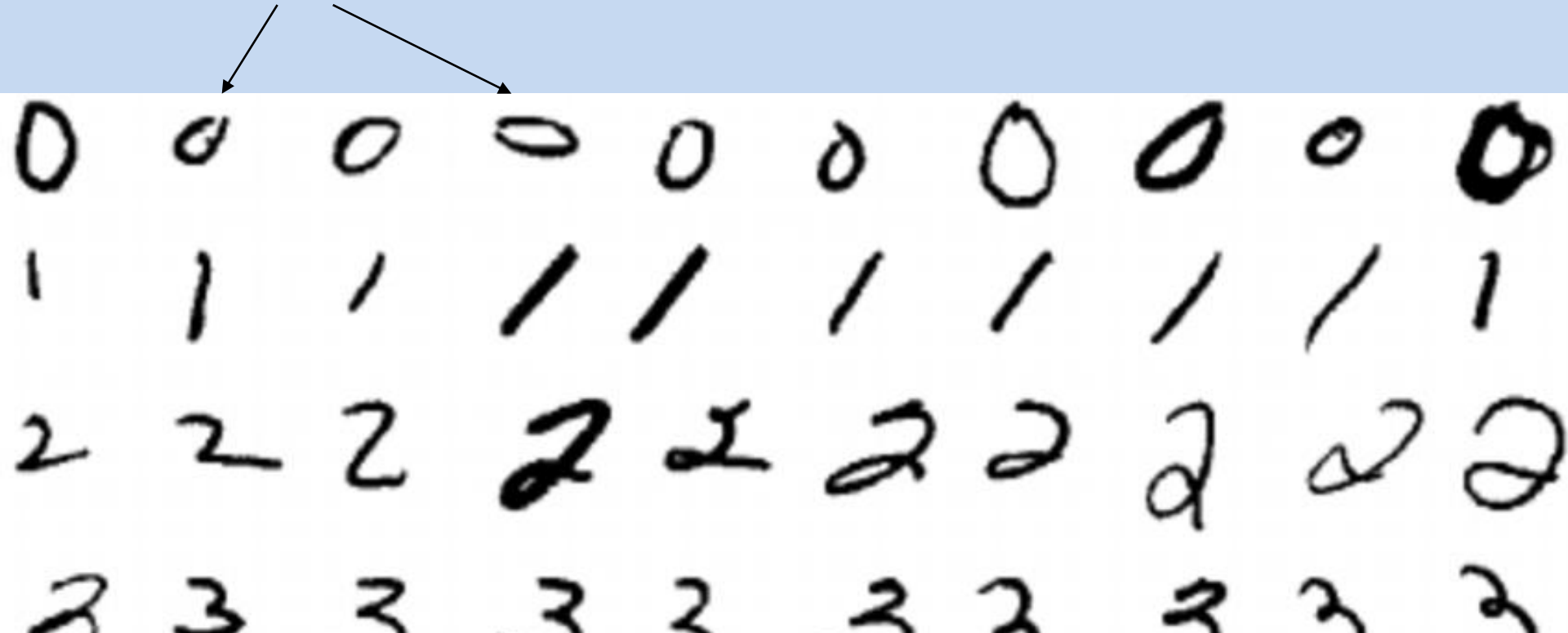
Each digt in the first row can be recognized as a “0”.

The same can be said of the remaining digits.

What rules could be used to a digit from the other?

One could stablish a first to identify a “0” as a single closed loop.

Of course, this is not enough. **What hapend if someone does not close the loop?**



How do we distinghish between a 3 and a 5?

How do we distinghish between a 4 and a 9?

We **can add more and more rules** or describing features, through a Deep analysis or observations through weeks, months,…

It is not clear, that at the end we will arrive to the solution…

Something scapes us!

Many problems fall into this category:

- Object recognition.
- Language underestanding.
- Automatic translation, and
- So on.

Fact: **We do not know what programs to write** for we **do not know** how we solve these problems in our brain.

¡¡¡Even if we knew how we do this, the program could be horribly complicated!!!

In this new revolution (the las 20 years), **we see more and more programs that learn.**

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Programs that **adapt their behavior** in an automatic way to **the requirements** of a given task.

Programs that:

- **Recognize** faces.

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- **Drive** cars.

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- **Recognize** faces.

- **Drive** cars.

- **Recommend** which movie to watch.

- And so no.

Before, a person (a programmer) **defined** what a computer should do**,**

but how?

Before, a person (a programmer) **defined** what a computer should do**,**

by codifying an algorithm in programming language**.**

Today, for many tasks, **no more programs are written, instead data is collected.**

1) This data **contains** instances of what should be done, and

2) A learning algorithm modifies (in a automatic way) **a learner program in such way that as to match the requirements specified by the data.**

For many applications:

- from vision to speech,
- from translation to robotics,

we are **not able** to devise very good algorithms despite decades of research beginning in the 50´s.

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- from vision to speech,
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we are **not able** to devise very good algorithms despite decades of research beginning in the 50´s.

However, for these tasks it is **very easy** to collect data.

The idea is to automatically **learn** the algorithms from data, replacing **programmers with learning programs**.

This is the niche
of **Machine Learning**
(ML)

Mechanics of Machine Learning (ML):

How do we learn natural things?

Fact: The more natural things, we learn them through examples, not from equations…

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Example: Since children our parents teach us how to recognize a dog. They do it by showing us dogs.

model

Our brain **provides of a model** describing the world we perceive.

Through our lives, this model becomes **more and more precise**, through more examples of things.

All of this happens:

1) **Without realize it,**
2) **And in an unconscious way.**

If our model is the following:

$$h(X, \theta),$$

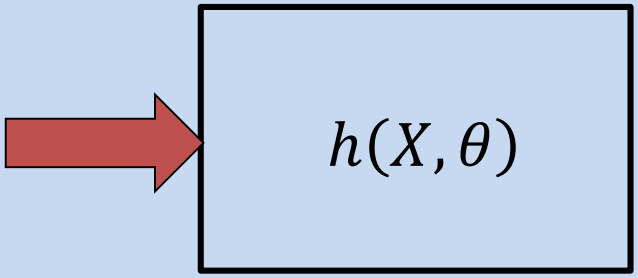
with:

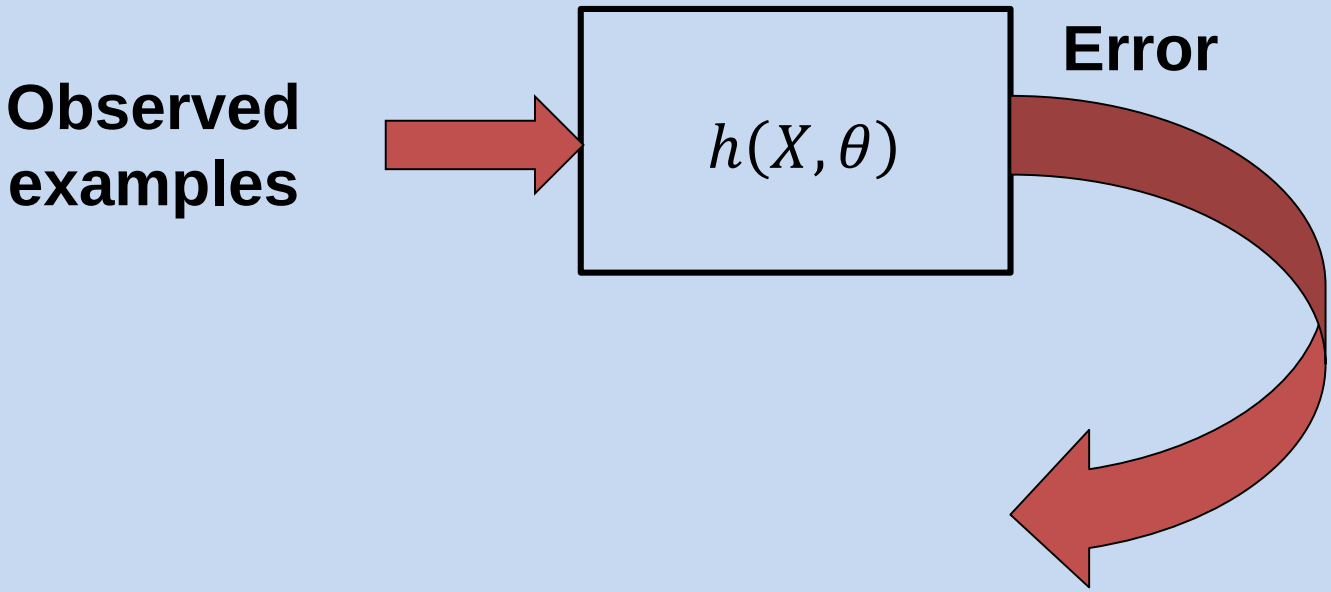
X one of the observed examples represented in vector form, and

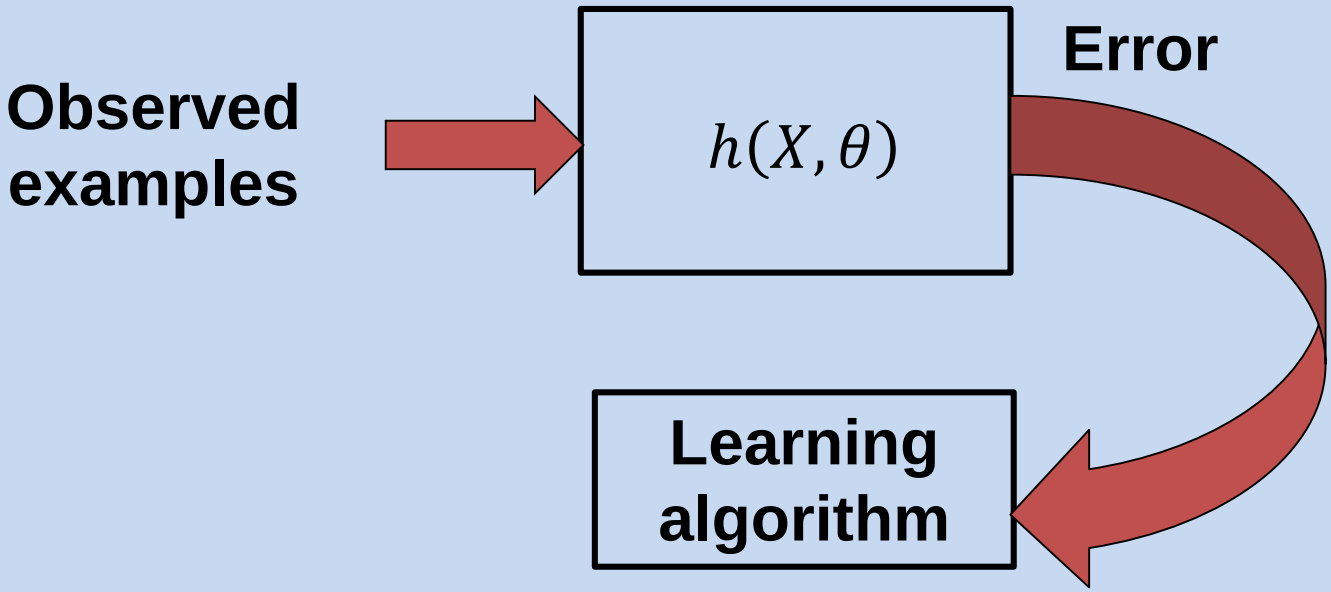
θ the parameter vector that our model uses.

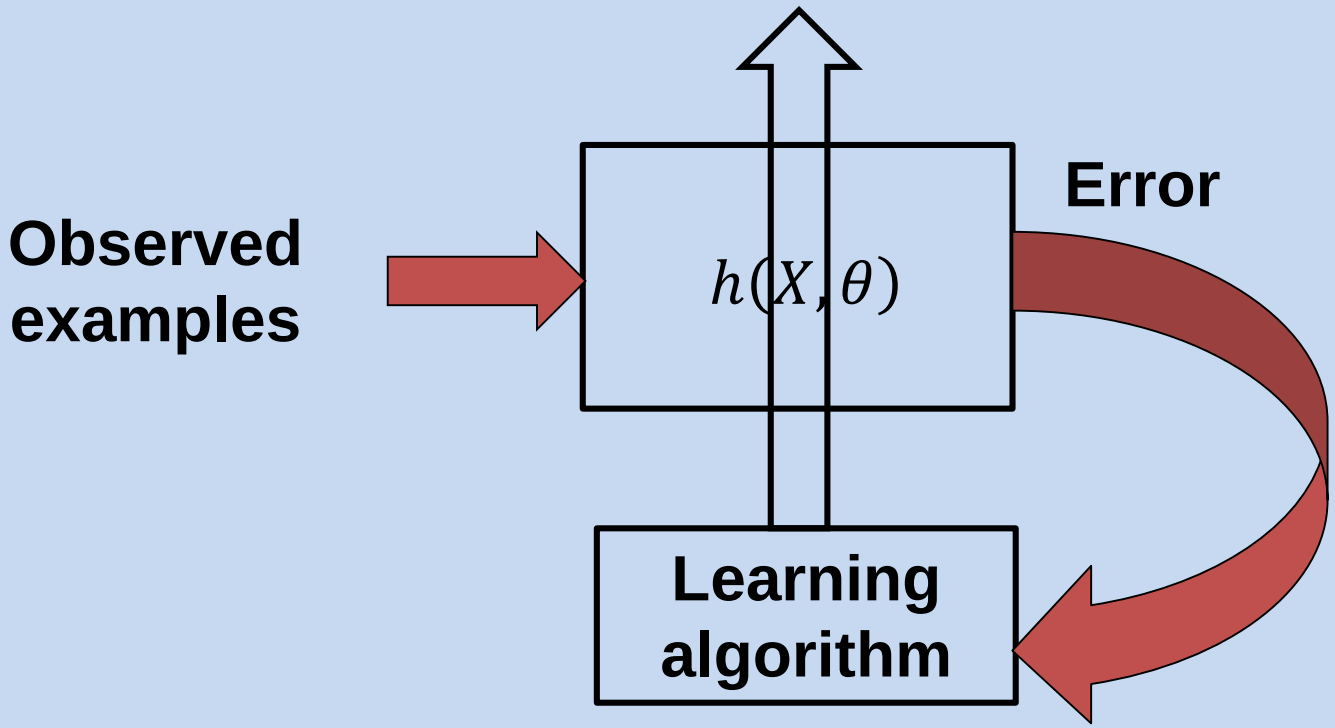
Our learning algorithm would try to improve, little by little, vector θ through more and more examples, this would produce a better model.

Observed examples




Observed examples
$h(X, \theta)$
Error


Observed examples
$h(X, \theta)$
Error
Learning algorithm


Observed examples
$h(X, \theta)$
Error
Learning algorithm

For a given application, data could be too big!!!

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For example: **Face recognition**:





Something interesting: all this data **can be explained** in terms of a **relatively simple model with a small number of hidden factors and their interaction**.

The **goal** of ML is to **turn this data into knowledge**.

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What smart people do?

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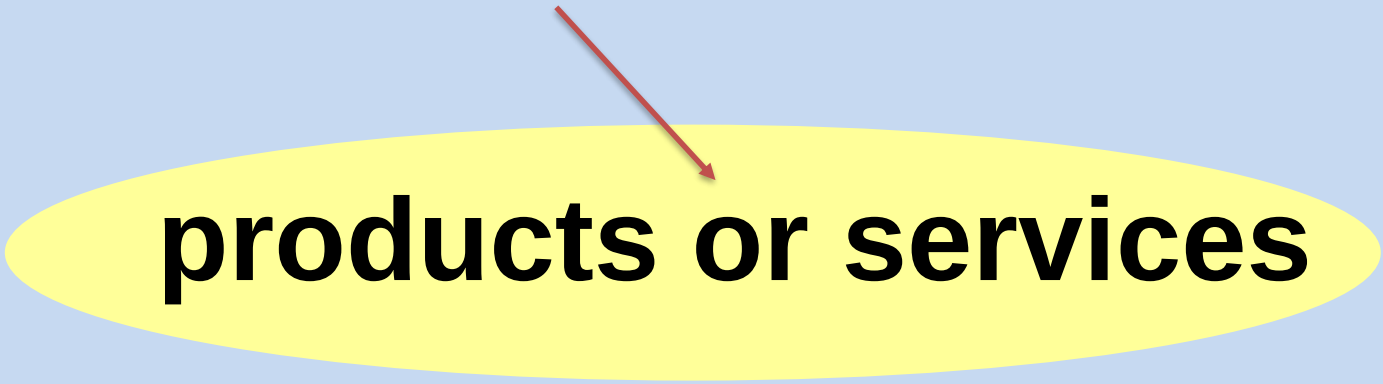
What smart people do?

They find new ways to:

1) **Use data to**

2) **Turn into useful:**



Another example: Think about millions of customers who **buy** thousands of products **online** or from their local supermarket **every day**.

This implies a **very large database** of transactions.

There is a pattern on this data:

People do not buy at random!

Again, there are **hidden factors** that **explain** the **costumer behavior.**

Goal: To infere the **hidden model** in the observed data.

This is the core of ML.

Learning is requisite of intelligence.

An intelligent system is a system that **adapts** to its environment.

It should learn not to repeat its mistakes but to repeat its succeses.

Before, researchers believed that for AI to become a reality, we needed new:

1) paradigms,
2) ways of thinking,
3) computation models,
4) sets of algorithms.

Thaking into account the recent succeses of ML, **it can be claimed** that what we need is:

1) **a lot of example data, and**
2) **sufficient computing power**

to run learning methods on that much data, **boostrapping the necessary algorithms from data.**

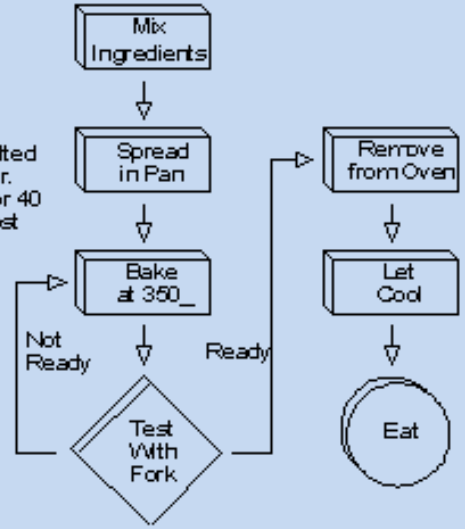
Recipe
CHOCOLATE CAKE

4 oz. chocolate — 3 eggs
1 cup butter — 1 tsp. vanilla
2 cups sugar — 1 cup flour

Melt chocolate and butter. Stir sugar into melted chocolate. Stir in eggs and vanilla. Mix in flour. Spread mix in greased pan. Bake at 350_ for 40 minutes or until inserted fork comes out almost clean. Cool in pan before eating.

Program Code

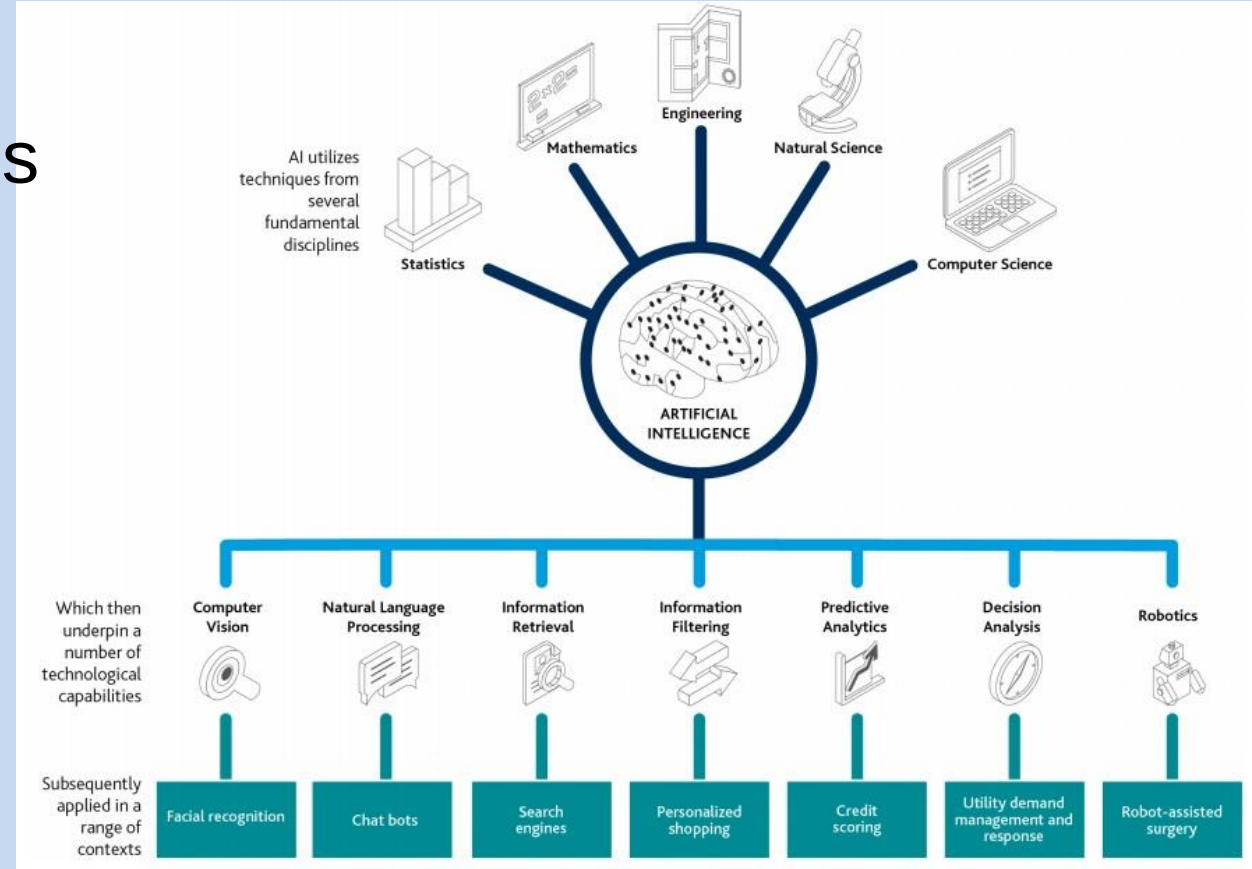
```
Declare variables:
    chocolate   eggs      mix
    butter      vanilla
    sugar       flour
mix = melted ((4*chocolate) + butter)
mix = stir (mix + (2*sugar))
mix = stir (mix + (3*eggs) + vanilla)
mix = mix + flour
spread (mix)
While not clean (fork)
bake (mix, 350)
```



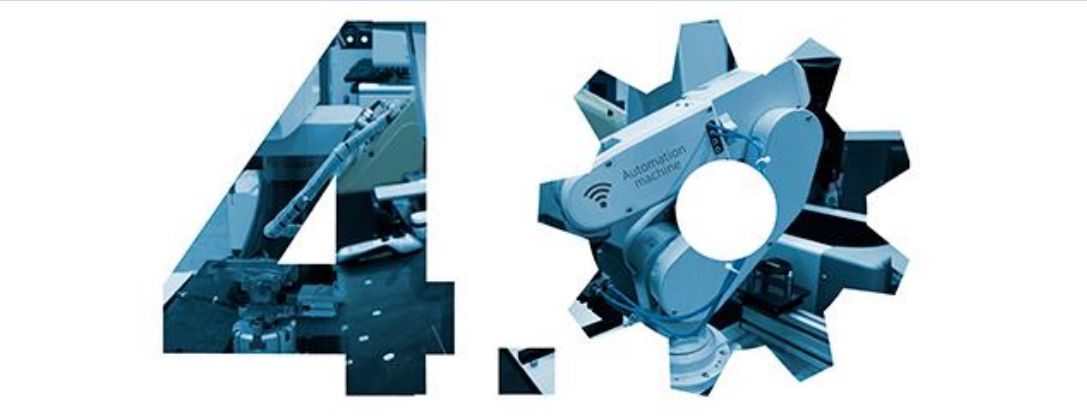
It seems that as:

1) technology **develops**,
2) we **have access** to faster computers, and
3) we **obtain** more data,

learning algorithms **will generate a slighly higher level of intelligence,** which will find more and more uses.



En esta nueva llamada revolución industrial:



Surge u nuevo actor:

La Inteligencia Artificial

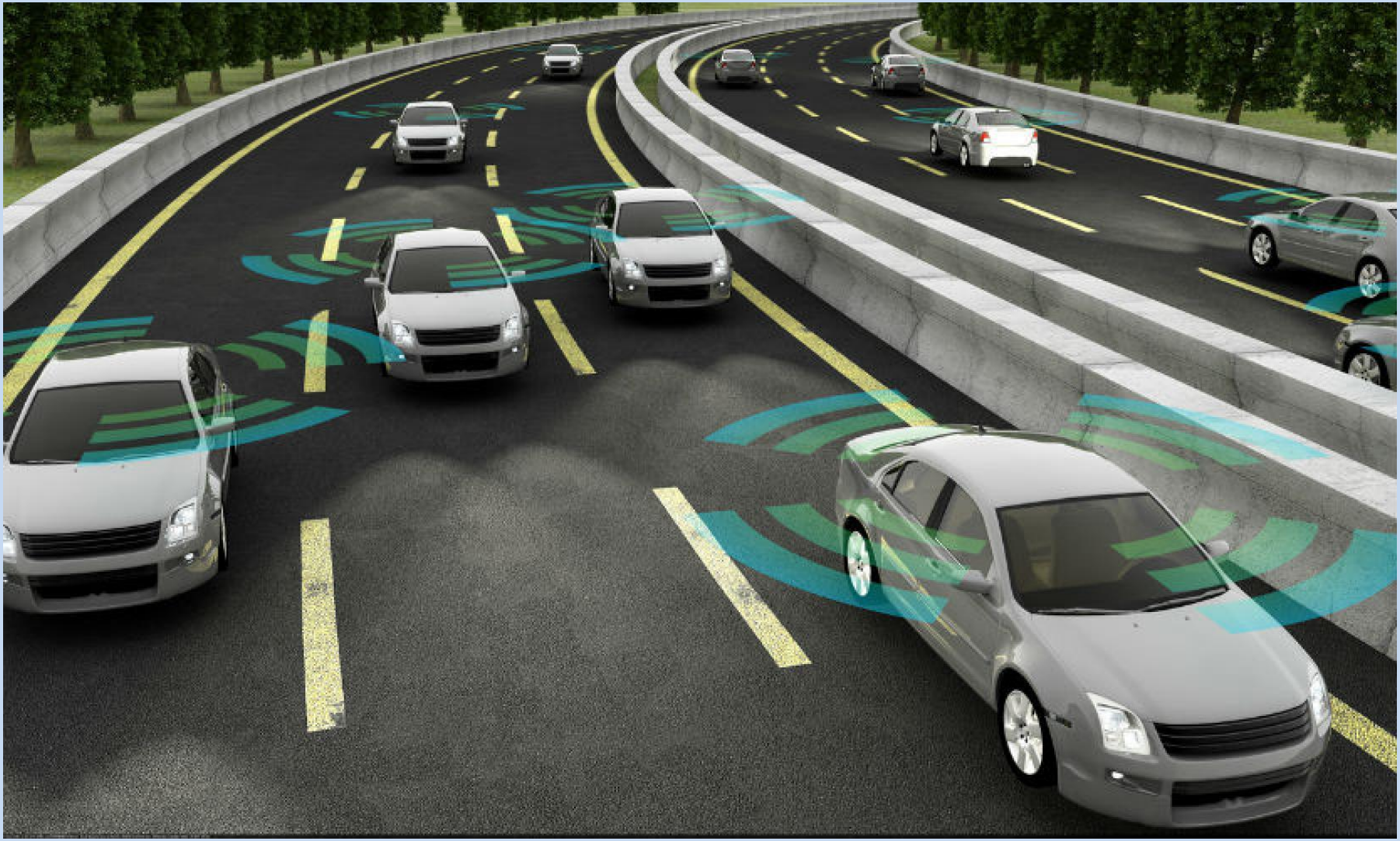
La Inteligencia artificial (IA) es, sin duda, una de las tendencias definitorias de nuestros días.

En los últimos 10 años, máquinas han sido entrenadas para resolver problemas cada vez más complejos.

Hoy, las máquinas son capaces de llevar a cabo tareas solo atribuibles en otros tiempos solo al ser humano.

1) **La identificación de personas en medio de la multitud.**

2) El guiado autónomo de autos.



IEEE SPECTRUM

6 Dec 2018 | 19:00 GMT

3) Juegos:

DeepMind Achieves Holy Grail: An AI That Can Master Games Like Chess and Go Without Human Help:

AlphaZero, a general-purpose game-playing system, quickly taught itself to be the best player ever in **Chess, Go**, and **Shogi.**

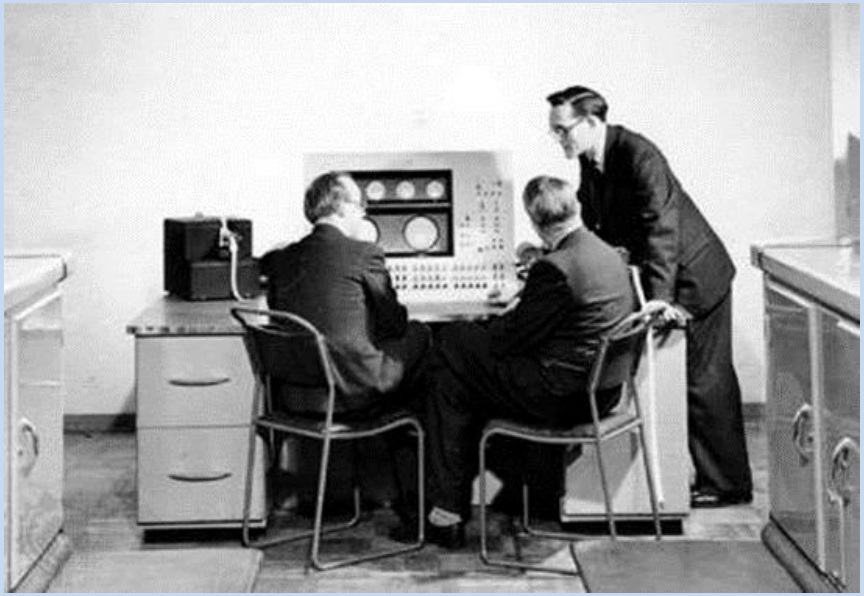
4) LIBRATUS capaz de vences a los mejores jugadores profesionales de Poker.

Es indudable que algunas veces las máquinas hacen mejor las cosas que nosotros los seres humanos.

Las máquinas pensantes no son nuevas por supuesto, datan de hace más de 75 años.

Entre los más antiguos se puede contar al programa que **juega damas diseñado por Christopher Strachey y el programa que juega ajedrez desarrollado por Dietrich Prinz**.

Ambos programas fueron desarrollados en la computadora **Ferranti Mark 1 de la Universidad de Manchester en 1951.**



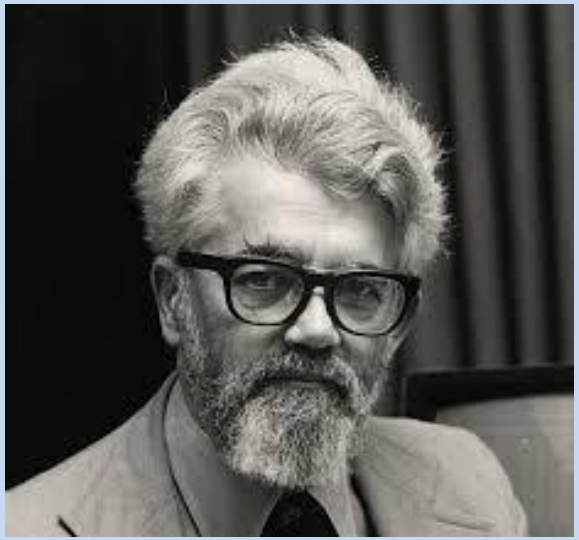
¿Qué es la Inteligencia Artificial?

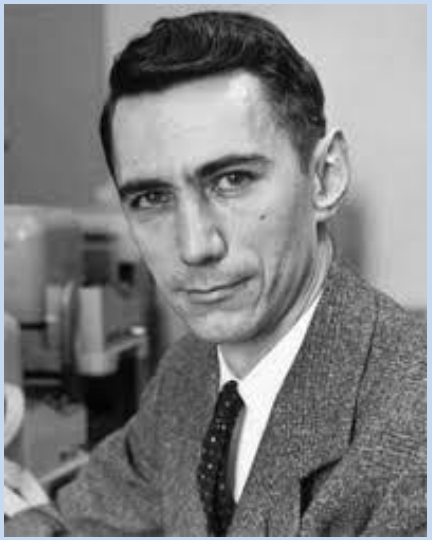
La Inteligencia Artificial es la ciencia e ingeniería de las máquinas que actúan de manera inteligente.

Una máquina es inteligente cuando es **capaz de tomar decisiones apropiadas en circunstancias inciertas**.

Una máquina de dice ser inteligente cuando **es capaz de aprender** de mejorar su comportamiento con base en sus experiencias.

El término **Inteligencia Artificial** nace en el congreso de Dartmouth en 1956. Fue inventado por John McCarthy, Marvin Minsky y Claude Shannon.





En este congreso **se hicieron previsiones triunfalistas a diez años que jamás se cumplieron**, lo que provocó el abandono casi total de las investigaciones durante quince años.

Características de un verdadero sistema de IA o verdadera IA:

1. **Un verdadero sistema de IA** es aquel que es capaz de aprender por sí mismo.

2. **Una verdadera IA** sería aquella que puede mejorar de iteraciones pasadas, viniendo a ser más inteligente y más consciente, permitiéndole mejorar sus capacidades y su conocimiento.

Aplicaciones comerciales de la IA:

Un estudio llevado a cabo por la empresa Gartner en 2016 muestra que para el 2020, al menos 30% de las todas las compañías usarán IA en al menos un fragmento de sus procesos de venta.

Algunas áreas de oportunidad:

1. Asistentes personales.
2. Automóviles autónomos.
3. Banca y finanzas
4. Edificios inteligentes.
5. Chatbots.
6. Ciberseguridad.
7. Comercio electrónico (e-commerce).
8. Cuidado de la salud.
9. Diseño de ropa, estilos de zapatos, etcétera.
10. Electrodomésticos.
11. Entretenimiento.
12. Logística y cadenas de suministro.
13. Manufactura optimizada.
14. Servicio al cliente en línea.
15. Sistemas de recomendación.
16. Telefonía celular.
17. Turismo.

Retos actuales (2018) para implementar la IA:

Aunque ya se cuenta con:

1. **Mejor poder** de cómputo (músculo).
2. **Mejores** técnicas para el manejo de grandes cantidades de datos.
3. **Mejores** técnicas para el aprendizaje de máquinas (aprendizaje profundo).

Todavía hay mucho camino que recorrer.

1. **El volumen de los datos.**
2. **Inteligencia artificial multitarea.**
3. **Hardware.**

El volumen de los datos:

La IA **necesita miles de veces más datos** que los requeridos por el cerebro humano para **poder comprender** conceptos y características.

La capacidad de las máquinas para ver, entender e interactuar con el mundo está creciendo a un ritmo acelerado, apoyado en el volumen de datos que les ayuda aprender y entender aún más rápido.

El volumen de los datos:

Cada año la cantidad de datos que producimos se duplica.

En la próxima década habrá unos 150 mil millones de sensores conectados a la red, **equivalente a más de 20 veces la población de la Tierra**.

En este sentido, el **big data ha sido y será un gran aliado de la IA** para procesar esta cantidad cada vez más grande de información y volverla útil.

Inteligencia artificial multitarea:

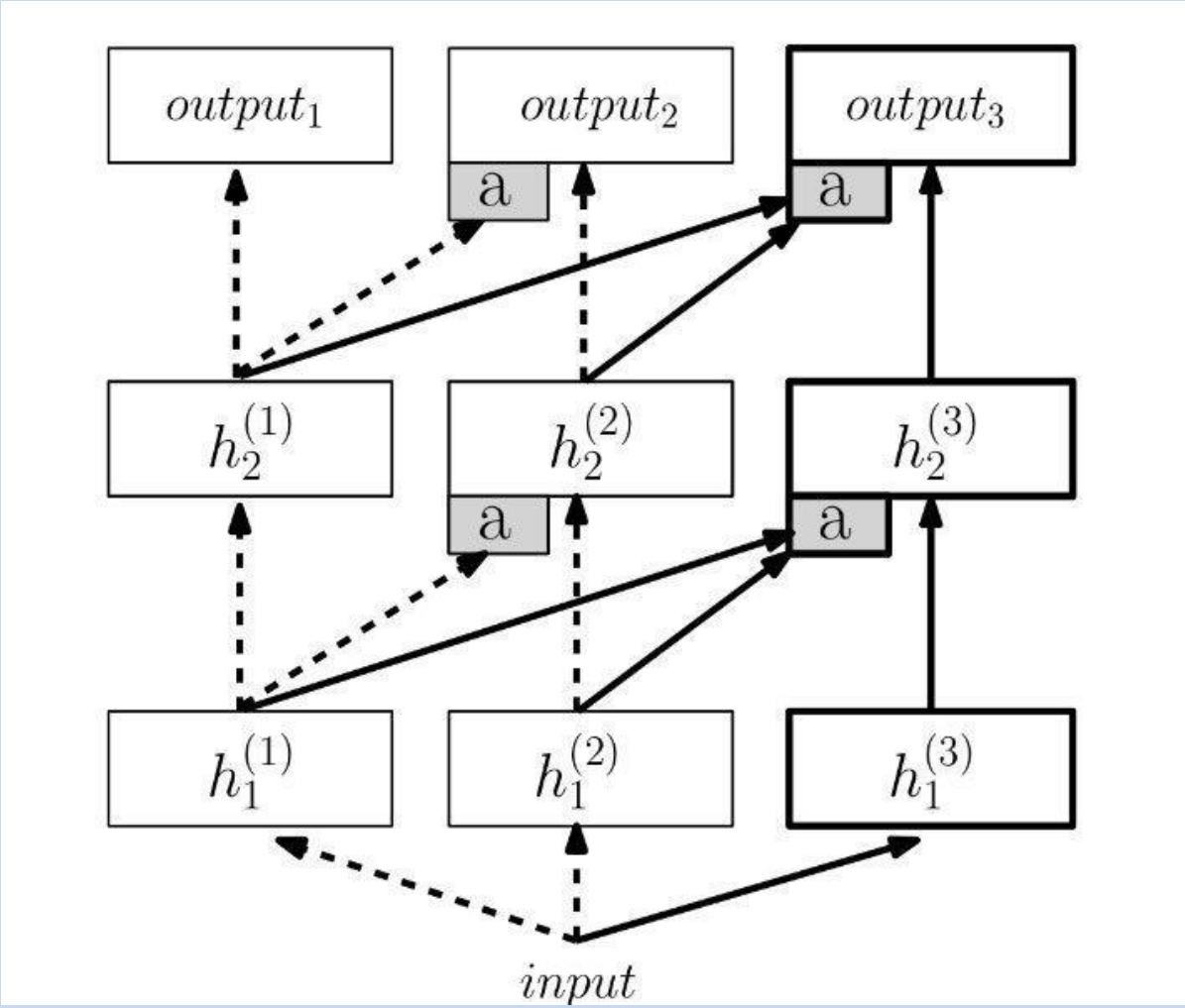
Una vez que una máquina de IA es entrenada, es muy efectiva para tareas como el reconocimiento facial o de voz.

Solo son capaces de realizar tareas específicas.

Actualmente, no hay máquinas inteligentes capaces de cambiar de una tarea a la otra.

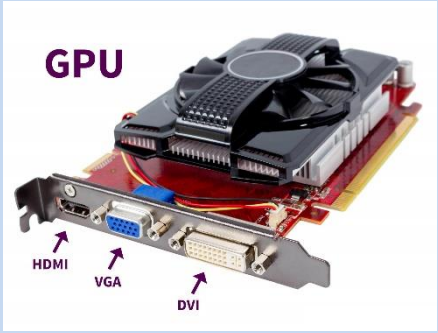
Este es uno de los retos actuales de la IA.

Una propuesta de solución consiste en usar las llamadas **“redes neuronales progresivas”,** aún en fase de desarrollo y prueba.



Limitaciones de hardware:

A pesar de la gran capacidad de procesamiento que han alcanzado las máquinas y toda la información que se encuentra disponible, esta tecnología aún se encuentra limitada por el hardware.

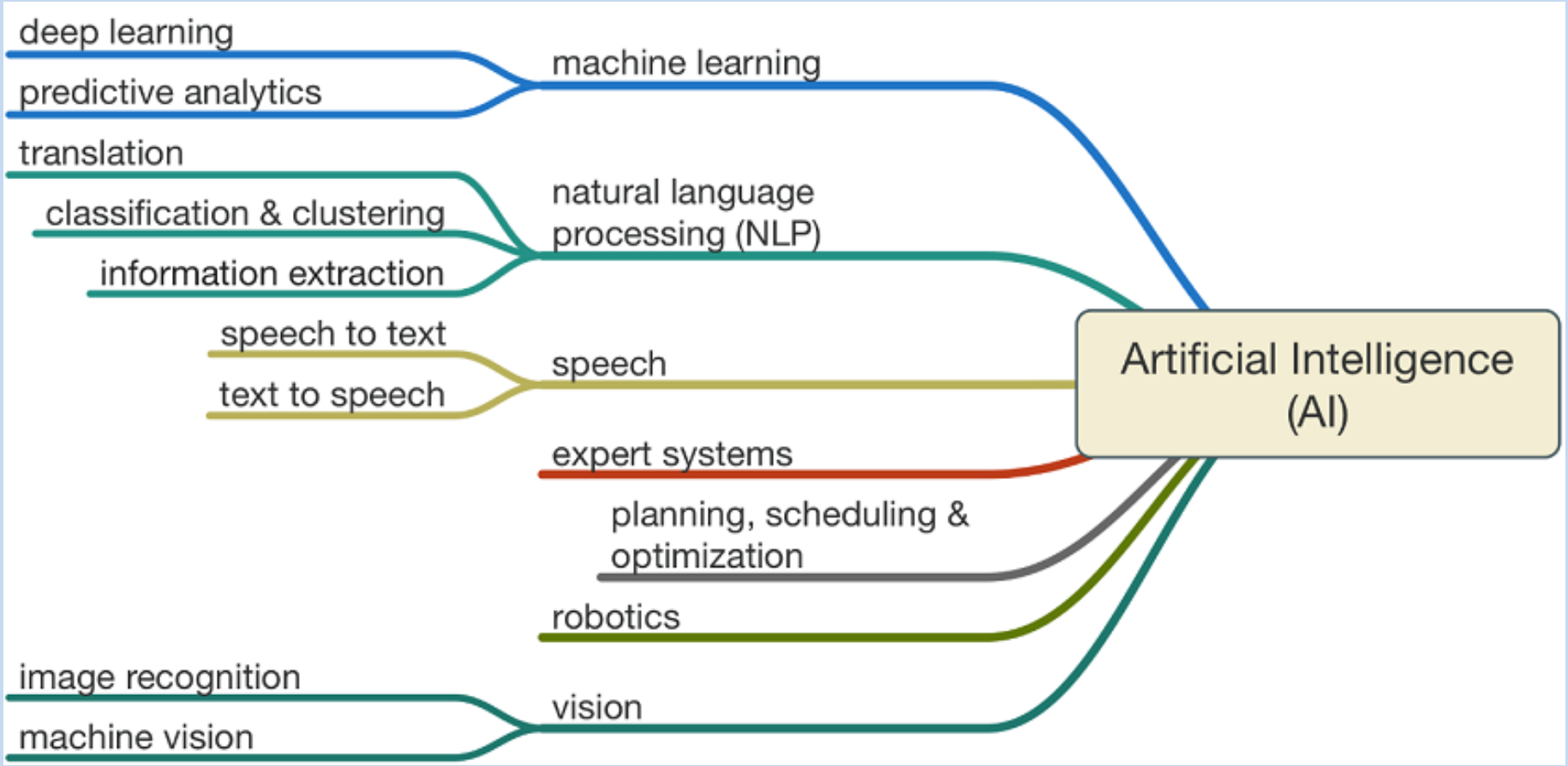


La infraestructura necesaria para experimentar con la IA es escasa y costosa. Se necesitan equipos más potentes para tener mejores resultados.

Solución: Cómputo masivamente paralelo (Cómputo cuántico. Cómputo DNA, Cómputo óptico, Cómputo atómico, Cómputo bacteriano, Etcétera.

Consideraciones para las empresas:

Talento humano:



Listado parcial de programas en IA y temas relacionados:

1. Ingeniería en IA, Universidad Panamericana.
2. Lic. en Ciencia de Datos (CD) y Maestría en IA, UNAM.
3. Maestría en IA, Universidad Veracruzana.
4. Maestría en Ciencias con Especialidad en Sistemas Inteligentes, Tecnológico de Monterrey.
5. Maestría en CD, ITAM.
6. Maestría en CD, UVM.
7. Maestría en CD y Procesamiento de Datos Masivos (Big Data), Universidad Cuauhtémoc.
8. Doctorado en IA, Universidad Veracruzana.
9. Ing. en IA y Lic. en CD, Instituto Politécnico Nacional (2020).
10. Maestría en IA y CD y Doctorado en IA y AM, Instituto Politécnico Nacional (2020).

Ética en su uso:

1) La IA **debería ser utilizada** para construir máquinas para el servicio del ser humano, **no para su perjuicio**.

2) No se debería usar la IA **para construir máquinas de guerra**.

Call to ban killer robots in wars BBC News, Washington DC, 15 February, 2019.

A group of scientists has called for a ban on the development of weapons controlled by artificial intelligence (AI).

He Helped Create A.I. Now, He Worries About 'Killer Robots. New York Times. March 29, 2019

Yoshua Bengio, an A.I. pioneer who won the 2018 A.M. Turing Award with two others, supports a proposed ban of robots that could use A.I. to target humans without human oversight.

3) No se debería usar la IA para **influenciar las elecciones presidenciales en países**.

4) No se debería usar la IA **para no contratar personas** para un trabajo dado.

Para esto es necesario entender los riesgos asociados a la IA.

Los expertos explican la diferencia entre la IA débil y la fuerte.

http://theinstitute.ieee.org/ieee-roundup/blogs/blog/understanding-the-risks-associated-with-ai

Google's AI Manifesto: Accountability, Privacy, and No Killer Robots

EXTREMETECH

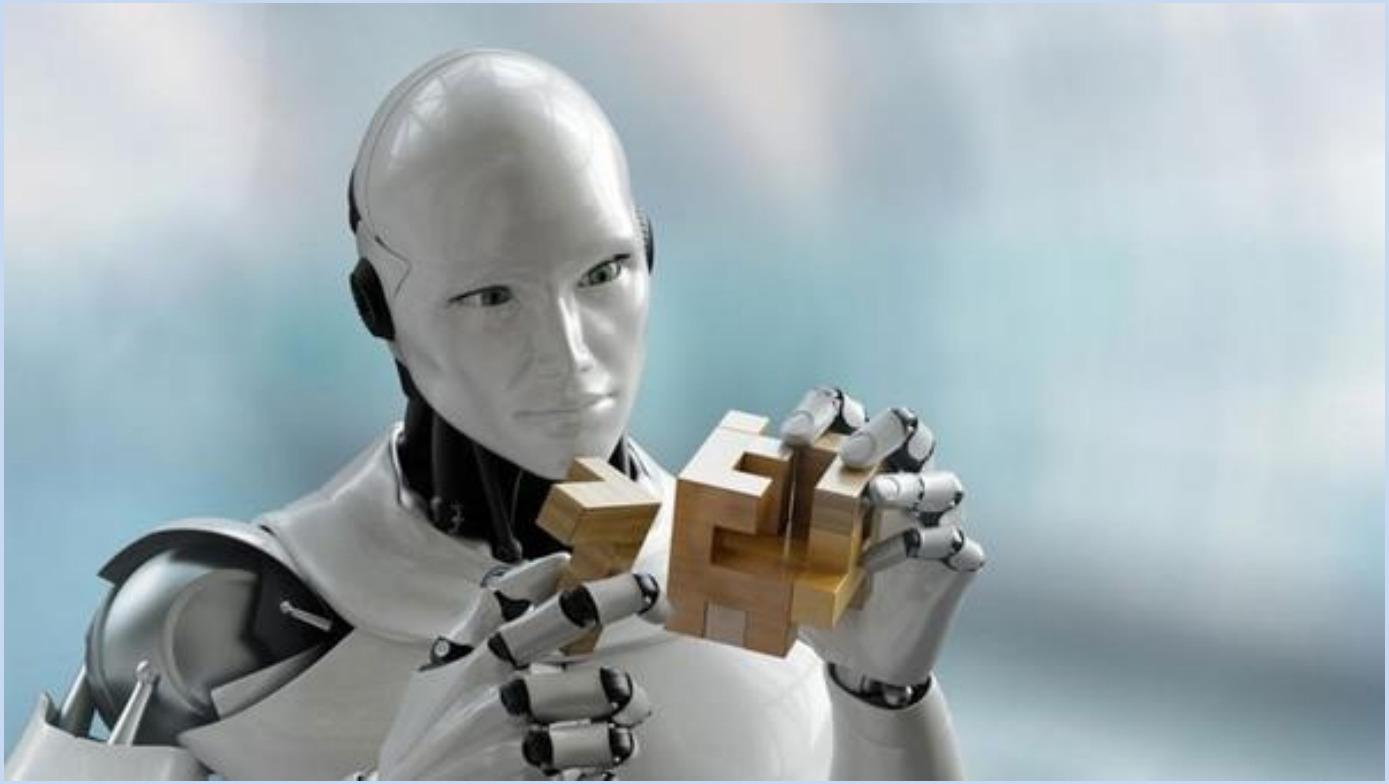
June 8, 2018 at 11:15 am

https://www.extremetech.com/extreme/270922-googles-ai-manifesto-accountability-privacy-and-no-killer-robots

infobae EL NACIONAL

Abril 6, 2019

Google disolvió su consejo de ética destinado a la Inteligencia Artificial



https://www.infobae.com/america/eeuu/2019/04/06/google-disolvio-su-consejo-de-etica-destinado-a-la-inteligencia-artificial/?outputType=amp-type

¿Por qué ahora es el tiempo de la IA?

Porque se cuenta con:

1. Mejores capacidades de cómputo.

2. Mas datos.

3. Mejores técnicas de procesamiento y análisis.

De acuerdo a:

https://blog.es.logicalis.com/analytics/inteligencia-artificial-el-tiempo-es-ahora

2018 es considerado como el **definitivo despegue** de las soluciones basadas en la IA.

Consultoras de prestigio han pronosticado un mercado de más de **31.000 millones de dólares en 2019**, un 55% más que en 2014.

Gartner ha detectado que **una de cada cuatro empresas** ya usa IA o tiene **planes de hacerlo a corto plazo**.

73% de los desarrolladores que no usan IA planifican aprender a usarla en 2018, https://mail.google.com/mail/u/0/#inbox/1607f5a37e44e218

Porque se utiliza actualmente en la solución de múltiples situaciones.

Ejemplos:

The New York Times

https://www.nytimes.com/2018/12/18/technology/driverless-mini-car-deliver-groceries.html

18 December 2018

A Toaster on Wheels to Deliver Groceries? Self-Driving Tech Tests Practical Uses

Starting this week, two small self-driving cars made by Nuro, a start-up, will chug along at no faster than 25 miles an hour to deliver groceries in Scottsdale, Ariz.

https://www.bbc.com/news/amp/technology-46987779

24 January 2019

Amazon Scout Robots Take to Pavements in Washington State:

Amazon is experimenting with delivery robots, starting with a little truck called Scout which is taking to the pavements in Washington State.

THE WALL STREET JOURNAL.

05 January 2019

https://www.wsj.com/articles/why-your-ice-cream-will-ride-in-a-self-driving-car-before-you-do-11546664589?mod=itp_wsj&ru=yahoo

Why Your Ice Cream Will Ride in a Self-Driving Car Before You Do:

Moving a few pounds of stuff to people turns out to be much easier than getting large, impatient and litigious human beings to their destinations

THE WALL STREET JOURNAL.

11 March 2019

https://www.wsj.com/articles/tonights-dinner-in-a-cooler-sized-robot-that-knows-where-you-live-11552296601?mod=itp_wsj&ru=yahoo

Tonight's Dinner? In a Cooler-Sized Robot That Knows Where You Live:

Food companies are experimenting with autonomous delivery to reduce the high costs and headaches of door-to-door service. But the robots aren't riding to the rescue any time soon.

The Washington Post

27 February 2019

https://www.washingtonpost.com/technology/2019/02/27/your-next-fedex-delivery-could-be-pizza/?noredirect=on&utm_term=.10f2225621d2

Your next FedEx delivery could be a pizza:

FedEx's delivery robot will be tested this summer in Memphis and other cities. It will deliver goods from such partners as Pizza Hut, Target and AutoZone. (FedEx/Reuters) (Handout/Reuters)

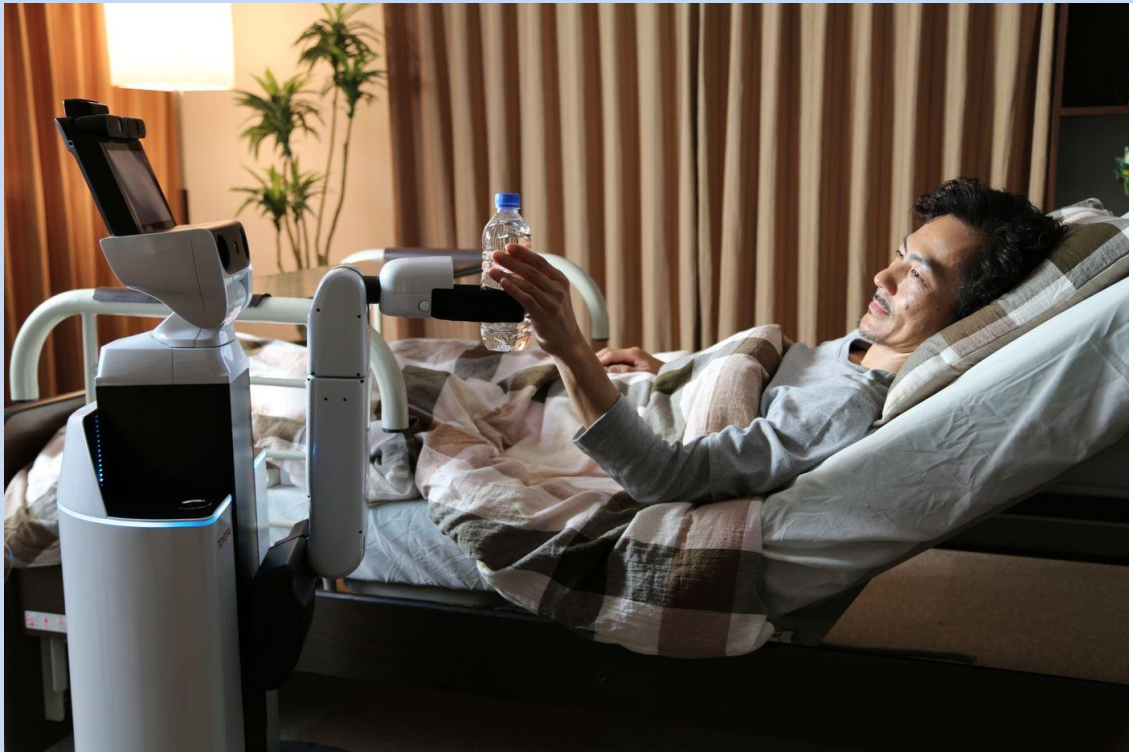
Bloomberg

https://www.bloomberg.com/news/articles/2018-12-26/toyota-wants-to-put-a-robot-in-every-home-and-make-it-your-pal?srnd=premium-asia

26 December 2018, 15:00 GMT-6

Toyota Wants to Put a Robot Friend in Every Home

Toyota Motor Corp. has sold enough cars to put one outside every Japanese home. Now it wants to put robots inside.



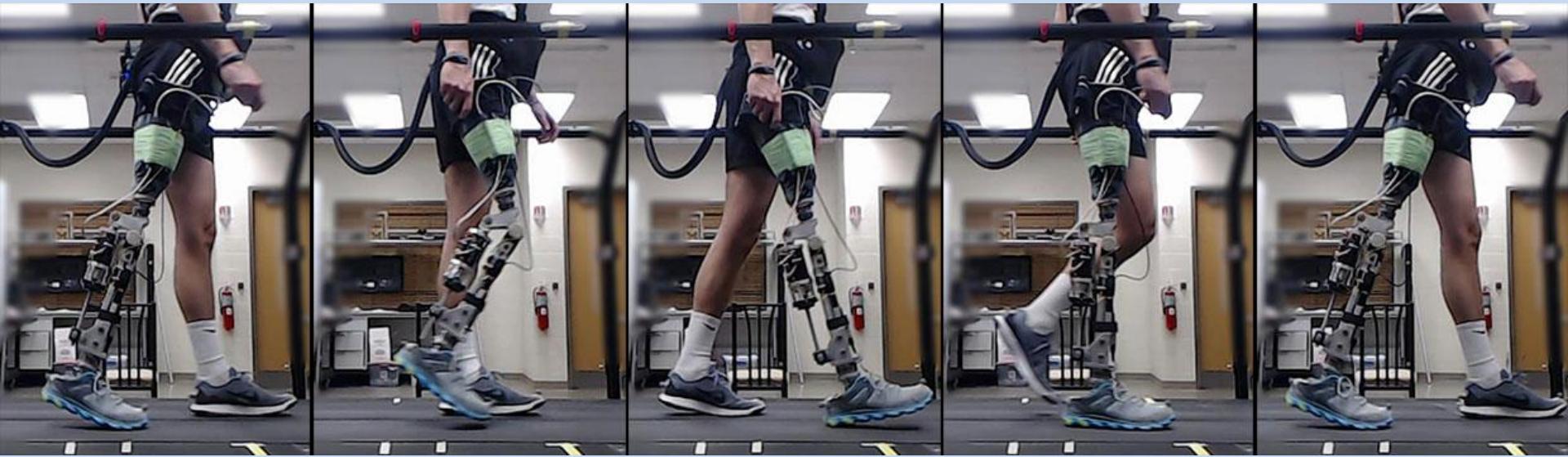
IEEE SPECTRUM

25 January 2019

https://spectrum.ieee.org/the-human-os/biomedical/bionics/ai-helps-humans-walk-on-robot-prosthetic-knee?utm_source=techalert&utm_campaign=techalert-01-31-19&utm_medium=email

AI Helps Amputees Walk With a Robotic Knee:

Computer algorithms help prosthetics wearers walk within minutes rather than requiring hours of training.



DailyMail.com

06 February 2019

https://www.dailymail.co.uk/health/article-6673115/Robbie-Robot-spot-worsening-dementia-watching-13-episodes-Emmerdale.html

'Robbie the Robot' can spot worsening dementia after watching 13 episodes of Emmerdale (and next the scientists want to make it view Friends...):

- The AI robot was developed at Edge Hill University.
- Researchers hope it will help diagnose and care for patients with dementia.

The Washington Post

14 February 2019

https://www.washingtonpost.com/express/2019/02/15/is-that-robot-dr-bear-bot-helps-care-kids-local-hospital/?utm_term=.4742f92ba94f

Is that a robot? Dr. Bear Bot helps care for kids at local hospital:

Children's National cardiologist Alejandro Lopez-Magallon remotely checks in on a patient and speaks to her parents using Dr. Bear Bot. (Sadie Dingfelder/Express)

The New York Times

https://www.nytimes.com/2019/03/10/technology/artificial-intelligence-eye-hospital-india.html

10 March 2019

India Fights Diabetic Blindness With Help From AI:

A technician screening a patient at the Aravind Eye Hospital in Madurai, India. The hospital is using a Google system that relies on artificial intelligence to diagnose a retinal problem from such a scan.

WIRED

https://www.wired.com/story/the-clever-clumsiness-of-a-robot-teaching-itself-to-walk/

08 January 2019

The Clever Clumsiness of a Robot Teaching Itself to Walk

It's easy to watch a baby finally learn to walk after hours upon hours of trial and error and think, OK, good work, but do you want a medal or something? Well, maybe only a childless person like me would think that, so credit where credit is due: It's supremely difficult for animals like ourselves to manage something as everyday as putting one foot in front of the other.

It's even more difficult to get robots to do the same. It used to be that to make a machine walk, you either had to hard-code every command or build the robot a simulated world in which to learn. But lately, researchers have been experimenting with a novel way to go about things: Make robots teach *themselves* how to walk through trial and error, like babies, navigating the real world.

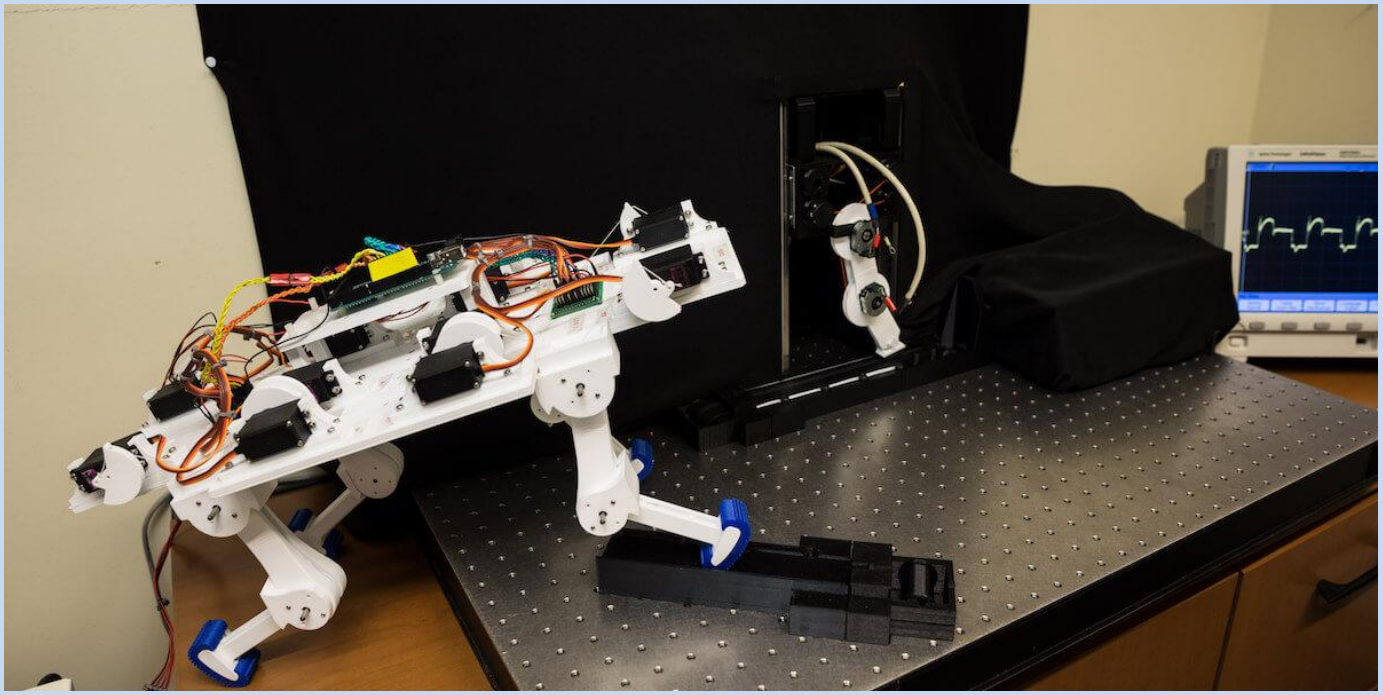
USC Viterbi
School of Engineering

https://viterbischool.usc.edu/news/2019/03/a-robotic-leg-born-without-prior-knowledge-learns-to-walk/

11 March 2019

A Robotic Leg, Born Without Prior Knowledge, Learns to Walk:

New AI algorithms could allow robots to learn to move by themselves, imitating animals.



IEEE SPECTRUM

29 January 2019

https://spectrum.ieee.org/computing/software/mayhem-the-machine-that-finds-software-vulnerabilities-then-patches-them?utm_source=circuitsandsensors&utm_campaign=circuitsandsensors-02-05-19&utm_medium=email

Mayhem, the Machine That Finds Software Vulnerabilities, Then Patches Them:

The machine triumphed in DARPA's Cyber Grand Challenge, where teams automated white-hat hacking.

Fraunhofer

01 February 2019

https://www.fraunhofer.de/en/press/research-news/2019/february/software-that-can-automatically-detect-fake-news.html

Software that can automatically detect fake news:

Using machine learning to analyze social media data

To identify fake news, Fraunhofer FKIE's new machine learning tool analyzes both text and metadata.

Bloomberg

14 February 2019

https://www.bloomberg.com/news/articles/2019-02-14/the-ai-that-can-write-a-fake-news-story-from-a-handful-of-words

The AI That Can Write a Fake News Story From a Handful of Words:

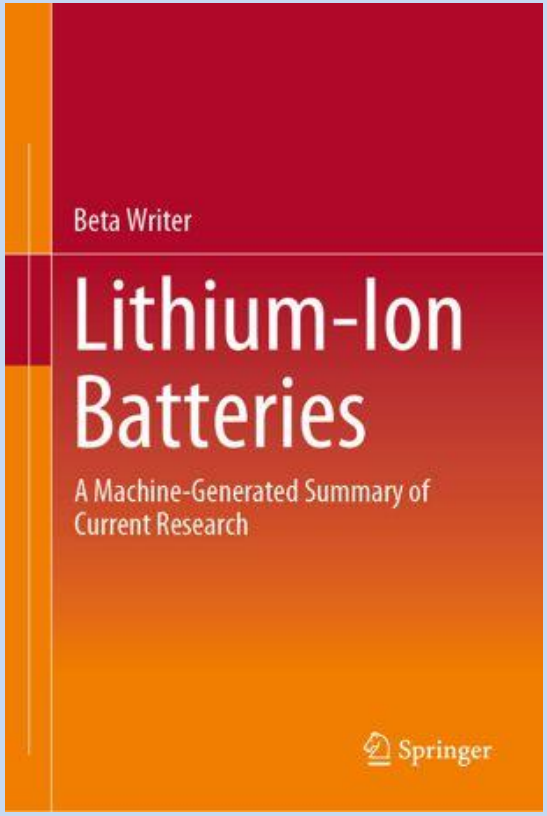
OpenAI, an artificial intelligence research group co-founded by billionaire Elon Musk, has demonstrated a piece of software that can produce authentic-looking fake news articles after being given just a few pieces of information.

https://aktuelles.uni-frankfurt.de/englisch/first-machine-generated-book-published/

April 8, 2019

First machine-generated book published:

Springer Nature published its first **machine-generated book**, compiled using an algorithm developed by researchers from Goethe University. This collaboration broke new ground with the first machine-generated book to be published by a scholarly publisher.



The New York Times

https://www.nytimes.com/2019/02/05/business/media/artificial-intelligence-journalism-robots.html

05 February 2019

The Rise of the Robot Reporter:

As reporters and editors find themselves the victims of layoffs at digital publishers and traditional newspaper chains alike, journalism generated by machine is on the rise.

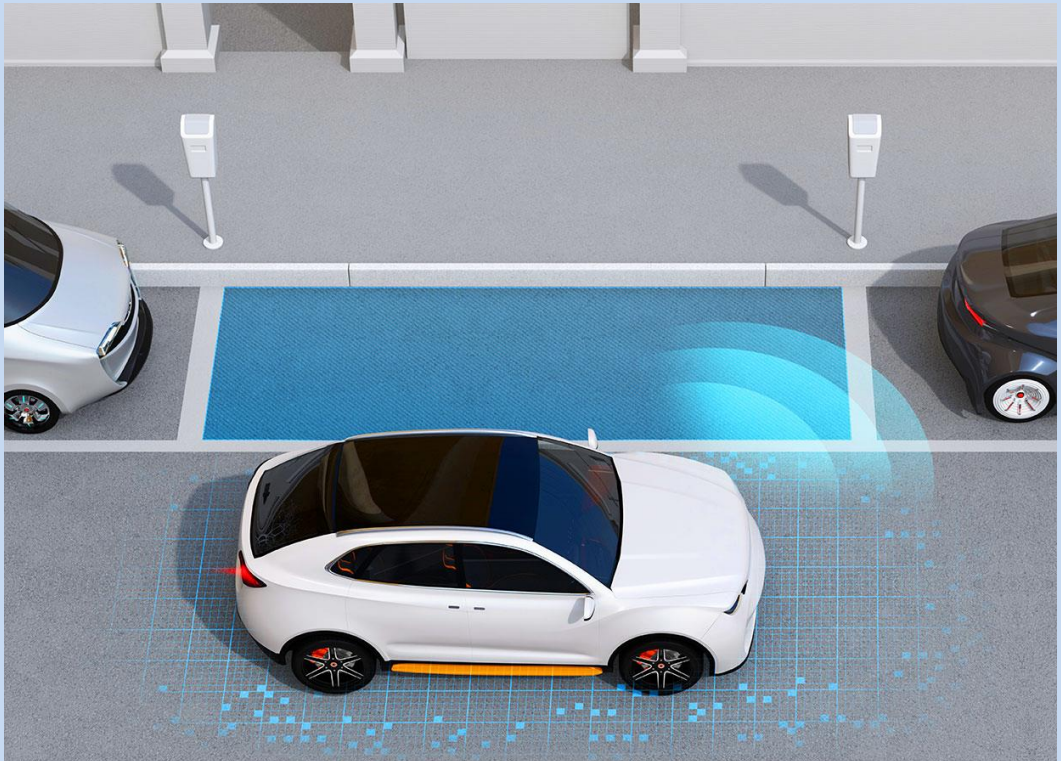
IEEE SPECTRUM

20 February 2019

https://spectrum.ieee.org/cars-that-think/transportation/self-driving/autonomous-parking?utm_source=roboticsnews&utm_campaign=roboticsnews-02-26-19&utm_medium=email

How Self-Driving Cars Might Transform City Parking:

Autonomous vehicles could use parking lots more efficiently, but also worsen gridlock.



CNBC

https://www.cnbc.com/2019/02/23/new-technology-shows-promise-reducing-pedestrian-fatalities.html

24 February 2019

New technology shows promise reducing skyrocketing pedestrian fatalities:

The Insurance Institute for Highway Safety found digital safety systems that **can spot pedestrians and apply a vehicle's brakes automatically** can help preventing many pedestrian collisions and reducing the severity of others.

NewScientist

29 March 2019

https://www.newscientist.com/article/2197941-driverless-car-learns-to-perform-high-speed-turns-without-crashing/

Driverless car learns to perform high-speed turns without crashing

The New York Times

https://www.nytimes.com/2018/12/26/science/chess-artificial-intelligence.html

26 December 2018

One Giant Step for a Chess-Playing Machine:

The stunning success of AlphaZero, a deep-learning algorithm, heralds a new age of insight — one that, for humans, may not last long.

https://www.xataka.com/inteligencia-artificial/speedgate-nuevo-deporte-creado-inteligencia-artificial-a-partir-reglas-otras-400-modalidades-deportivas/amp

Abril 17, 2019

Speedgate, el nuevo deporte creado por una inteligencia artificial a partir de las reglas de otras 400 modalidades deportivas

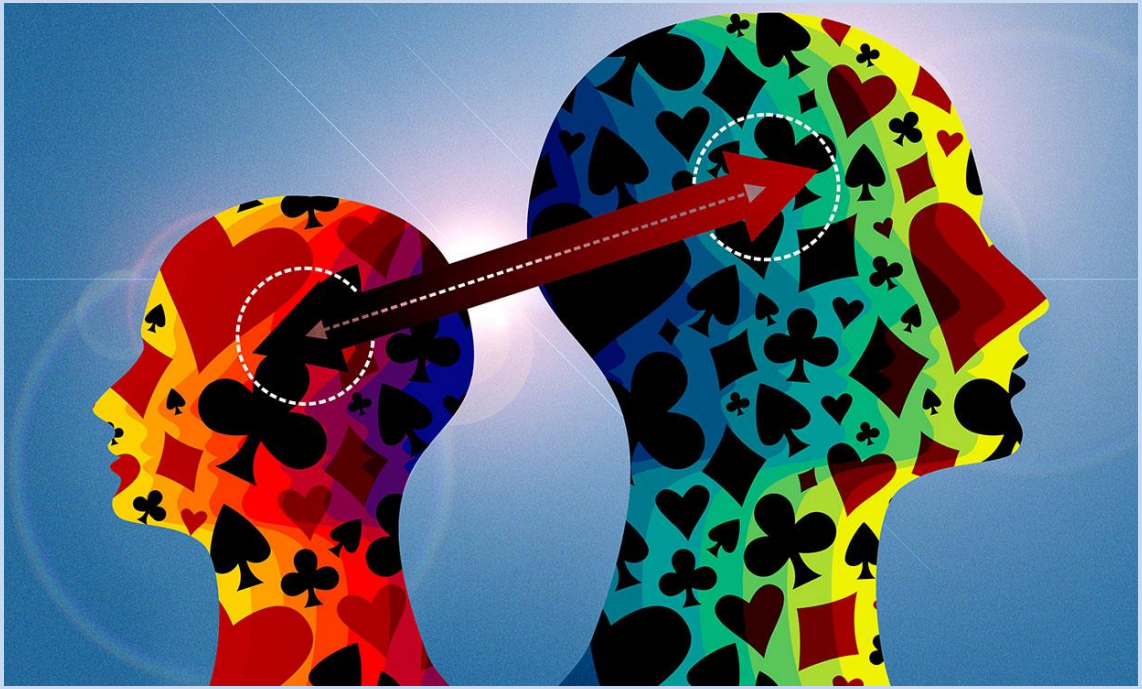
IEEE SPECTRUM

22 February 2019

https://spectrum.ieee.org/tech-talk/computing/software/artificially-intelligent-players-invent-nonverbal-languages-to-win-card-games?utm_source=techalert&utm_campaign=techalert-02-28-19&utm_medium=email

Artificially Intelligent Players Invent Nonverbal "Languages" to Win Card Games:

To win at bridge and Hanabi, AIs must come up with subtle cues to communicate.



Science

https://www.sciencemag.org/news/2019/02/pictionary-playing-computer-connects-humans-deep-thoughts?r3f_986=https://www.google.com/

05 February 2019

Pictionary-Playing Computer Connects to Humans' 'Deep Thoughts‘:

For decades, scientists have sought to give computers common sense—a basic understanding of the world that lets humans navigate everything from conversation to city traffic. Now, researchers have come up with a new approach: They’ve designed an artificial intelligence (AI) that can abstract knowledge and generalize it to play the surprisingly subtle drawing game Pictionary.

https://www.apnews.com/6034c9ce1af347ec8da996e39b29c51b

24 January 2019

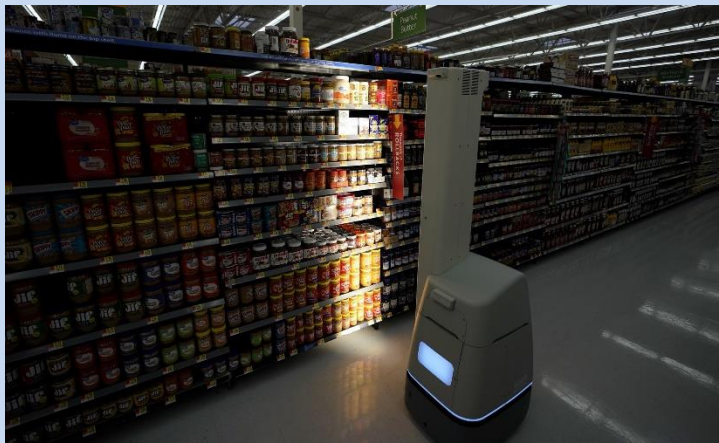
Will robots take your job? Quarter of US workers at risk

Robots aren't replacing everyone, but a quarter of U.S. jobs will be severely disrupted as artificial intelligence accelerates the automation of existing work, according to a new Brookings Institution report.

Photo pods full of merchandise are moved around the floor by robotic drives at the Amazon fulfillment center on Staten Island borough of New York, on Dec. 5, 2018.

A Bossa Nova robot scans shelves to help provide associates with real-time inventory data at a Walmart Supercenter in Houston on Nov. 9, 2018.

A worker lifts a lunch bowl off the production line at Spyce, a restaurant which uses a robotic cooking process, in Boston on May 3, 2018.



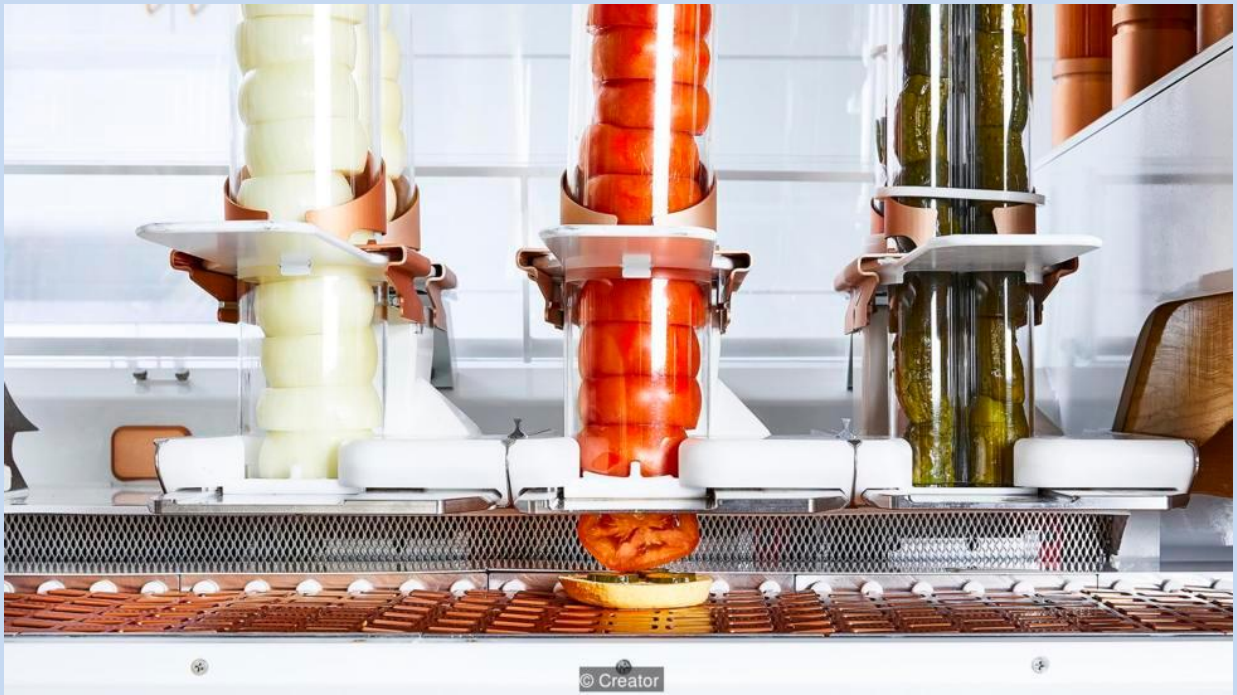
BBC

6 December 2018

http://www.bbc.com/future/story/20181204-the-chef-making-fast-food-even-faster

The Chef that can make a gourmet burger every 30 seconds:

Robots that can grill meat, slice tomatoes, stir fry vegetables and even stretch pizza dough are making fast food even faster, but would you trust a chef who has never tasted the food it creates?



Forbes

https://www.forbes.com/sites/bernardmarr/2019/04/05/the-fascinating-ways-pepsico-uses-artificial-intelligence-and-machine-learning-to-deliver-success/amp/

5 April 2019

The Fascinating Ways PepsiCo Uses Artificial Intelligence And Machine Learning To Deliver Success

The New York Times

https://www.nytimes.com/2019/03/04/business/ai-technology-travel-planning.html

4 March 2019

A.I. Wants to Know How You Plan a Trip:

www.news.cn
新华网
NEWS
www.xinhuanet.com
XINHUANET
http://www.xinhuanet.com/english/2018-12/24/c_137695066.htm

24 December 2018, 09:51:08

AI can easily break text CAPTCHA: new research

XI'AN, Dec. 24 (Xinhua) -- A new study suggested that text-based CAPTCHAs, one of the most widely used website security mechanisms, are no longer safe when facing smarter artificial intelligence.

Researchers from China's Northwest University, Peking University, and Lancaster University in Britain said they developed a new algorithm, based on machine learning, that can break most text-based CAPTCHAs within 0.05 seconds.

CNBC

27 February 2019

https://www.cnbc.com/2019/02/27/alphabets-deepmind-uses-machine-learning-to-predict-wind-power-output.html

Alphabet's DeepMind uses machine learning to predict wind power output:

Alphabet's DeepMind, an artificial intelligence (AI) firm, has used machine learning to boost the productivity of wind energy.

Science

http://www.sciencemag.org/news/2018/12/artificial-intelligence-helps-predict-volcanic-eruptions

11 December 2018 , 4:00 PM

Artificial intelligence helps predict volcanic eruptions:

New algorithms processing satellite data automatically caught the ground motion before the eruption of Wolf Volcano in the Galápagos Islands.

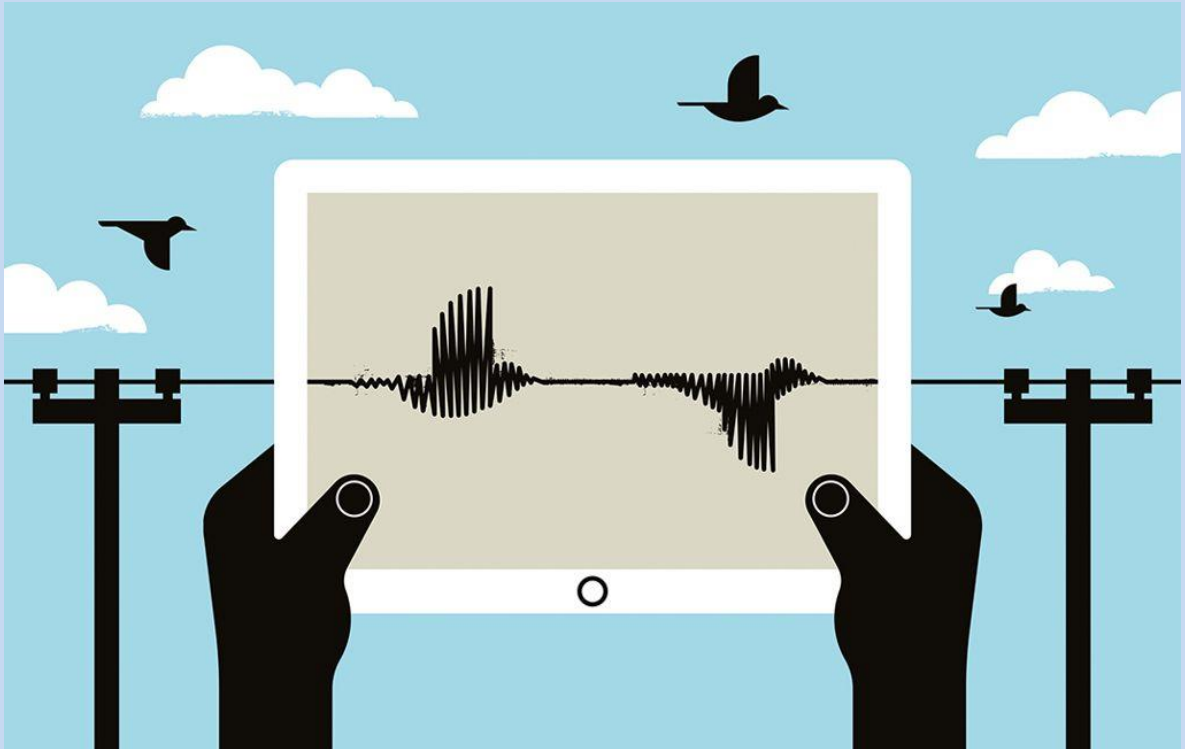
nature
International weekly journal of science

https://www.nature.com/articles/d41586-019-00746-1

4 March 2019

AI empowers conservation biology:

Faced with mountains of image and audio data, researchers are turning to artificial intelligence to answer pressing ecological questions.



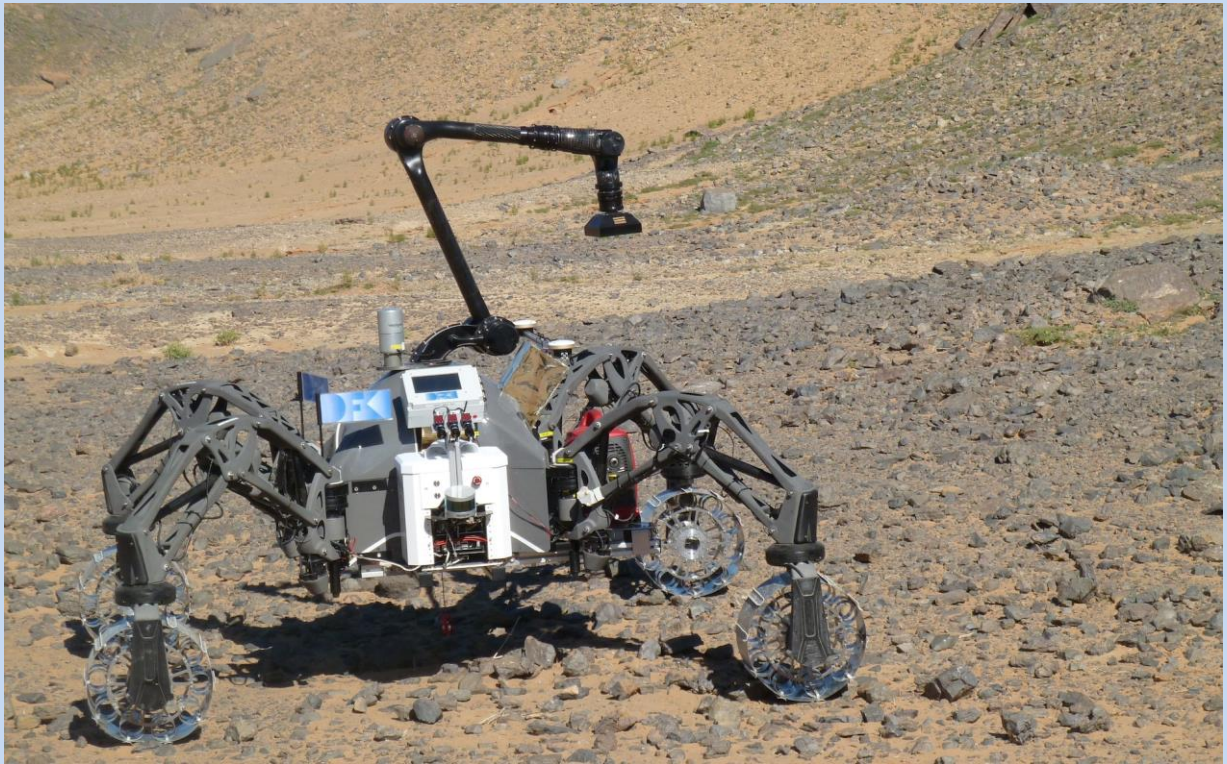
The Telegraph

02 January 2019

https://www.telegraph.co.uk/technology/2019/01/02/uk-tests-autonomous-martian-robot/

Martian robot will explore the Red Planet with mind of its own:

The new autonomous systems were tested last month in the Sahara Desert on a four-wheeled rover called 'Sherpa'. Credit: UK SPACE AGENCY



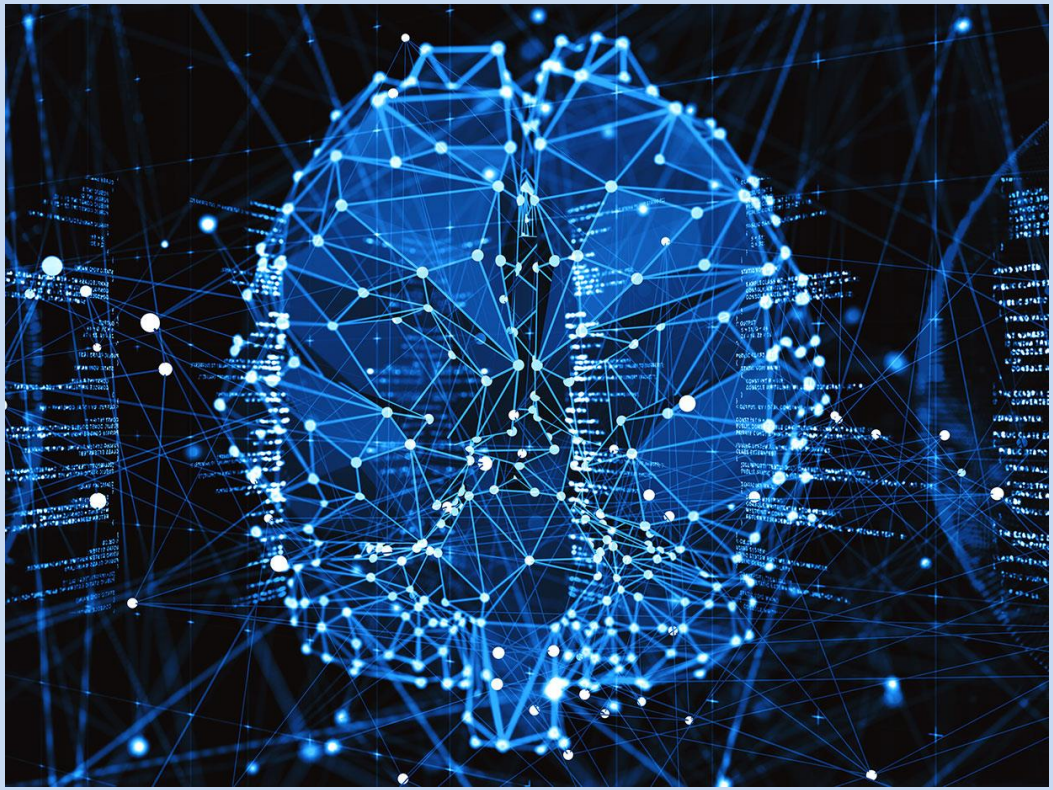
IEEE SPECTRUM

April 2, 2019

https://spectrum.ieee.org/tech-talk/computing/networks/using-ai-to-make-better-ai?mkt_tok=eyJpIjoiTm1RNU0yTmxNemd4WmpKayIsInQiOiI0Z2cyVFdFcEJvUTdMdDlNT0JLbjdmaGdBbFBXXC9kelBEV2diVHVMdHRTelQ1Snc0endsNDVnWDNQdUZRUkE0WkwxeDNkS2pONzhPVUdGUGlMQ2hnWVhvWUU3T0lwcm1NSHNEeWNGVEx0TmhOWDZpM3hLcE1SNzZUTmNOVUMxWGEifQ%3D%3D

Using AI to Make Better AI:

New approach brings faster, AI-optimized AI within reach for image recognition and other applications

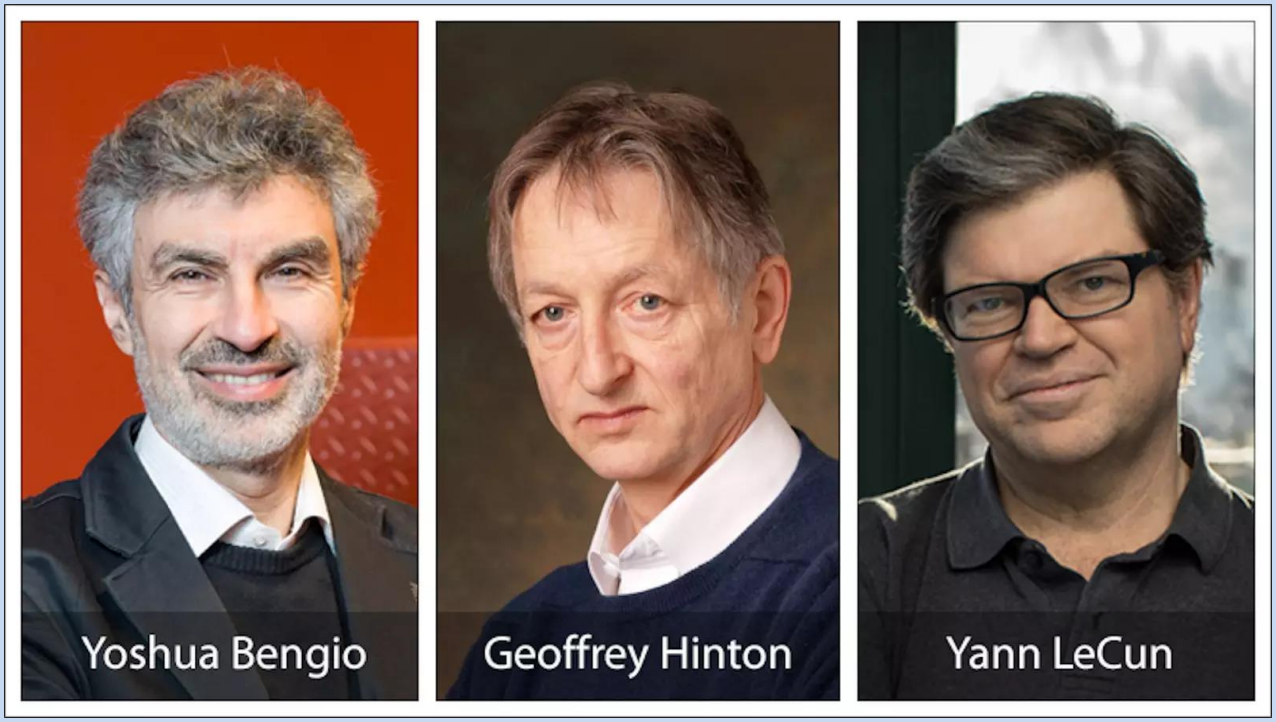


The New York Times

The Washington Post

Mar 27, 2019, 6:02am EDT

Artificial-intelligence pioneers win $1 million Turing Award



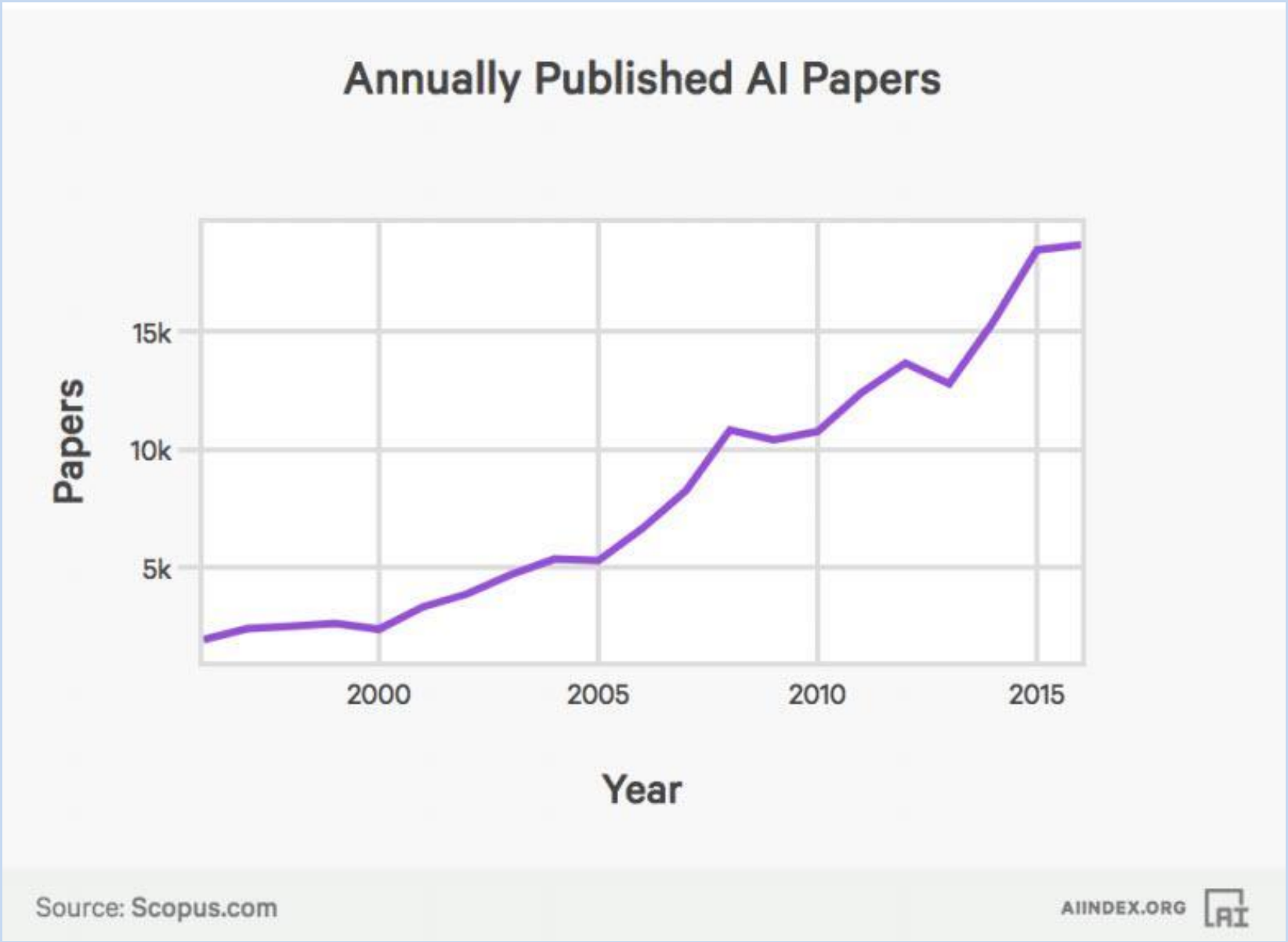
https://www.washingtonpost.com/technology/2019/03/27/artificial-intelligence-pioneers-win-turing-award/?noredirect=on&utm_term=.406cb50d8f3e

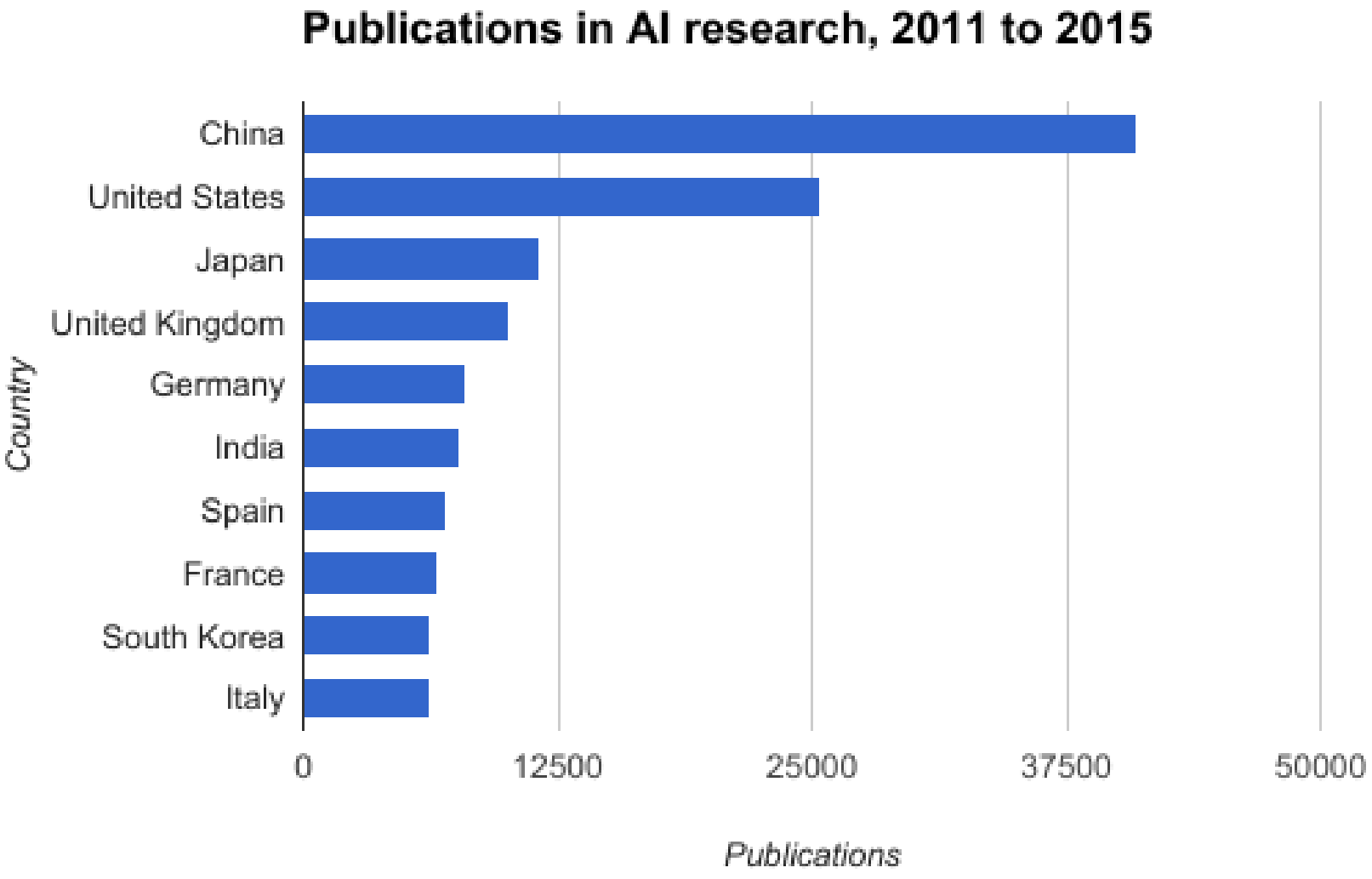
https://www.washingtonpost.com/technology/2019/03/27/artificial-intelligence-pioneers-win-turing-award/?noredirect=on&utm_term=.406cb50d8f3e

Algunas cifras:

Países lideres en el desarrollo de la IA:

1. **Estado Unidos. Ya ni se diga…!!!**
2. **China**: Anuncia lanzar su plan nacional para el desarrollo de la IA, Marzo de 2017. **Un trillón de dólares** en IA para 2030.
3. **24 países europeos** firman convenio en IA para **competir** con EU y China, Abril de 2018.
4. **Francia**: Anuncia dedicar **1.85 billones de dólares** para el desarrollo de IA para competir con EU y China, Marzo 2018.
5. **La Comisión Europea** anuncia **1.5 billones de Euros** para el desarrollo de la IA, Abril de 2018.
6. **Canadá**: Informa invertir **125 millones de dólares** para el desarrollo de IA, Marzo de 2017. **Montreal quiere ser el centro mundial de desarrollo en IA**, Mayo 20, 2017.
7. **Inglaterra, Alemania, Suiza, Suecia** proponen establecer un AI Hub para competir con EU y China, Abril de 2018.
8. **Noruega**: Anuncia la apertura de un Centro de Investigación en IA, Universidad de Adger, Febrero de 2017.
9. **Inglaterra**: Anuncia que La Universidad de Cambridge recibirá apoyo de **10 millones de libras** para una supercomputadora para IA.
10. **Inglaterra**: Anuncia que Samsung instalará un Laboratorio de Investigación en IA en la Universidad de Cambrige, Mayo de 2018.

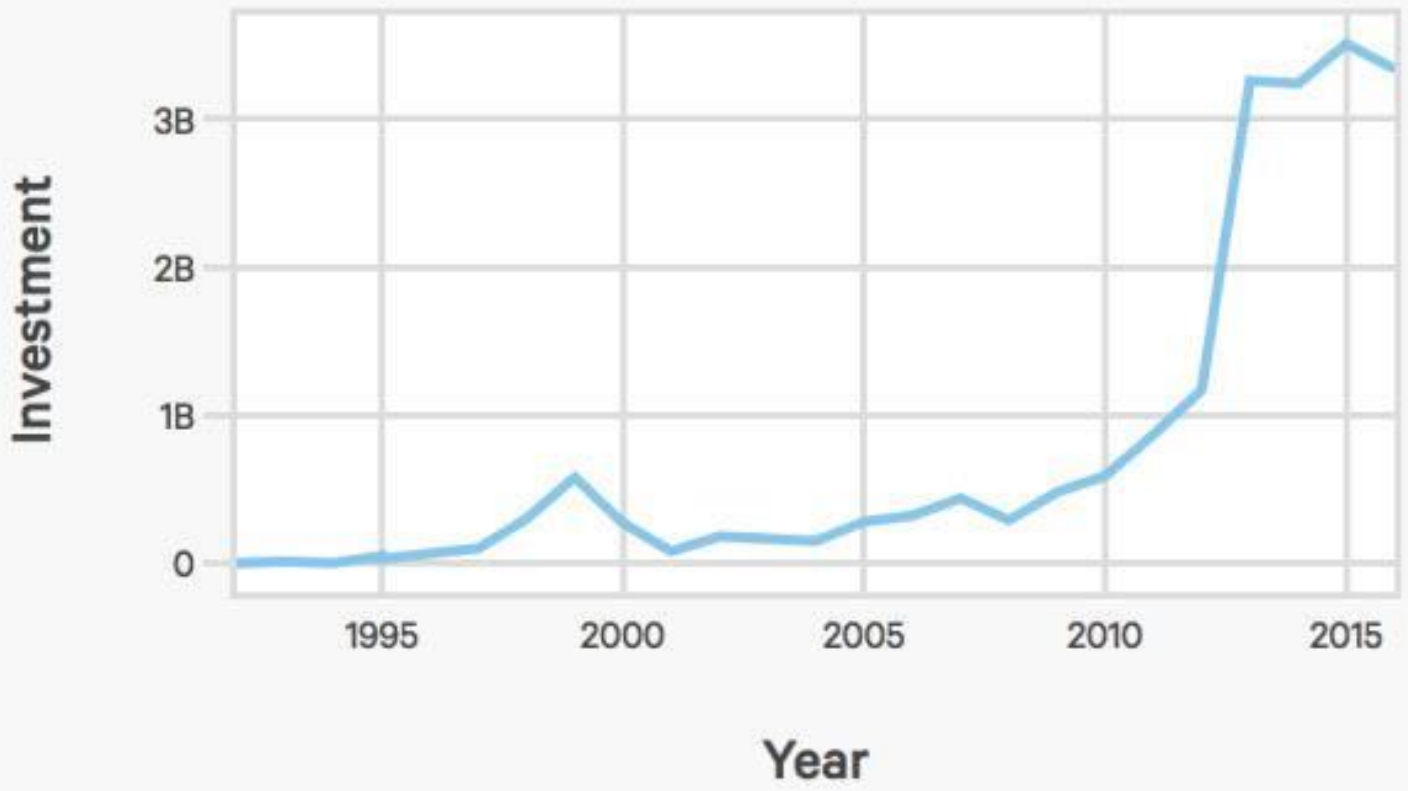

Annually Published AI Papers
Papers
15k
10k
5k
2000
2005
2010
2015
Year
Source: Scopus.com
AIINDEX.ORG


Publications in AI research, 2011 to 2015
China
United States
Japan
United Kingdom
Germany
India
Spain
France
South Korea
Italy
Country
0
12500
25000
37500
50000
Publications

En cuestión de patentes relacionadas con IA, China concentra el 22% a nivel mundial:

https://tecno.americaeconomia.com/articulos/china-concentra-el-22-de-las-patentes-de-inteligencia-artificial-nivel-mundial

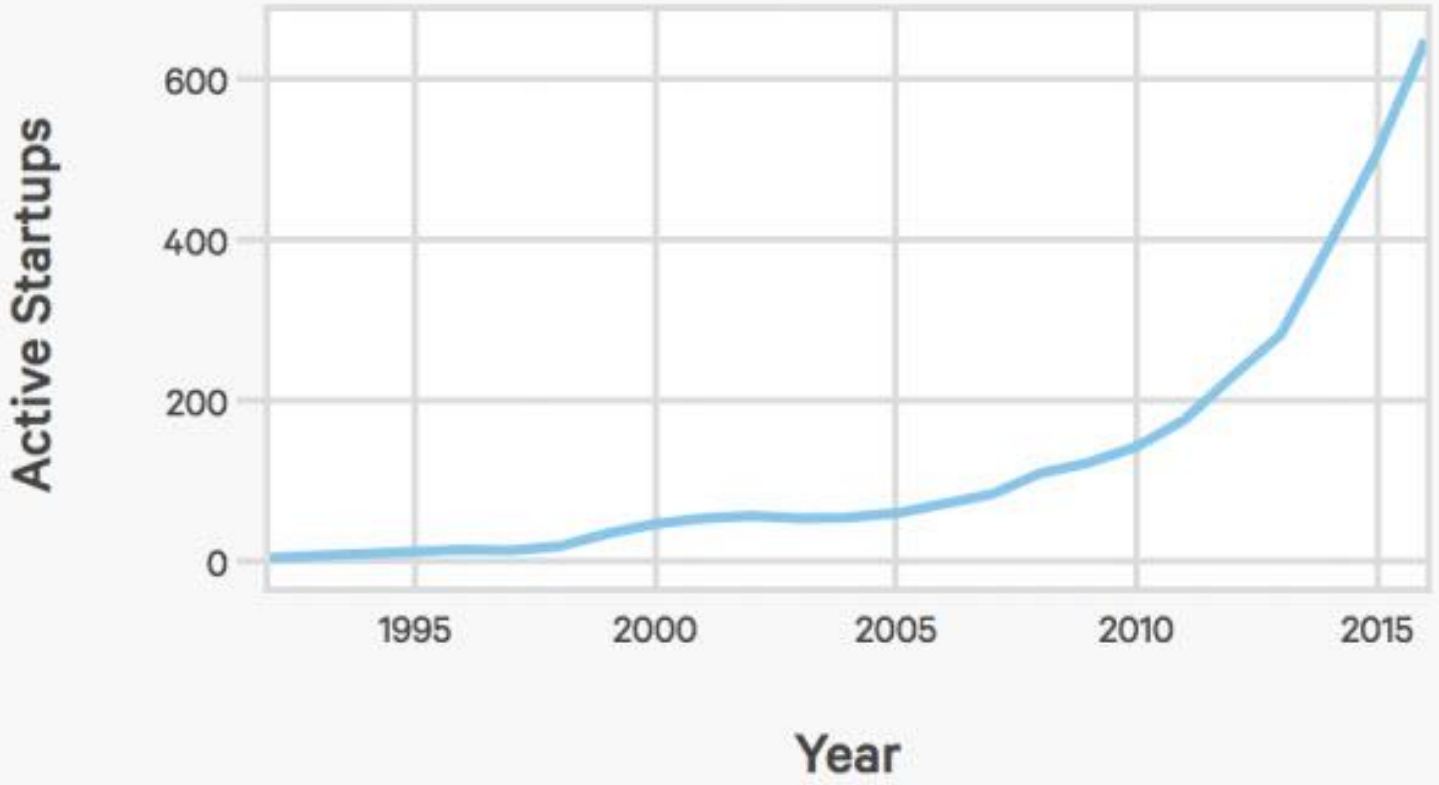
Annual VC Investment in AI Startups



Sources: Crunchbase, VentureSource, Sand Hill Econometrics

AIINDEX.ORG

Startups Developing AI Systems

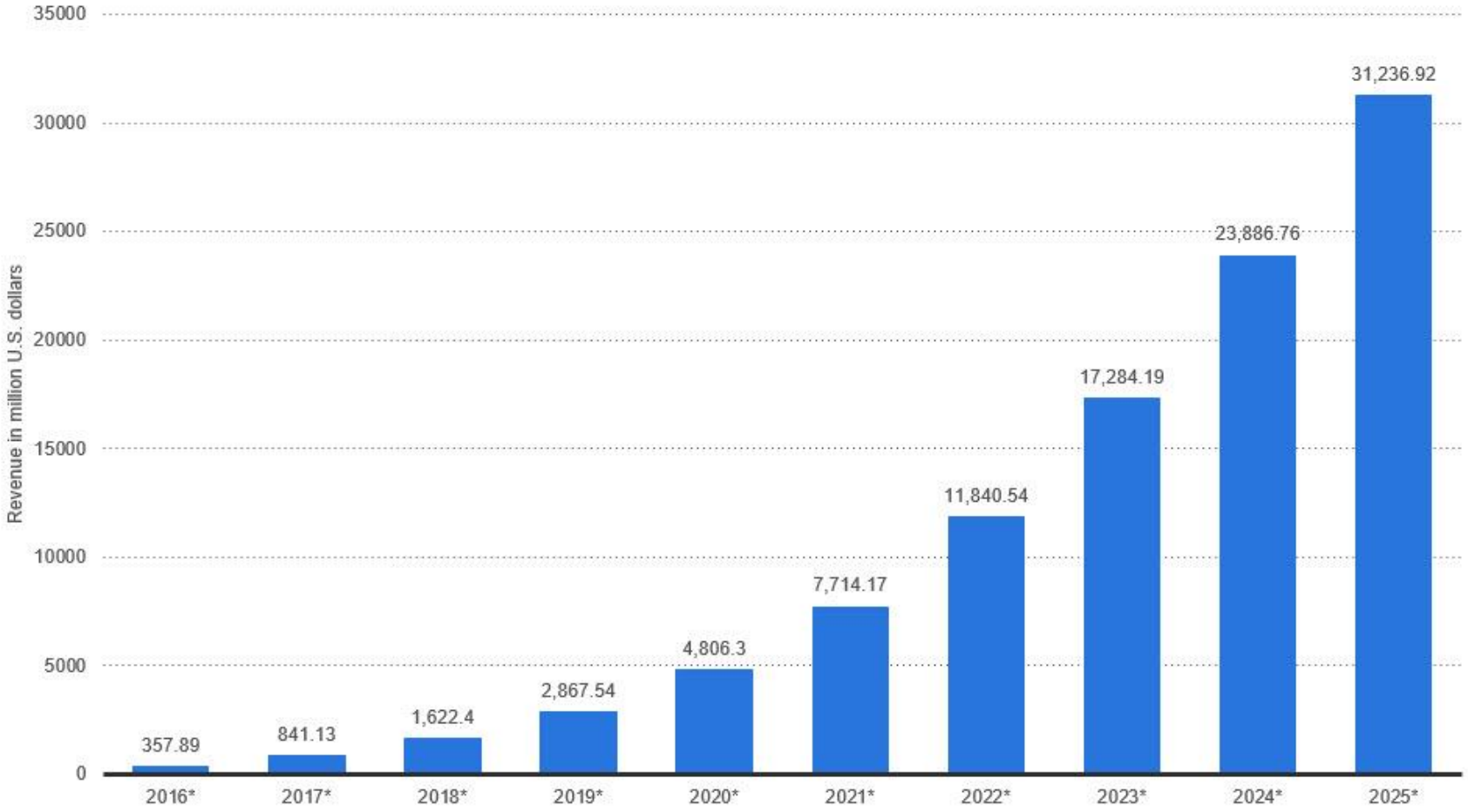


Sources: Crunchbase, VentureSource, Sand Hill Econometrics

AIINDEX.ORG

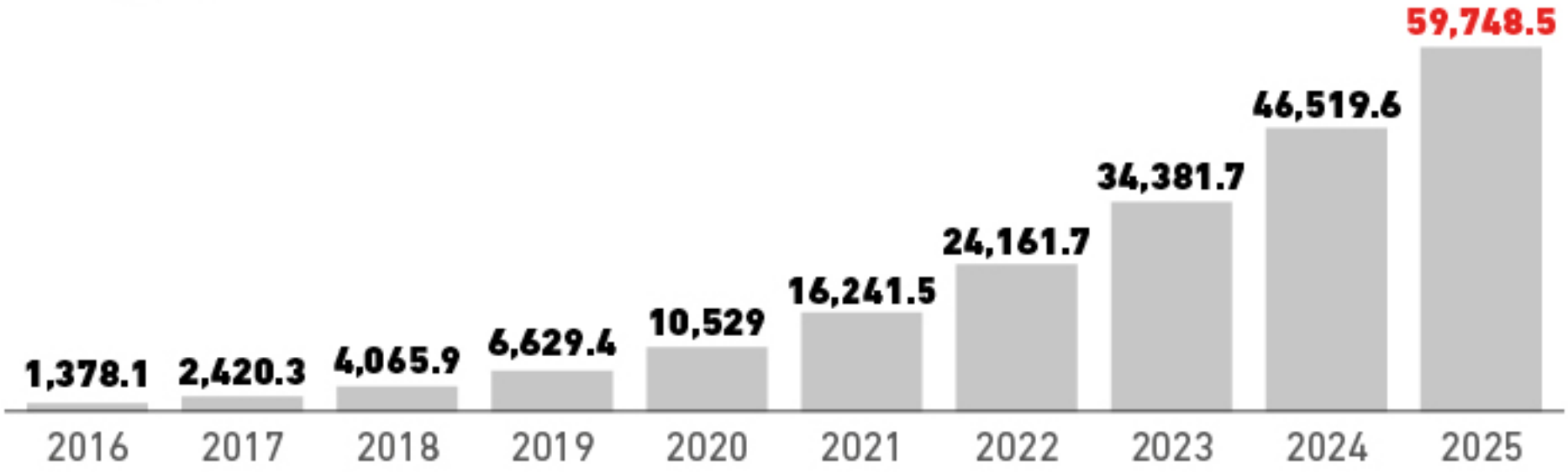
Enterprise artificial intelligence market revenue worldwide 2016-2025

Revenues from the artificial intelligence for enterprise applications market worldwide, from 2016 to 2025 (in million U.S. dollars)



INGRESOS PROYECTADOS POR EL MERCADO DE INTELIGENCIA ARTIFICIAL

Cifras y proyecciones mundiales calculadas en millones de dólares

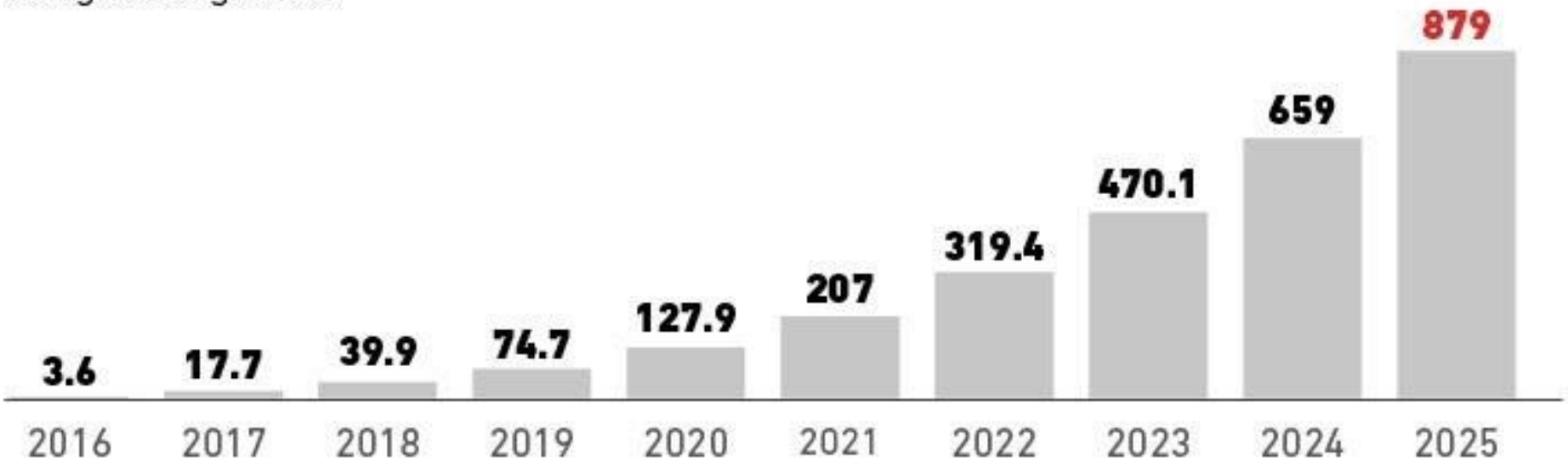


Merca2.0
mercadotecniapublicidadmedios

Fuente: Tractica

INTELIGENCIA ARTIFICIAL EN AMÉRICA LATINA

Tractica estimó que los ingresos de la inteligencia artificial crecerán dentro del mercado de aplicaciones empresariales en América Latina de manera constante, tal como se muestra en la siguiente gráfica.



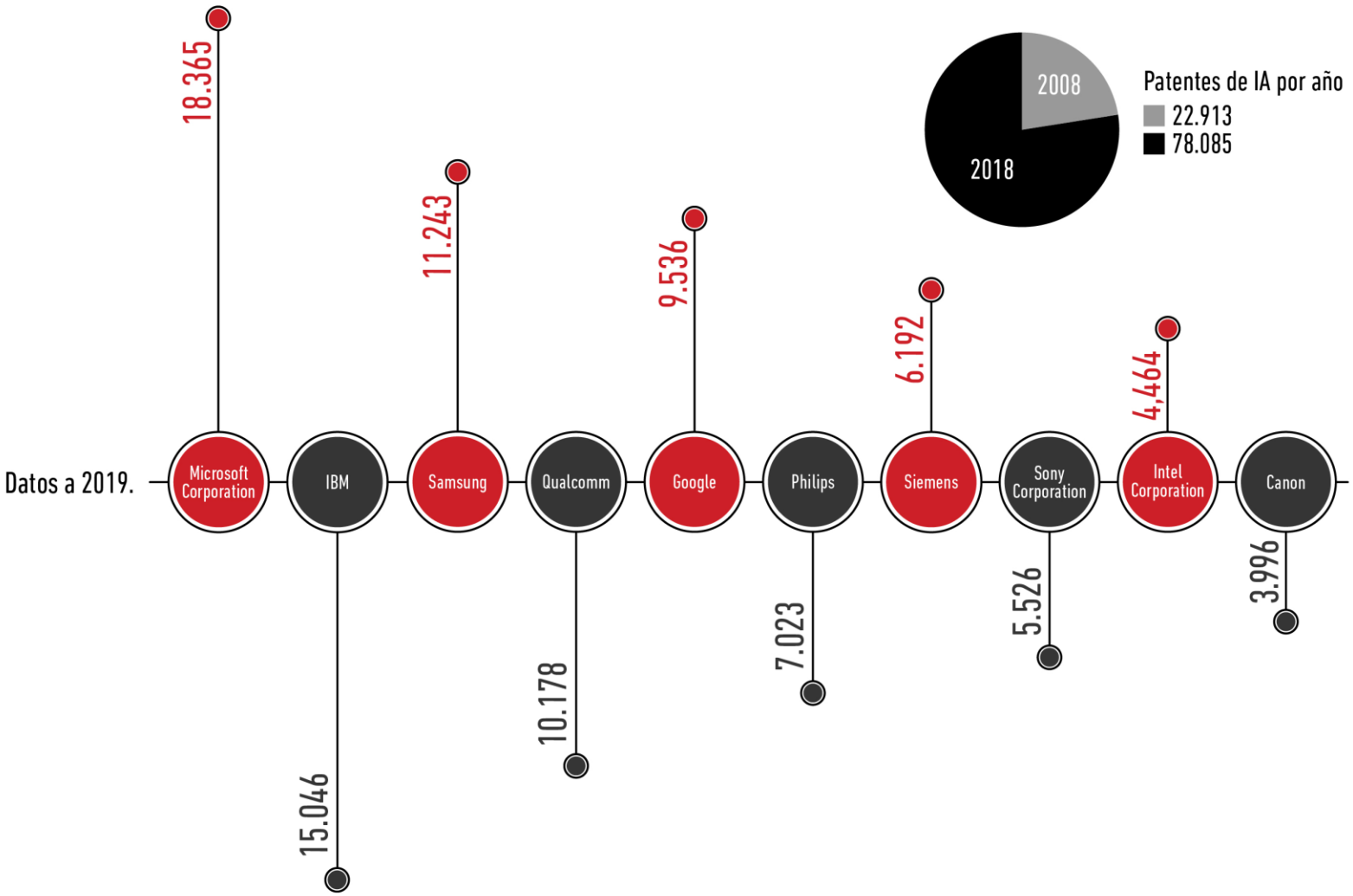
Merca2.0
mercadotecniapublicidadmedios

Fuente: Statista

EMPRESAS LÍDERES EN EL RAMO DE LA INTELIGENCIA ARTIFICIAL

Mayo 29, 2019

Empresas que tienen más patentes registradas de Inteligencia Artificial a nivel mundial.



Merca2.0
mercadotecniapublicidadmedios

Fuente: Departamento de investigación Merca2.0 / Iplytics

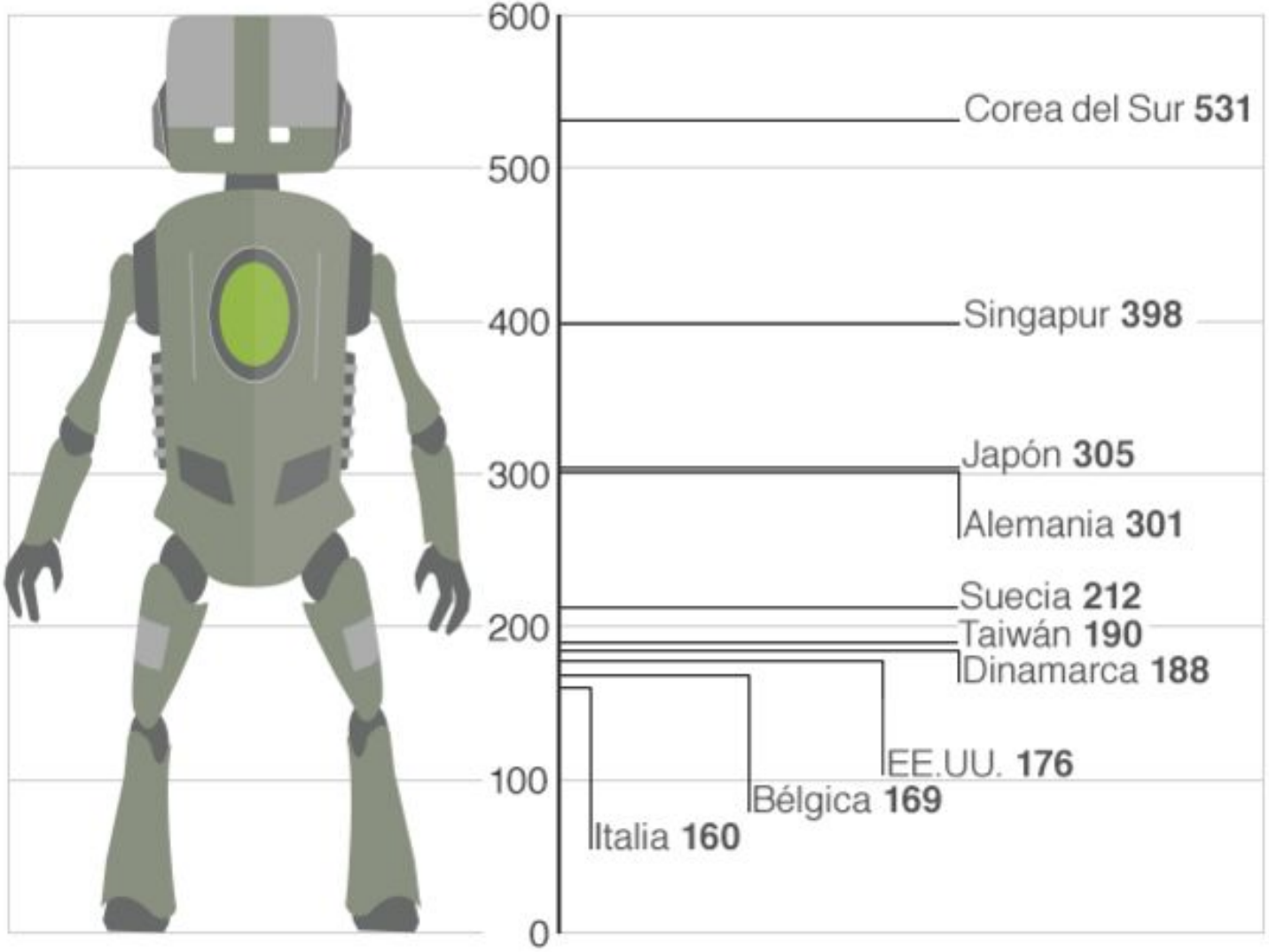
Se espera que el valor del mercado de la Inteligencia Artificial tenga un crecimiento del 154 % durante este 2019.

72 por ciento de los líderes de negocios consideran a la IA como una ventaja de negocios clave para el futuro.

https://www.merca20.com/firmas-dominan-la-inteligencia-artificial/

Los 10 países más robotizados

Número estimado de robots por cada 10.000 empleados

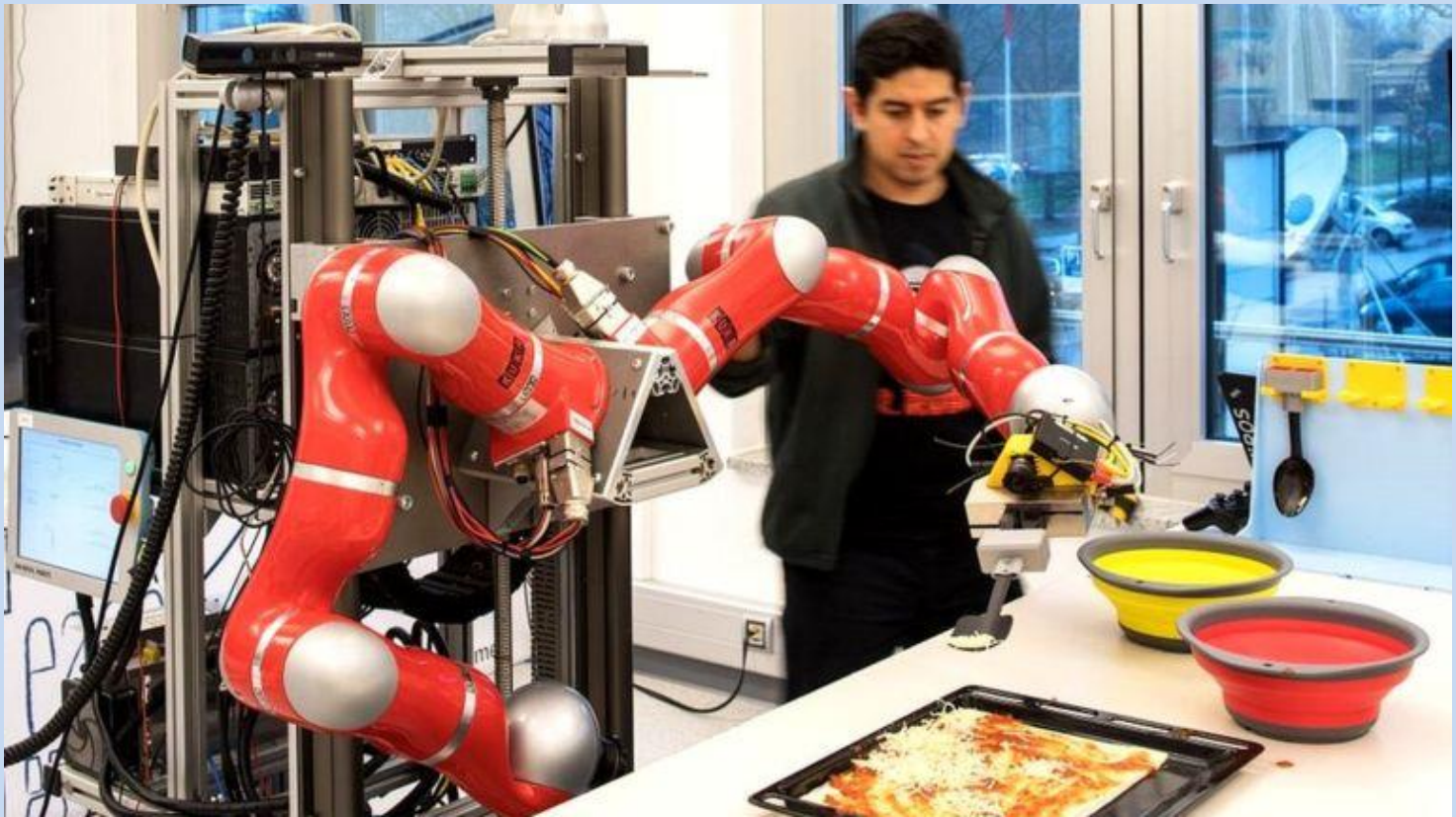


Fuente: Federación Internacional de Robótica, 2016

BBC

Los **países latinoamericanos** más robotizados figuran muy por debajo en la lista, lejos del promedio global de 69 autómatas por cada 10.000 empleados.

México: puesto 30 con 33 robots / 10000 empleados.
Argentina el **36 con 16 robots** / 10000 empleados.
Brasil el **38 con 11 robots** / 10000 empleados.

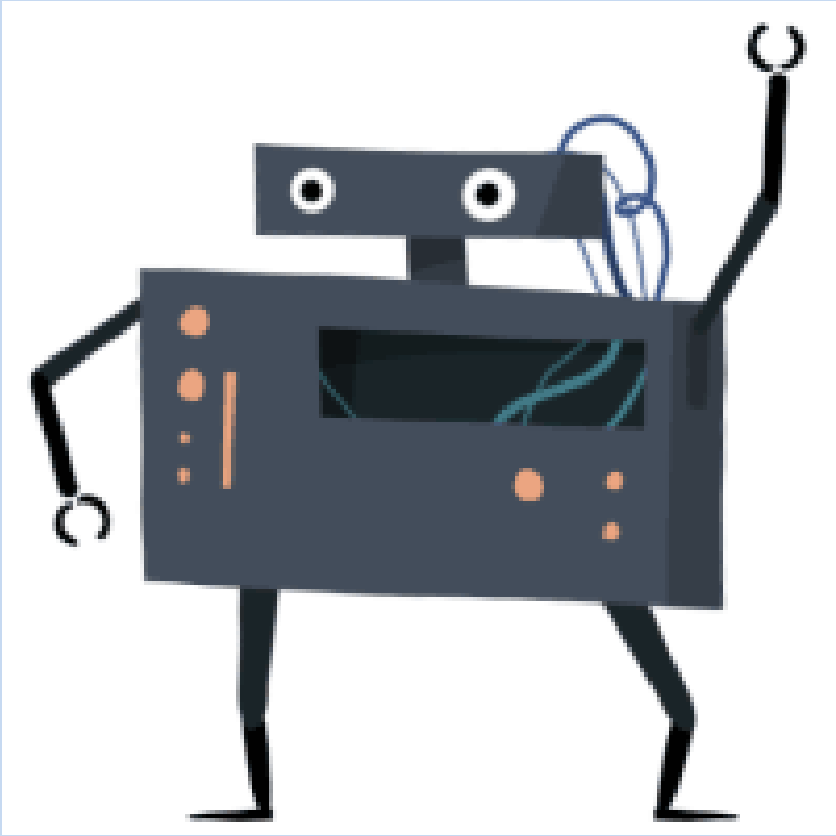



Para
reflexionar:

¿Tarde o temprano, un algoritmo nos reemplazará?

http://jobs.ieee.org/jobs/content/Will-an-Algorithm-Replace-Me-2017-11-02

¿Mi trabajo será realizado por una máquina?



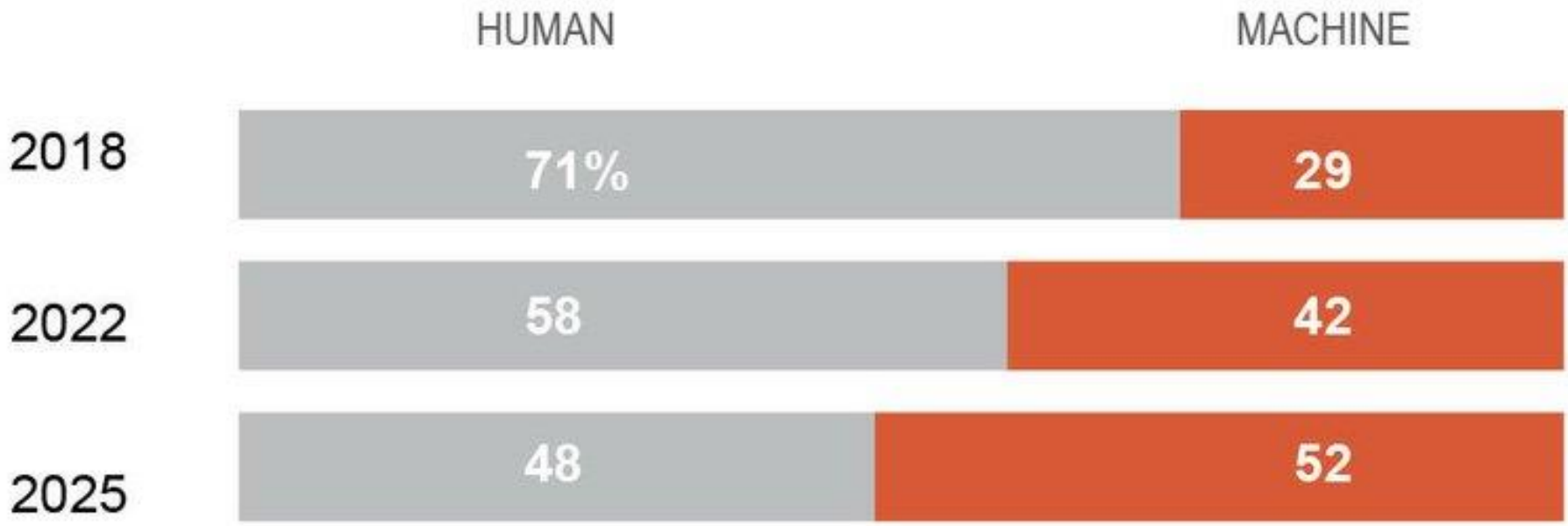
https://www.npr.org/sections/money/2015/05/21/408234543/will-your-job-be-done-by-a-machine

2025-2035 será un periodo crítico para los trabajos tradicionales.

Muchos empleos van a desaparecer, otros van a aparecer.

Rate of automation

Division of labor as a share of hours spent (%)



SOURCE: Future of Jobs report 2018, World Economic Forum

AP

Más del 50% de los trabajos serán realizados por máquinas en 2025. Muchos trabajos desaparecerán y muchos otros aparecerán. Un gran reto será el entrenamiento y re-entrenamiento de empleados para el nuevo mundo de trabajos.

Posibilidad de ser automatizado:

- Analistas de créditos 97.9%.
- Cocineros 96.3%.
- Contadores y auditores 93.5%.
- Mantenimiento de carreteras 87.4%.
- Archivista 75.9%.
- Carpintero 72.4%.
- Reparadores de electrodomésticos 72.2%.
- Bibliotecario 64.9%.
- Asistente de profesor 55.7%.
- Reportero 50.2%.
- Programador 48.1%.
- Actor 37.4%.
- Estadístico 21.8%.
- Electricista 14.8%.
- Desarrollador de software 12.8%.

Posibilidad de ser automatizado:

- Bailarín 12.7%.
- Ingeniero eléctrico 10.2%.
- Matemático 4.7%.
- Abogado 3.5%.
- Director de arte 2.3%.
- Diseñador de interiores 2.2%.
- Arquitecto 1.8%.
- Ingeniero aeroespacial 1.7%.
- Ingeniero mecánico 1.1%.
- Profesor de secundaria 0.8%.
- Profesor de preescolar 0.7%.
- Analistas de sistemas de cómputo 0.6%.
- Profesor de escuela primaria 0.4%.
- Dentista 0.4%.
- Médicos y cirujanos 0.4%.

Límites de la IA:

November 14, 2018.

'AI is very, very stupid,' says Google's AI leader, at least compared to humans

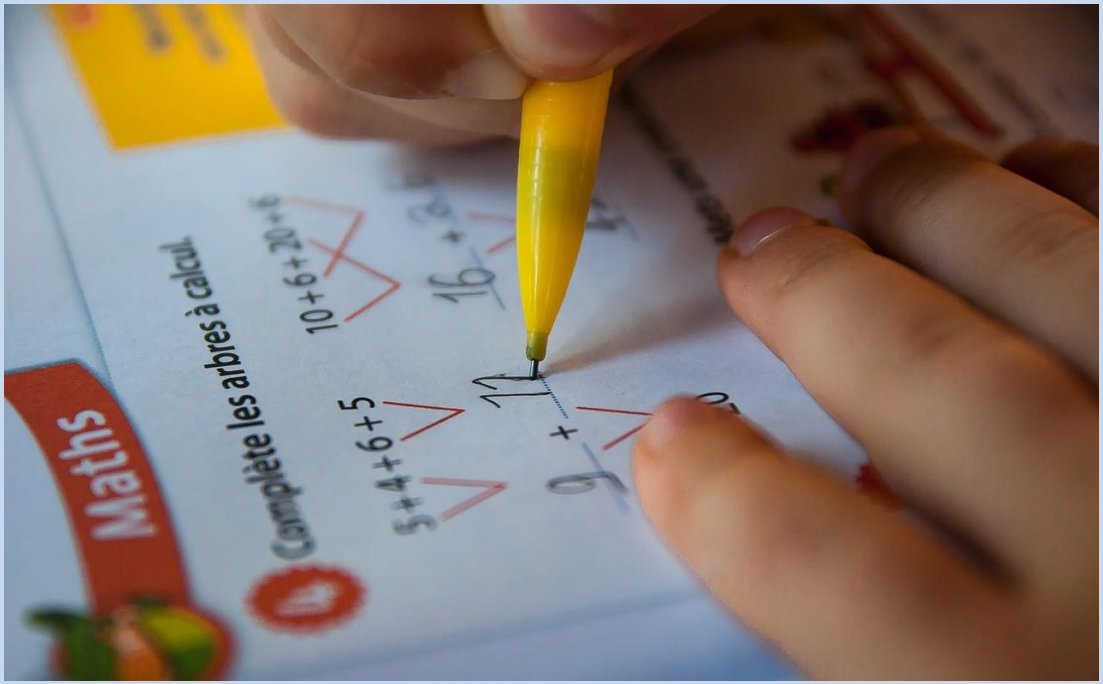
Be aware of the limits of artificial intelligence, not just the hype.

Andrew Moore, VP of AI for Google Cloud, speaks at a Google AI event.

https://www.cnet.com/news/ai-is-very-stupid-says-google-ai-leader-compared-to-humans/?ftag=CMG-01-10aaa1b

Abril 5, 2019.

Ponen una IA de DeepMind a resolver un examen escolar de matemáticas y suspende: no fue capaz de sumar bien "1+1+1+1+1+1+1"

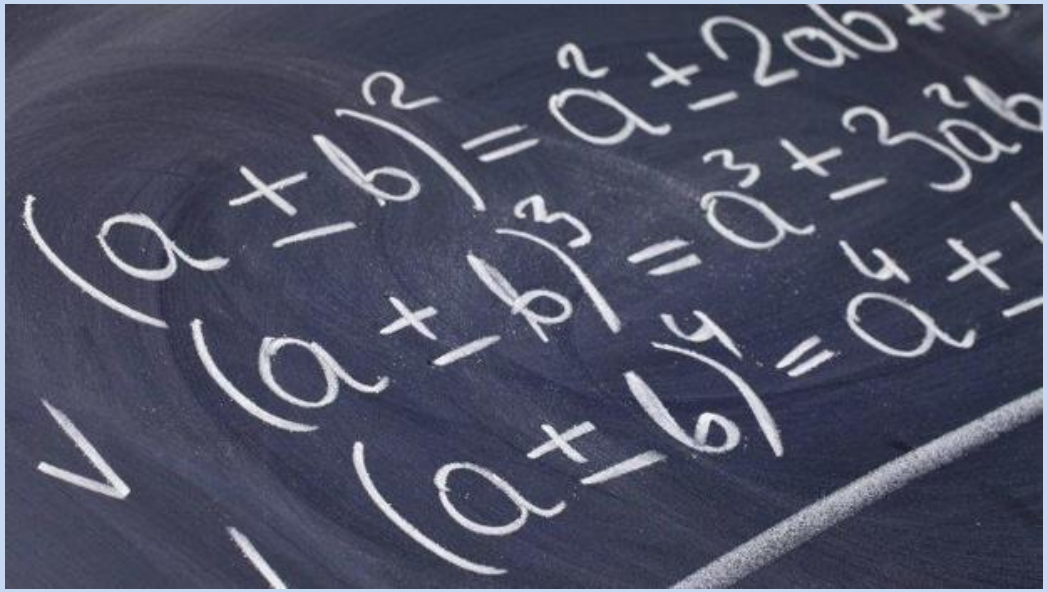


https://www.xataka.com/inteligencia-artificial/ponen-ia-deepmind-a-resolver-examen-escolar-matematicas-suspende-no-fue-capaz-sumar-bien-1-1-1-1-1-1-1/amp

ABC
Tecnología
Abril 11, 2019.

DeepMind, la inteligencia artificial de Google, suspende un simple examen de bachillerato

El software de la compañía fue capaz de resolver catorce de cuarenta preguntas



https://www.abc.es/tecnologia/informatica/software/abci-deepmind-inteligencia-artificial-google-suspende-simple-examen-bachillerato-201904101502_noticia_amp.html

debate

Abril 7, 2019.

Robot Sophia pide igualdad y respeto para los androides

https://www.debate.com.mx/tecnologia/Robot-Sophia-pide-igualdad-y-respeto-para-los-androides-20190407-0078.html

Conclusiones finales:

1) Todavía no se descubren las leyes que rigen el cómo se da la inteligencia.

2) Es posible construir máquinas inteligentes.

3) No hay leyes de la física que se opongan a esto…

A lo largo de esta plática se ha “rascado” la superficie de los múltiples ejemplos de la aplicación de la IA en la vida del día a día.

¿Cómo la IA afectará nuestras vidas a gran escala en el futuro cercano?

Kevin Kelly predice que conforme la IA se va integrando más profundamente en nuestras vidas, sin duda, vendrá a ser **la nueva infraestructura que impulse la siguiente revolución industrial**.

La Quinta Revolución Industrial

1ª	2ª	3ª	4ª	5ª
Mecanización	Electricidad	Informática	Digitalización	Economía Circula
quina de vapor, rgía hidráulica y canización	Producción en masa, cadena de montaje y electricidad	Automatización, tecnologías de la información y comunicación (TIC)	Internet de las cosas, la Nube, coordinación digital, sistemas ciberfísicos y robótica	Cierre del circulo extractivo, productivo, logístico, uso-consumo recuperación y reciclaje

SINGULARIDAD TECNOLÓGICA

La singularidad será un acontecimiento que sucederá dentro de unos años, con el aumento espectacular del progreso tecnológico debido al desarrollo de inteligencia artificial.

THE NATIONAL ARTIFICIAL INTELLIGENCE RESEARCH AND DEVELOPMENT STRATEGIC PLAN

National Science and Technology Council

Networking and Information Technology Research and Development Subcommittee

October 2016

Artificial Intelligence and National Security

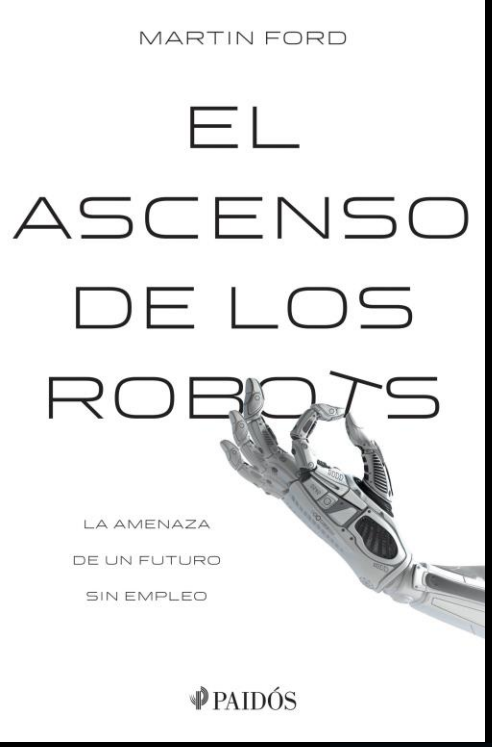
Greg Allen

Taniel Chan

A study on behalf of Dr. Jason Matheny, Director of the U.S. Intelligence Advanced Research Projects Activity (IARPA)

HARVARD Kennedy School
BELFER CENTER
for Science and International Affairs

STUDY
JULY 2017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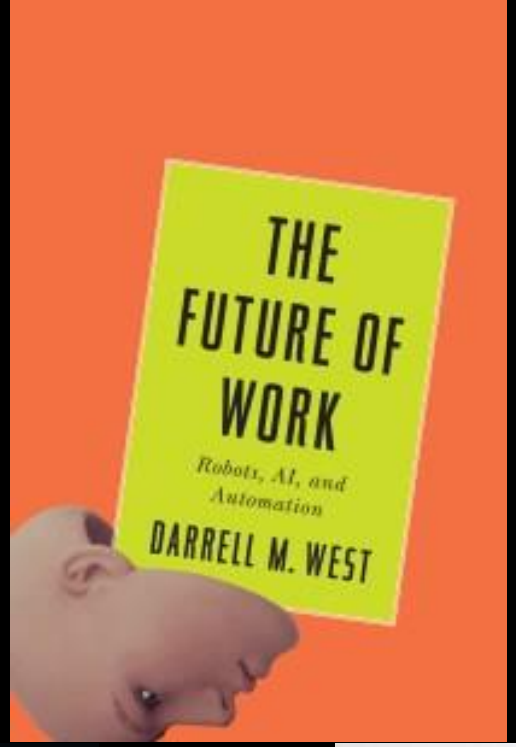
THE FUTURE OF WORK
Robots, AI, and Automation
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Kevin Kelly
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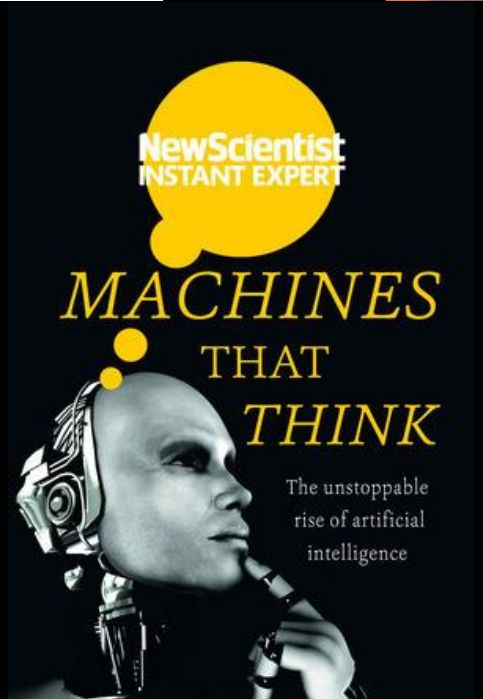
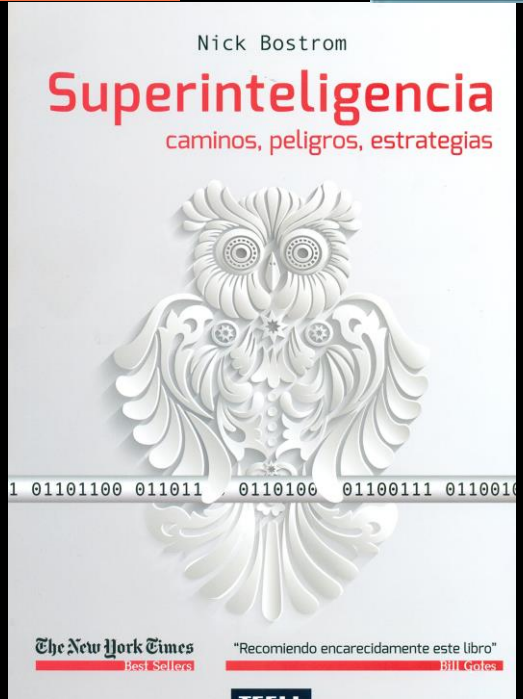
Entender las 12 fuerzas tecnológicas que configurarán nuestro futuro
TEELL


NewScientist
INSTANT EXPERT
MACHINES THAT THINK
The unstoppable rise of artificial intelligence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RAY KURZWEIL

AUTHOR OF *THE AGE OF SPIRITUAL MACHINES*

Do not stop looking for you think is unreachable, sooner or later, if want, you will reach it…

Star Trek Series

GRACIAS

Juan Humberto Sossa Azuela

E-mail: hsossa@cic.ipn.mx

humbertosossa@gmail.com