

Google's Artificial Intelligence Built an AI That Outperforms Any Made by Humans

It's more accurate and more efficient than any other system.

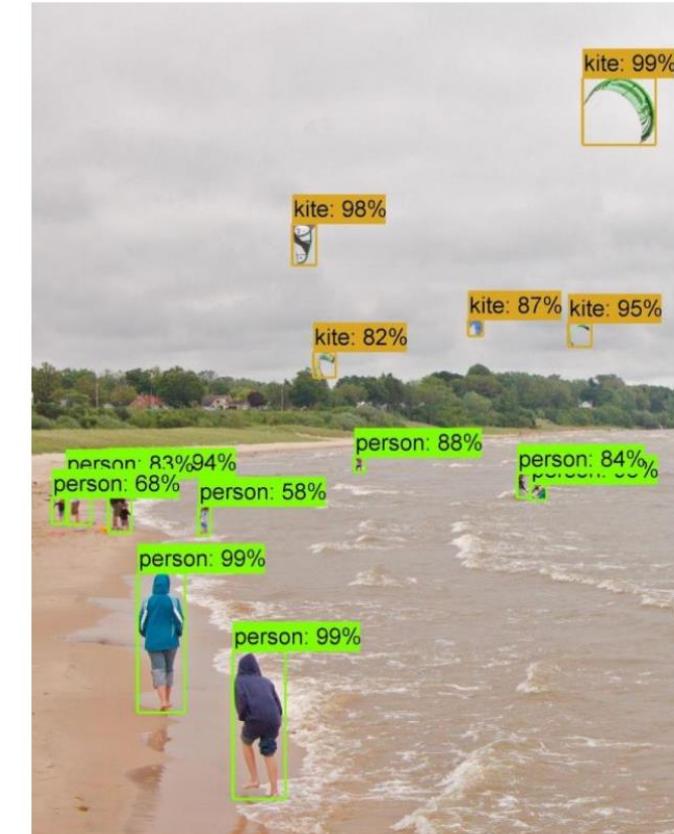
DOM GALEON | DECEMBER 1ST 2017

An AI That Can Build AI

In May 2017, researchers at [Google Brain](#) announced the creation of [AutoML](#), an artificial intelligence (AI) that's capable of generating its own AIs. More recently, they decided to present AutoML with its biggest challenge to date, and the AI that can build AI created a "child" that outperformed all of its human-made counterparts.

The Google researchers [automated the design of machine learning models](#) using an approach called [reinforcement learning](#). AutoML acts as a controller neural network that develops a child AI network for a specific task. For this particular child AI, which the researchers called NASNet, the task was recognizing objects — people, cars, traffic lights, handbags, backpacks, etc. — in a video in real-time.

According to the researchers, NASNet was 82.7 percent accurate at predicting images on ImageNet's validation set. This is 1.2 percent better than any [previously published results](#), and the system is also 4 percent more efficient, with a 43.1 percent mean Average Precision (mAP). Additionally, a less computationally demanding version of NASNet outperformed the best similarly sized models for mobile platforms by 3.1 percent.



Google fires Timnit Gebru, 12.2020

The withering email that got an ethical AI researcher fired at Google

"Stop writing your documents because it doesn't make a difference": Timnit Gebru's final message to her peers



Casey Newton

Dec 3, 2020 19 6



Google, 1.2021

[Home](#) | [Internet](#) | [Internet News](#) | Google Suspends Second AI Ethics Researcher, Union Says

Google Suspends Second AI Ethics Researcher, Union Says

Researcher Margaret Mitchell's suspension came in response to her downloading and sharing of company documents.

By Agence France-Presse | Updated: 22 January 2021 12:09 IST

[!\[\]\(a03a7eb2f4046e1d3c76772003e549ea_img.jpg\) Share on Facebook](#)

[!\[\]\(cbe2492b119e39e02a1dab2af4a4b296_img.jpg\) Tweet](#)

[!\[\]\(e474458956c9a37fbf9586ddb60a7fa1_img.jpg\) Snapchat](#)

[!\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\) Share](#)

[!\[\]\(5361750c22c4e047a52f4eac1ec2d4cc_img.jpg\) Reddit](#)

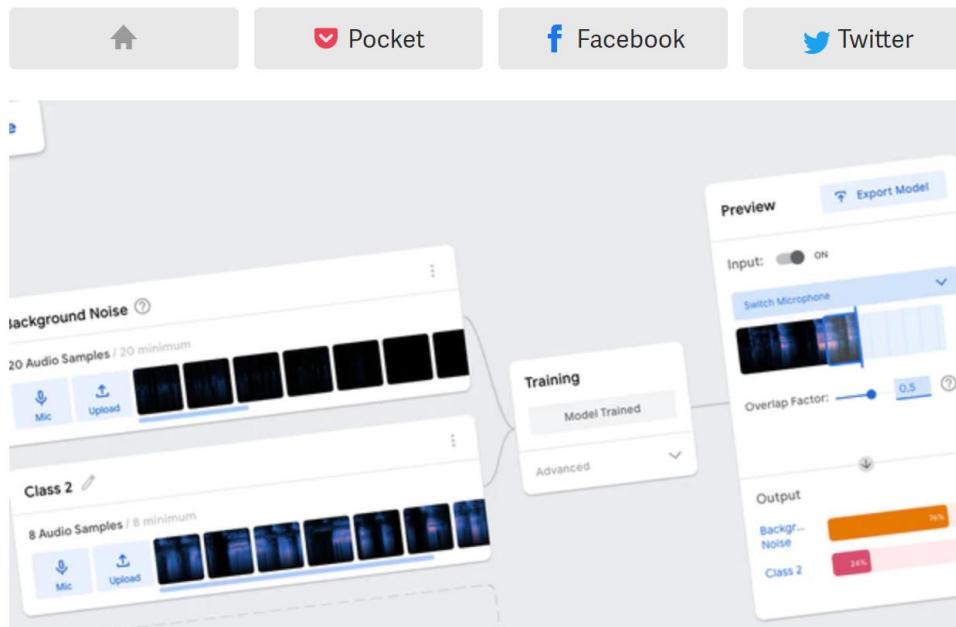
[!\[\]\(870f5d5e9c0d57485634be3ecf52f3ca_img.jpg\) Email](#)

[!\[\]\(4fe57c3593bf1b21d272ae7ac8dfaf77_img.jpg\) Comment](#)



Google Teachable Machine 2.0

Maschinelles Lernen für alle: Google stellt Teachable Machine 2.0 vor



Teachable Machine 2.0. (Screenshot: Teachable Machine / t3n)

11.11.2019, 13:28 Uhr • Lesezeit: 1 Min. Gerade keine Zeit? Jetzt speichern und später lesen

Teachable Machine erlaubt es auch absoluten Anfängern, maschinelles Lernen einzusetzen. Jetzt hat Google Version 2.0 des kostenlosen Tools vorgestellt.

Schon 2017 hat Google mit der Teachable Machine eine Web-App vorgestellt, mit der sich ganz ohne Programmierkenntnisse einfache Machine-Learning-Modelle erstellen lassen. Jetzt hat der Internet-Konzern Version 2.0 des Tools vorgestellt.

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Kim Rixecker
News-Redakteur

Verwandte Themen

Google
Künstliche Intelligenz
Machine Learning
Apps
Arduino

**NIX MEHR VERPASSEN
UNSERE NEWSLETTERT**

E-Mail-Adresse

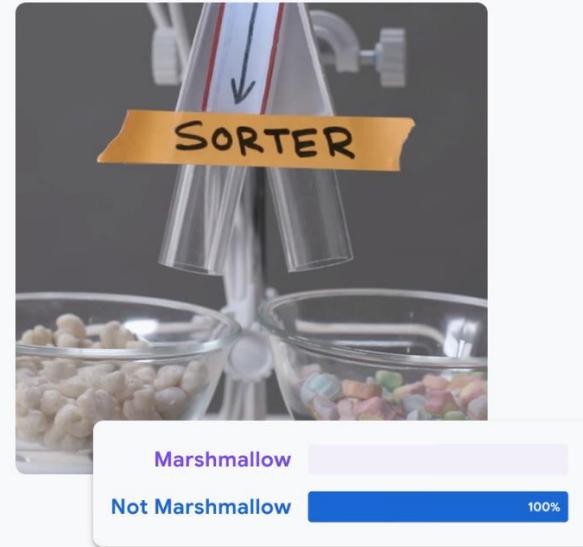
Google Teachable Machine (Homepage)

Teachable Machine

**Bring einem Computer bei, deine
eigenen Bilder, Töne und Posen zu
erkennen.**

Du kannst schnell und einfach Modelle für
maschinelles Lernen für deine Websites und Apps
erstellen – ganz ohne Fachwissen oder
Programmierkenntnisse.

Erste Schritte



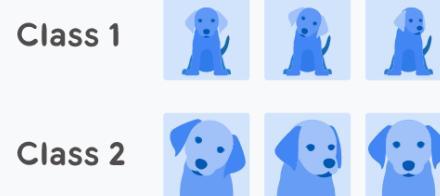
Google Teachable Machine (Homepage)

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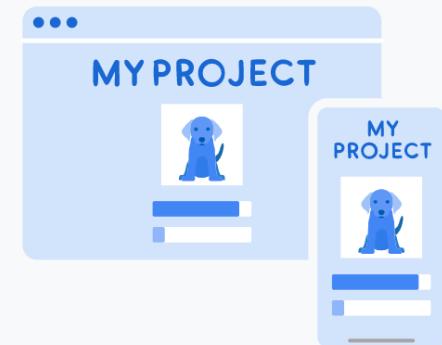
Brin
eigen
erken

Du kann
maschin
erstellen
Program

Er



TRAIN MODEL



1 Zusammentragen

Du kannst Beispiele zusammentragen und sie in Klassen oder Kategorien gruppieren, die der Computer lernen soll.

[Video: Beispiele
zusammentragen](#)

2 Trainieren

Trainiere dein Modell und teste es danach sofort, um herauszufinden, ob es neue Beispiele korrekt klassifiziert.

[Video: Trainiere dein
Modell](#)

3 Exportieren

Exportiere dein Modell für deine Projekte, Websites, Apps und mehr. Du kannst es herunterladen oder kostenlos online hosten.

[Video: Exportiere dein
Modell](#)

Google Teachable Machine (Homepage)

Teachable Machine

Bring einem Computer
eigenen Bilder, Töne
erkennen.

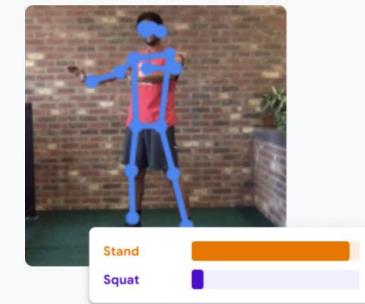
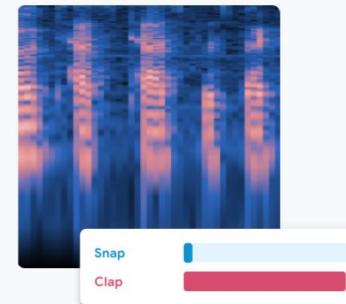
Du kannst schnell und einfach Maschinelles Lernen für deine Visionen erstellen – ganz ohne Fachwissen oder Programmierkenntnisse.

Erste Schritte



Was kann ich zum Trainieren des Modells verwenden?

Teachable Machine ist flexibel – du kannst Dateien verwenden oder Beispiele live erfassen. Das Tool respektiert deine Arbeitsweise. Und du kannst es sogar komplett auf dem Gerät verwenden, ohne dass Webcam- oder Mikrofondaten deinen Computer verlassen.



Bilder

Trainiere ein Modell zur Klassifizierung von Bildern, mit Dateien oder deiner Webcam.

Töne

Ein Modell durch Aufnahme kurzer Audiobeispiele dazu trainieren, Audio zu klassifizieren. (Unterstützung von WAV/MP3-/Dateien und anderen kommt demnächst.)

Posen

Bringe einem Modell mithilfe von Dateien oder auffälligen Posen in deiner Webcam bei, Körperhaltungen zu klassifizieren.

Google Teachable Machine: An Intro

The screenshot shows the Google Teachable Machine web interface. At the top left is a navigation bar with three horizontal lines and the text "Teachable Machine". Below this are two sections for "Example Class 1" and "Example Class 2", each with "Add Image Samples:" buttons for "Webcam" and "Files". To the right is a "Training" panel with a "Train Model" button and an "Advanced" dropdown. A large bracket groups the "Training" panel with the "Preview" panel, which contains a "Preview" button and an "Export Model" button. A message in the "Preview" panel states: "You must train a model on the left before you can preview it here." At the bottom left is a dashed box with an "Add a class" button.

of machine learning in your hands

Teachable Machine 2.0: Making AI easier for everyone, 2019 2min
www.youtube.com/watch?v=T2qQGqZxkD0

Google Teachable Machine (Homepage)

Teachable Machine



Tutorials

Bilder: Bananameter

Erfahre, wie du ein Modell erstellst, das erkennt, ob eine Banane reif ist oder nicht.

Ton: Snap Clap

Whistle

Erfahre, wie du ein Modell erstellst, das einfache Töne erkennt, die du von dir gibst.

Pose: Head Tilt

Erfahre, wie du ein Modell erstellst, das erkennt, in welche Richtung du den Kopf neigst.

Google Teachable Machine (Homepage)

Teach Mach

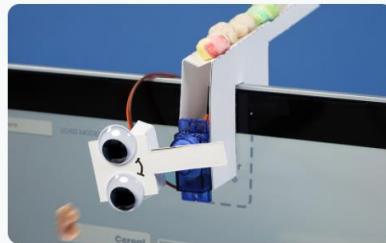
Bring einem
eigenen Bild
erkennen.

Du kannst schnell
maschinelles Lern
erstellen – ganz ohne
Programmierkenntnisse.

Erste Schritte

TensorFlow.js

Erstellt mit Teachable Machine



Tiny Sorter

Ein DIY-Experiment, das Arduino und Teachable Machine miteinander verbindet.

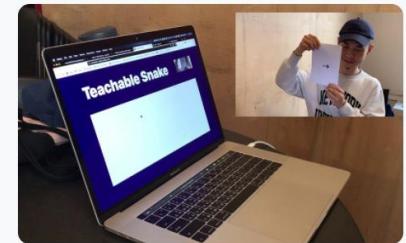
[Weitere Informationen](#)



Project Euphonia

Steve Saling nutzt Teachable Machine, um auf neue Art zu kommunizieren. Beispielsweise erzeugt er mit seiner Mimik verschiedene Klänge.

[Video ansehen](#)



Teachable Snake

Vince MingPu Shao hat mithilfe von Teachable Machine aus einer Webcam und einem Stück Papier einen Gamecontroller gemacht.

[Weitere Informationen](#)

Weitere Experimente, die mit Teachable Machine erstellt wurden, [findest du hier](#). Wenn du deine Projekte mit uns teilen möchtest, kannst du sie [hier einreichen](#) oder eine E-Mail an teachablemachine-support@google.com senden.

Google Teachable Machine (Homepage)

Teachable Machine

Bring
eigene
erkennt-

Du kannst
maschine
erstellen
Programm

AI + Ethics

von [Blakeley H. Payne](#),
Personal Robots Group, MIT
Media Lab

Eine Lerneinheit für Schüler
zu den Grundlagen der
Verzerrung in
algorithmischen Systemen.

Common Core, K-8, Technik



Zum Lernen

Du möchtest lernen, Teachable Machine zu verwenden?
Von Nutzern erstellte Unterrichtseinheiten und Aktivitäten:

Dancing with AI

von [MIT Media Lab](#)

Du kannst Teachable Machine
und PoseBlocks verwenden,
um interaktive Systeme zu
erstellen.

K-8, Technologie

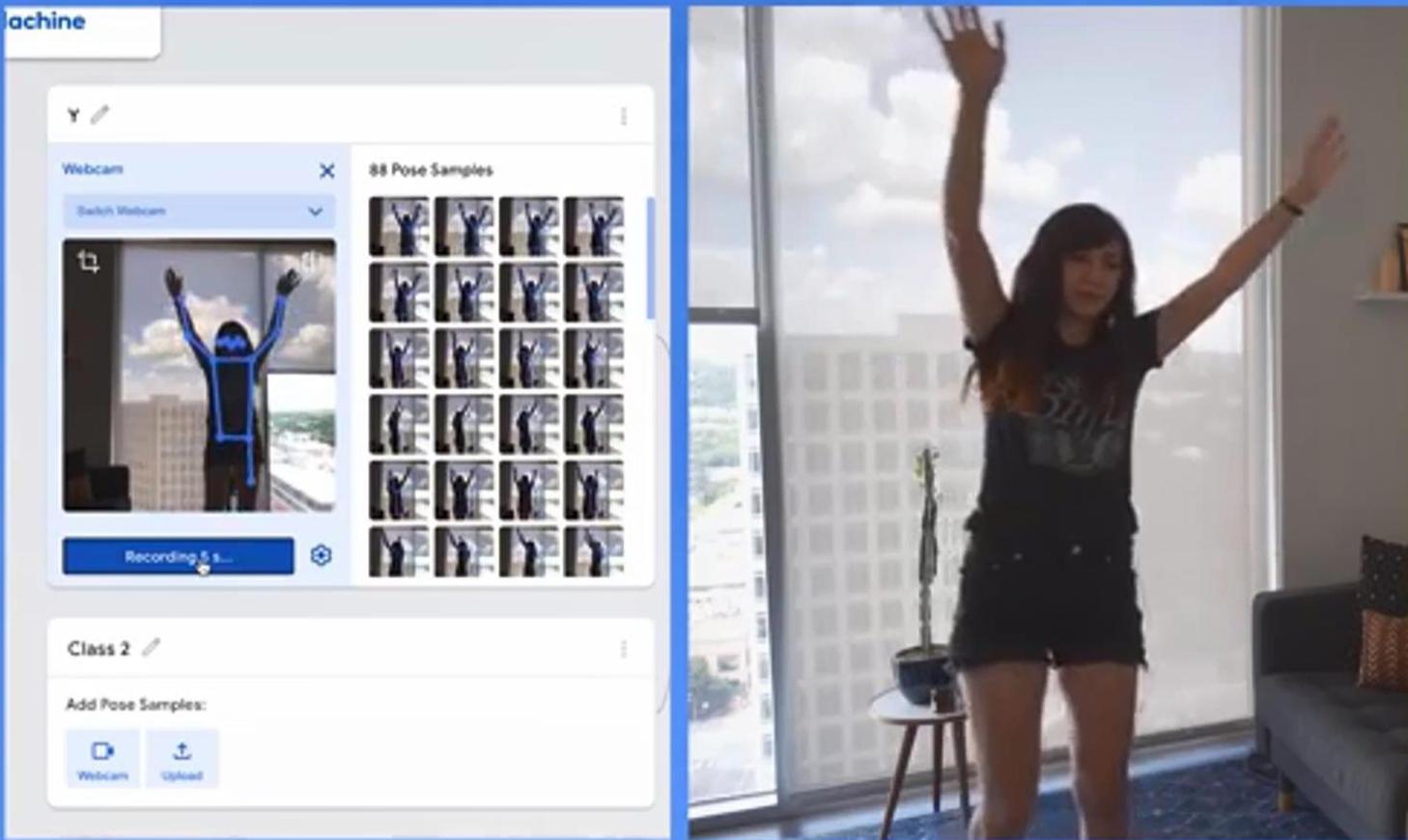
Ready AI Lesson

von [Ready AI](#)

Entdecke Teachable Machine
und lerne die Konzepte für
maschinelles Lernen,
Klassifizierung und
gesellschaftliche
Auswirkungen kennen.

K-12

Google Teachable Machine: An Example

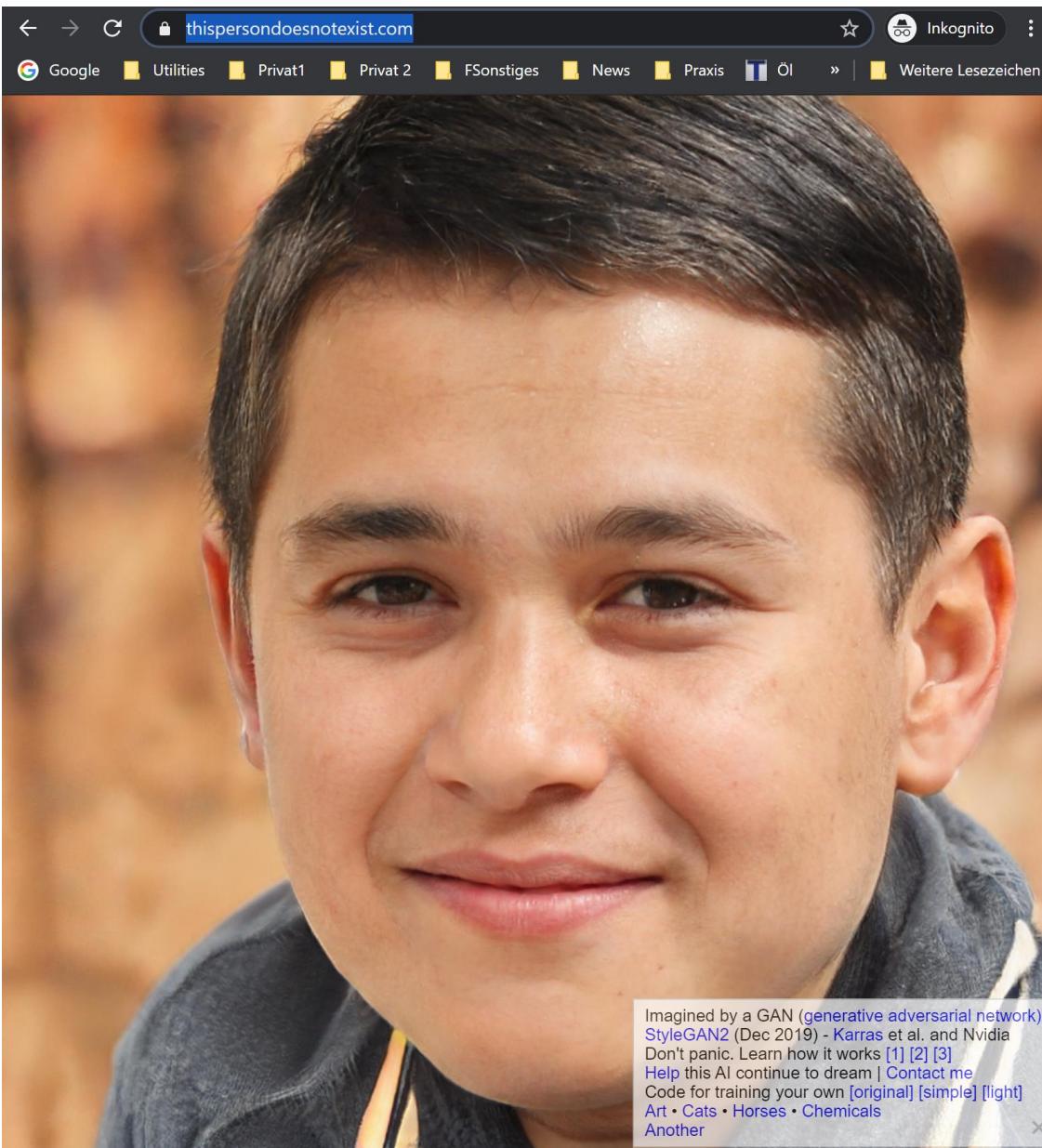


model from overfitting on features about

Machine learning without code in the browser, 2020 2min

www.youtube.com/watch?v=i9tjzr1KME0

StyleGAN2: Playground ThisPersonDoesNotExist



Playing Atari Breakout with Reinforcement Learning

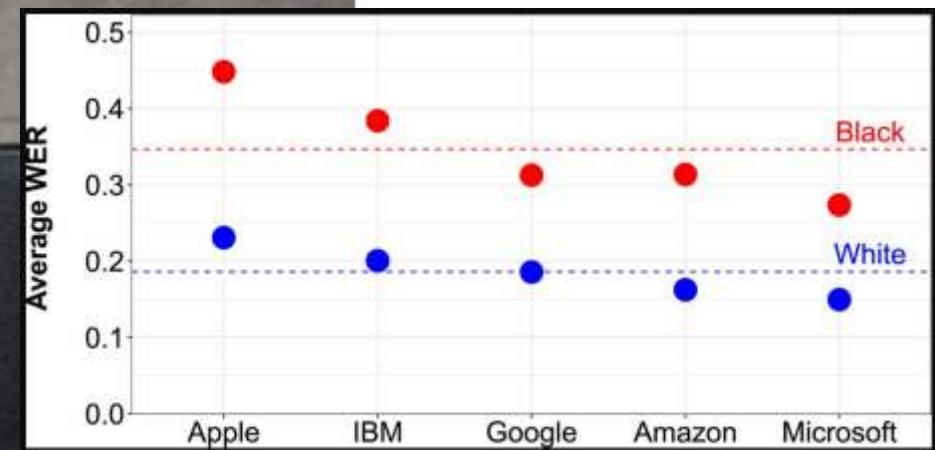


Google DeepMind's Deep Q-learning playing Atari Breakout, 2015

www.youtube.com/watch?v=V1eYniJ0Rnk

There Is a Racial Divide in Speech-Recognition Systems, Researchers Say

Technology from Amazon, Apple, Google, IBM and Microsoft misidentified 35 percent of words from people who were black. White people fared much better.

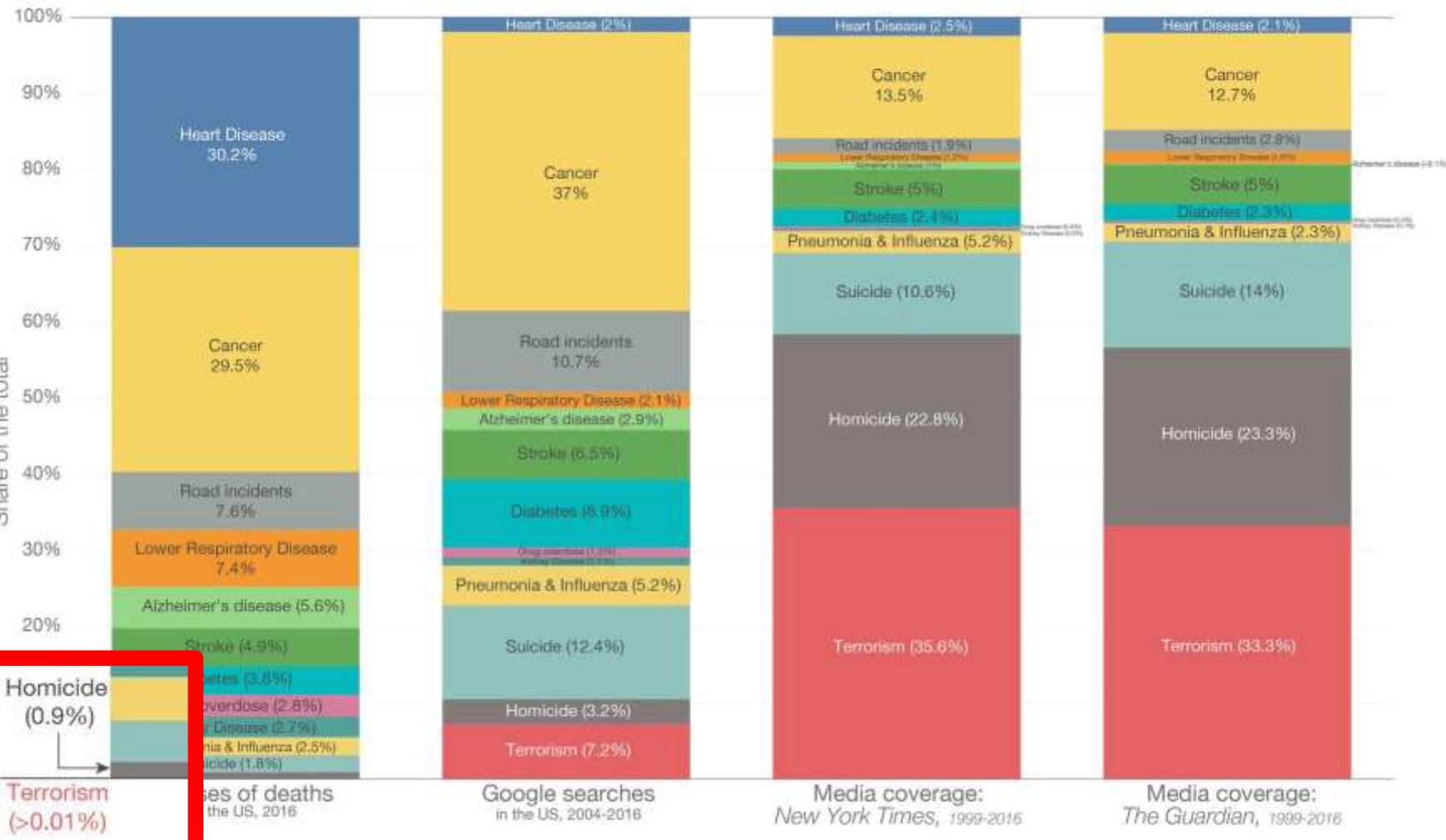


Cognitive Biases durch Medien

Causes of death in the US

Our World
in Data

What Americans die from, what they search on Google, and what the media reports on



[18] – Death: reality vs. reported. All data available at: <https://ourworldindata.org/charting-death>

[19] – Google search data averaged over the period from 2004 to 2016; and NYT and Guardian data from 1999 to 2016.

Shown is the data on the ten leading causes of death in the United States plus drug overdoses, homicides and terrorism.

All values are normalized to 100% so they represent their relative share of the top causes, rather than absolute counts (e.g. 'deaths' represents each causes' share of deaths within the 13 categories shown rather than total deaths). The causes of death shown here account for approximately 88% of total deaths in the United States in 2016.

This is a visualization from OurWorldinData.org, where you find data and research on how the world is changing.

Licensed under CC-BY by the authors Hannah Ritchie and Max Roser.

Fines Database

Fine Models by DPAs

Fines Statistics

Filter by country:



Filter by violation (Art.):

All	5	6	7	9
12	13	14	15	17
18	21	24	25	28
29	31	32	33	34
35	36	37	58	83

UK: Fine against British Airways finally set

Fine against British Airways for inadequate security measures finally set at approx. EUR 22 million (reduction from initially proposed EUR 202 million).



GDPR Enforcement Tracker

tracked by **C'M/S'**
Law.Tax

The CMS.Law GDPR Enforcement Tracker is an overview of fines and penalties which data protection authorities within the EU have imposed under the EU General Data Protection Regulation (GDPR, DSGVO). Our aim is to keep this list as up-to-date as possible. Since not all fines are made public, this list can of course never be complete, which is why we appreciate any indication of further GDPR fines and penalties. Please note that we do not list any fines imposed under national / non-European laws, under non-data protection laws (e.g. competition laws / electronic communication laws) and under "old" pre-GDPR-laws.

Show **10** entries

Search:

ETID	Country	Date	Fine [€]	Controller/Processor	Quoted Art.	Type	Source
ETID-23	FRANCE	2019-01-21	50,000,000	Google Inc.	Art. 13 GDPR, Art. 14 GDPR, Art. 6 GDPR, Art. 5 GDPR	Insufficient legal basis for data processing	link
ETID-405	GERMANY	2020-10-01	35,258,708	H&M Hennes & Mauritz Online Shop A.B. & Co. KG	Art. 5 GDPR, Art. 6 GDPR	Insufficient legal basis for data processing	link
ETID-189	ITALY	2020-01-15	27,800,000	TIM (telecommunications operator)	Art. 5 GDPR, Art. 6 GDPR, Art. 17 GDPR, Art. 21 GDPR, Art. 32 GDPR	Insufficient legal basis for data processing	link
ETID-58	UNITED KINGDOM	2020-10-16	22,046,000	British Airways	Art. 5 (1) f) GDPR, Art. 27 Privacy Impr.	Insufficient technical and Home License Privacy Impr.	link

**3,989,020,304**Google searches [today](#)**3,833,308**Blog posts written [today](#)**421,680,690**Tweets sent [today](#)**3,968,790,565**Videos viewed [today](#)
on YouTube**47,106,638**Photos uploaded [today](#)
on Instagram**81,811,485**Tumblr posts [today](#)**2,644,060,374**

Facebook active users

**886,599,428**

Google+ active users

**366,828,425**

Twitter active users

How Plato Foresaw Facebook's Folly

Technology promises to make easy things that, by their intrinsic nature, have to be hard.



By **Bret Stephens**
Opinion Columnist

Nov. 16, 2018



- **Tweeting and trolling are easy.** Mastering the arts of **conversation** and measured **debate** is **hard**.
- **Texting is easy.** Writing a proper **letter** is **hard**.
- Looking **stuff** up on **Google** is **easy**. Knowing **what to search for** in the first place is **hard**.
- Having a **thousand friends** on **Facebook** is **easy**. Maintaining **six or seven close adult friendships** over the space of **many years** is **hard**.
- **Swiping right** on **Tinder** is **easy**. **Finding love** — and **staying in it** — is **hard**.

Corporate Shitstorm Management



5 SHITSTORM TIPPS

wie Unternehmen erfolgreich auf Shitstorms reagieren

1 Fehler sind menschlich

1

Dort wo Menschen arbeiten, werden Fehler gemacht. Dagegen kannst Du nichts tun. Fehler werden in Medien öffentlich. Unterschätze nicht, dass öffentlich bekannt gewordene Fehler oder Fehlinterpretationen einen Shitstorm auslösen können. Je bekannter Deine Marke, desto wahrscheinlicher ist ein Shitstorm im Anmarsch.

2 Sei wachsam

2

Nutze Deine **Monitoring** und Social CRM Tools und **beobachte in Echtzeit** die sozialen Medien und Kanäle. Beobachte mit einem Google Alert, ob über Deine Marke in der Presse (TV, Zeitungen) berichtet wird. Je früher Du einen potentiellen Shitstorm erkennst, um so besser kannst Du darauf reagieren.

3 Der Notfallplan

3

Erstelle **noch heute** einen Notfallplan, der den genauen Ablauf im Falle eines Shitstorms regelt. Darin enthalten: Wer ist intern für was zuständig? Erstelle eine aktuelle Liste mit **Pressekontakten**. Plane genau, welche Medien Du wann und wie bedienen wirst. Definiere die internen Prozesse und **Zuständigkeiten** durch jede Organisation des Unternehmens hinweg (inkl. GF). Bedenke dabei, dass es im Social Web keine Bürozeiten gibt. Eine Interaktion durch Dich ist **rund um die Uhr** erforderlich!

4 Augen zu und durch

4

Ist der Sturm losgebrochen, heißt es: Ein dickes Fell überziehen und **interagieren**. Ignoriere oder lösche niemals negative Kommentare und stelle Dich **ehrlich** und **transparent** der Kritik. Drücke Dich diplomatisch aus. Zeige Verständnis, um die Diskussion nicht noch weiter anzuheizen. Bringe zum Ausdruck, dass sich Dein Unternehmen der **Kritik annimmt**. Verleihe Deiner Botschaft Ausdruck, indem der Kopf Deiner Marke ein öffentliches **Statement** abgibt. Stelle Dich auf viele Überstunden ein. Auch wenn sich die Aussagen wiederholen oder Dich in der Menge zu erschlagen scheinen: Interagiere immer wieder in einer **hohen Frequenz**, notfalls auch immer mit der gleichen Botschaft.

5 Ziehe ein Fazit

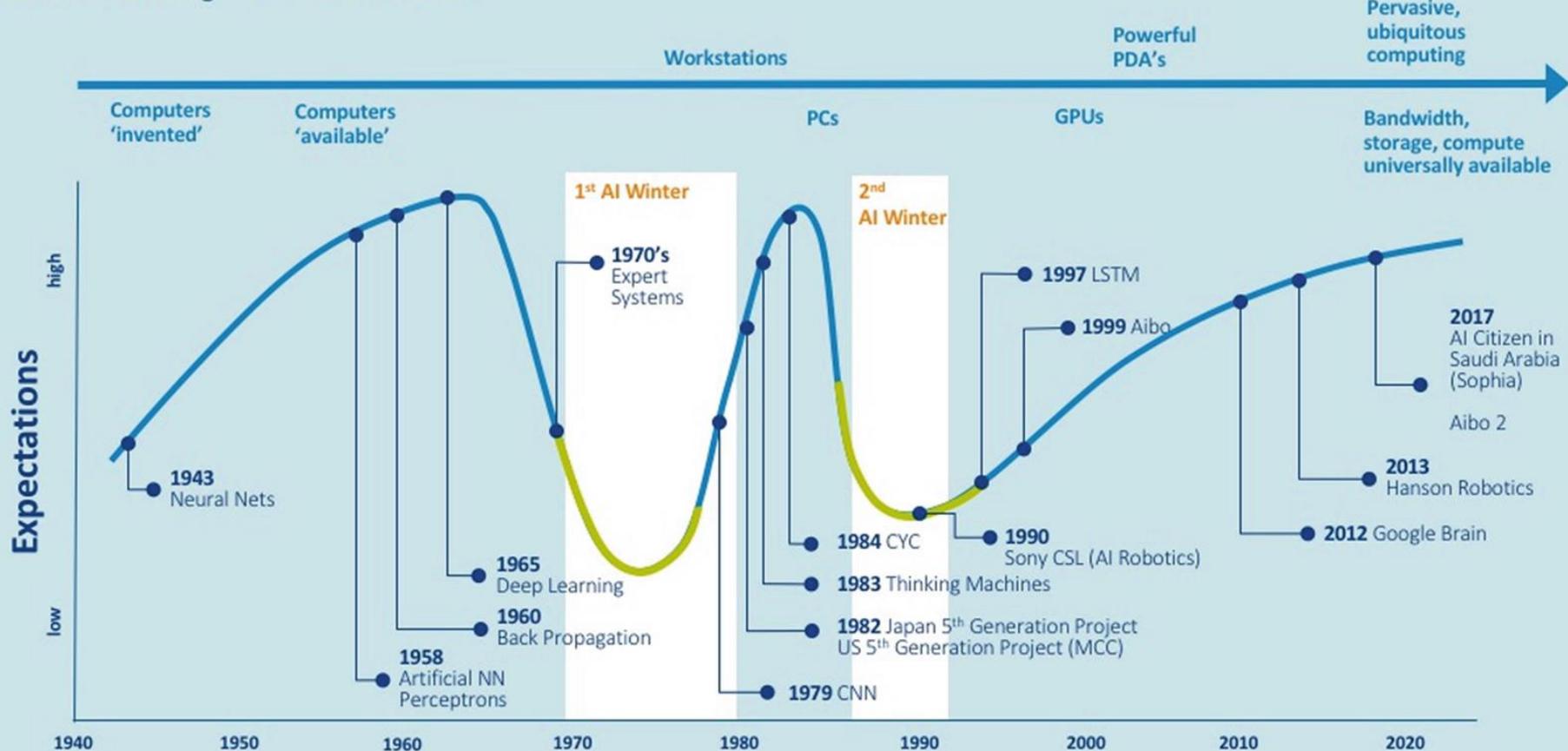
5

Nach einem Sturm zeigt sich die Sonne. Analysiere den Verlauf Deines Shitstorms: Wie viele Interaktionen gab es? Wie war die **Auswirkung auf den Umsatz**? Was ist das inhaltliche Fazit? Was ist das **Learning**? Verändere ggf. die kritisierten Punkte im Unternehmen und kommuniziere sie in der Presse und den sozialen Medien. Vergleiche Deine Messwerte auch sechs oder zwölf Monate nach dem Shitstorm und passe ggf. Deinen Notfallplan an.

Vitalik Buterin: Change whole Industries?

The AI Hype 'Roller Coaster'

What is Driving The Roller Coaster



Welches ist **kein** Beispiel für eine Digitale Plattform?

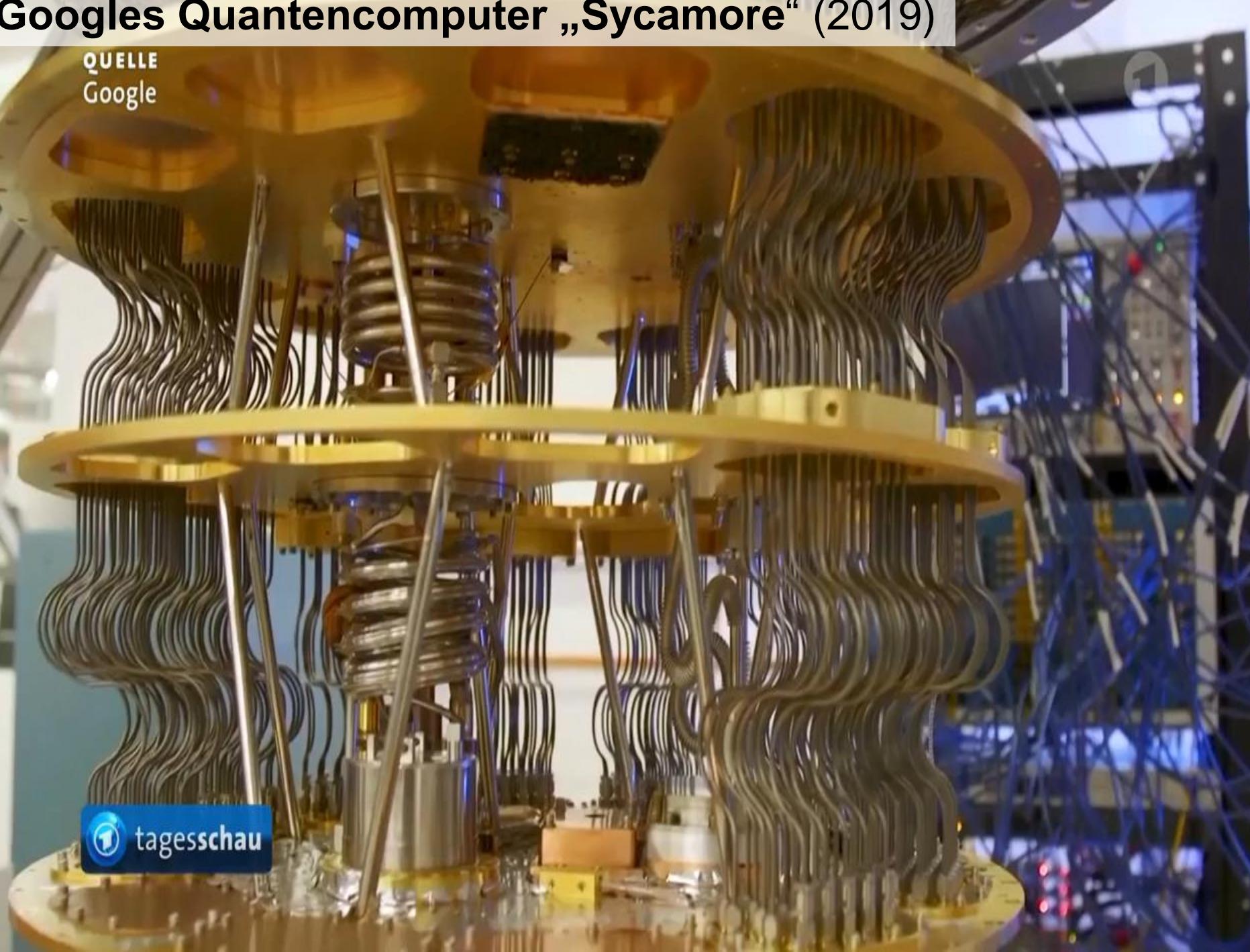


Schwierigkeitsgrad \ Art des Wissens	Abfragewissen (Vorlesung)	Anwendungswissen (Literatur)
Einfach	Green	Yellow (highlighted with a black border)
Mittel	Yellow	Red
Schwierig	Red	Red

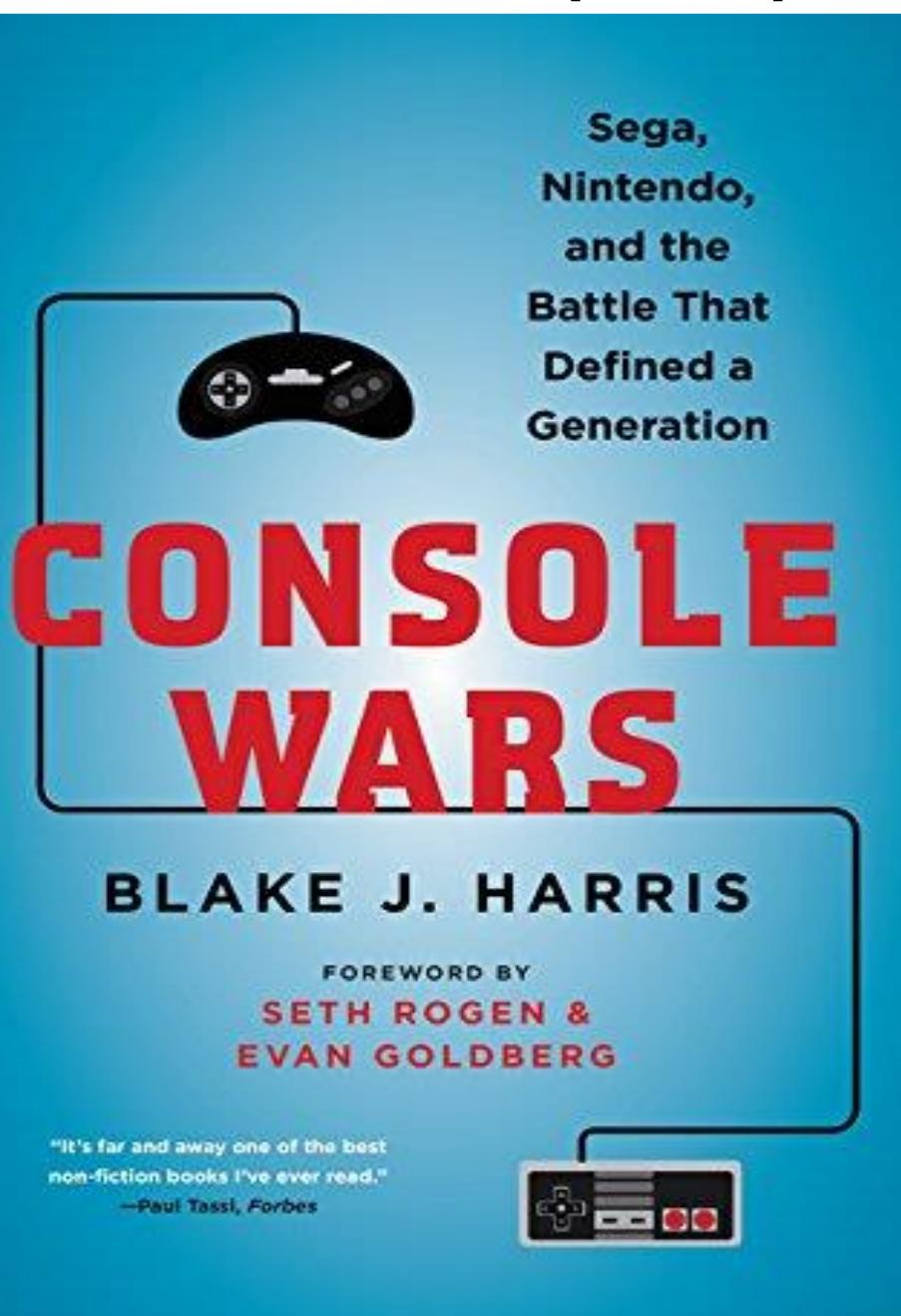
- a) **Suchmaschine**, z.B. Google
- b) **Lieferservice**, z.B. Lieferando
- c) **Hotelportal**, z.B. Trivago
- d) **Taxiplattform**, z.B. Uber
- e) **None above**

Googles Quantencomputer „Sycamore“ (2019)

QUELLE
Google



Console Wars (1990)



Der „Konsolenkrieg“ ist ein Beispiel für Plattformstrategien als entscheidende Wettbewerbsfaktoren.

Netzwerkeffekte in zweiseitigen Märkten haben dazu geführt, dass sich die Anzahl der Konsolenanbieter über die Jahre auf zwei wesentliche Anbieter reduziert hat.

Beispiele:

- Sony vs. Microsoft (Spielekonsolen)
- Apple vs. Google (Mobile OS)
- Microsoft vs. Apple (Desktop-OS)

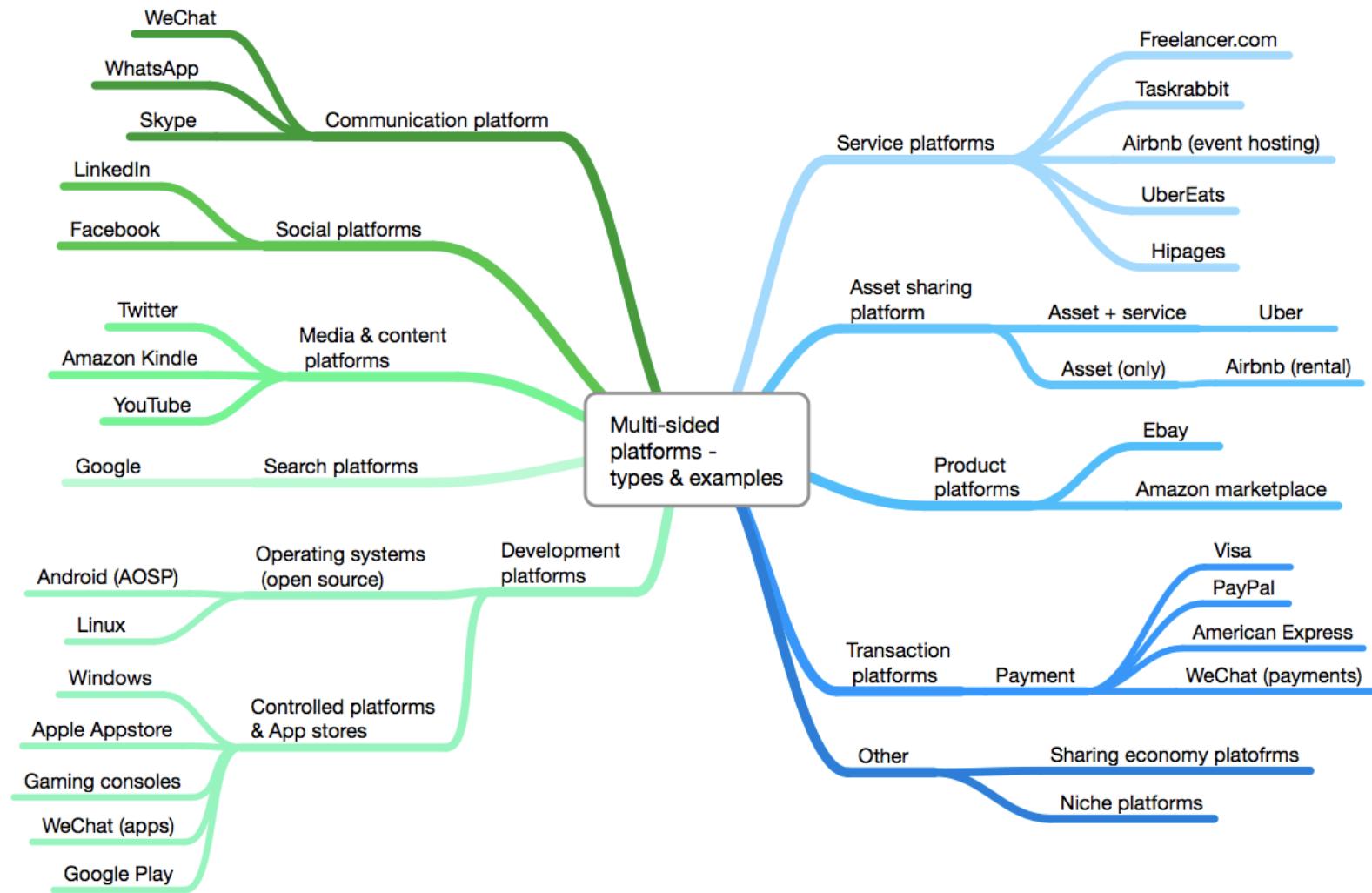
Die großen Tech-Unternehmen sind breit aufgestellt

Viele Branchen werden durch Google, Apple, Facebook and Amazon disruptiert



	g	a	f	o
TELECOM & IT	Google Fiber	Apple Sim	WhatsApp	Cloud Drive
HEALTH	Calico	HealthKit	Move	amazon.com Marketplace
RETAIL	Shopping express	iBeacon	Facebook "Buy" Button	Grocery Delivery
ENERGY & UTILITIES	nest Smart home	Solar Power	internet.org project	Fulfillment by Amazon
MEDIA & ENTERTAINMENT	Play	iTunes Radio	Oculus	twitch Gamers Video platform
FINANCIALS	Wallet	Apple Pay	Friend-To-Friend Payment ¹	amazonpayments Payments API
MOBILITY, TRAVEL & LEISURE	Car	CarPlay	Messenger + Uber integration ¹	amazoncloudplayer + Ford Media app for connected cars

Types & Examples of Platform Businesses



Laut Wikipedia...


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X (company)

From Wikipedia, the free encyclopedia

This article is about the semi-secret research subsidiary of Alphabet Inc.. For the Canadian television series, see [X Company](#). For the online banking company, [X.com](#), see [PayPal](#). For other uses, see [X \(disambiguation\)](#).

X Development LLC. (formerly [Google X](#)) is an [American](#) semi-secret research and development facility and organization founded by [Google](#) in January 2010,^{[1][2]} which now operates as a subsidiary of [Alphabet Inc.](#)^[3] X has its headquarters about a mile and a half from [Alphabet's](#) corporate headquarters, the [Googleplex](#), in [Mountain View, California](#).^{[4][5]}

Work at X is overseen by entrepreneur scientist [Astro Teller](#), as CEO and "Captain of Moonshots".^{[6][7][8]} The lab started with the development of [Google's](#) self-driving car.^[8]

On October 2, 2015, after the complete restructuring of Google into [Alphabet](#), Google X became an independent [Alphabet](#) company and was renamed X. On 25 October 2018, [The New York Times](#) published an exposé entitled "How Google's Secret Lab Under Andy Rubin Was Run Like a Mafia" detailing the company subsequently announced that "48 employees have been fired over the last year for misconduct."^[9] A week after the article appeared, [Google X](#) executive Rich DeVaul resigned pursuant to a settlement of sexual harassment allegations.

- Von **Google 2010 gegründete, teils geheime Forschungseinrichtung**
- **CEO: Astro Teller**
- **Erstes Projekt war das „Selbstfahrende Auto“**

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- 1.2 Makani
- 1.3 FSOC
- 1.4 Barge
- 1.5 Graduated projects
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 - 1.5.2 Loon
 - 1.5.3 Wing
 - 1.5.4 Others
- 1.6 Explorations
- 1.7 Other projects

X Development LLC.



Formerly	Google X (2010–2015)
Type	Subsidiary of Alphabet Inc.
Industry	Research and development
Founded	January 2010; 8 years ago (as Google X, under Google)
Founders	October 2, 2015; 3 years ago (as X, under Alphabet Inc.) Sebastian Thrun Yoky Matsuoka Astro Teller
Headquarters	Mountain View, California, United States Alphabet (CEO, "Captain of Moonshots")
Products	Artificial intelligence Computational neuroscience Health care Biotechnology
Parent	Google (2010–2015) Alphabet Inc. (2015–present)
Subsidiaries	Subsidiaries [show]
Website	x.company ↗

THE CHALLENGE

Every year 1.25 million people around the world die from car accidents. Of these accidents, an estimated 94% are caused by human error. A common culprit? Human inattention, made worse in recent years by the rise of mobile devices.

This begs the question: what if cars could drive themselves safely from point A to point B? X was home to the Google Self-Driving Car project, which had the goal of developing technology that could transform mobility for millions of people, whether by reducing road deaths caused by human error, reclaiming the billions of hours wasted in traffic, or bringing everyday destinations within reach for those unable to drive. In 2016, the project graduated from X to become Waymo.



OF VEHICLE CRASHES IN THE US

94%

ARE CAUSED BY HUMAN ERROR

*NHTSA

Early on, the team focused on freeway driving because it's a simpler driving environment to master: stay in your lane, maintain speed, don't hit the car in front of you. The cars were offered to a handful of Googlers to use on their daily commute to learn how people would really use the technology. The response was overwhelmingly positive — users said the car made their commute less stressful and tiring. But the team also learned that it wasn't reasonable to expect people to pay attention throughout a ride and be able to take back control of the car at short notice. This insight into human behavior and the team's commitment to safety led them to commit to an even more audacious mission: a fully self-driving car that could take anyone from A to B.



Google DeepMind

Challenge Match

8 - 15 March 2016



5. Google Deepmind
Deep Learning with AlphaGo, Zero...

Wikipedia zu DeepMind

DeepMind

From Wikipedia, the free encyclopedia

DeepMind Technologies Limited is a British artificial intelligence company founded in September 2010.

Acquired by Google in 2014, the company has created a neural network that learns how to play video games in a fashion similar to that of humans,^[4] as well as a Neural Turing machine,^[5] or a neural network that may be able to access an external memory like a conventional Turing machine, resulting in a computer that mimics the short-term memory of the human brain.^{[6][7]}

The company made headlines in 2016 after its AlphaGo program beat a human professional Go player for the first time in October 2015^[8] and again when AlphaGo beat Lee Sedol the world champion in a five-game match, which was the subject of a documentary film.^[9]

A more generic program, AlphaZero, beat the most powerful programs playing go, chess and shogi (Japanese chess) after a few hours of play against itself using reinforcement learning.^[10]

Contents [hide]

- 1 History
- 2 Machine learning
 - 2.1 Deep reinforcement learning

DeepMind Technologies Limited



DeepMind

Type of business	Subsidiary
Founded	23 September 2010; 7 years ago ^[1]
Headquarters	6 Pancras Square, ^[2] London N1C 4AG, UK
Founder(s)	Demis Hassabis, Shane Legg, Mustafa Suleyman
CEO	Demis Hassabis
Industry	Artificial Intelligence
Employees	400 ^[3]
Parent	Independent (2010–2014) Google Inc. (2014–present) Alphabet Inc. (2015–present)
Website	www.deepmind.com

Wikipedia zu AlphaGo

AlphaGo

From Wikipedia, the free encyclopedia

AlphaGo is a computer program that plays the board game Go.^[1] It was developed by Alphabet Inc.'s Google DeepMind in London.

In October 2015, AlphaGo became the first computer Go program to beat a human professional Go player without handicaps on a full-sized 19×19 board.^{[2][3]} In March 2016, it beat Lee Sedol in a five-game

match, the first time a computer Go program has beaten a 9-dan professional without handicaps.^[4] Although it lost to Lee Sedol in the fourth game, Lee resigned the final game, giving a final score of 4 games to 1 in favour of AlphaGo. In recognition of the victory, AlphaGo was awarded an honorary 9-dan by the Korea Baduk Association.^[5] The lead up and the challenge match with Lee Sedol were documented in a documentary film also titled *AlphaGo*,^[6] directed by Greg Kohs. It was chosen by *Science* as one of the Breakthrough of the Year runners-up on 22 December 2016.^[7]

At the 2017 Future of Go Summit, AlphaGo beat Ke Jie, the world No.1 ranked player at the time, in a three-game match. After this, AlphaGo was awarded professional 9-dan by the Chinese Weiqi Association.^[8] After the match between AlphaGo and Ke Jie, AlphaGo retired while DeepMind continues AI research in other areas.^[9]

AlphaGo uses a Monte Carlo tree search algorithm to find its moves based on knowledge previously "learned" by machine learning, specifically by an artificial neural network (a deep learning method) by extensive training, both from human and computer play.^[10]



Machine Learning Crash Course – A self-study Guide

The screenshot shows the homepage of the Machine Learning Crash Course website. At the top, there's a navigation bar with links for 'Courses' (which is underlined), 'Practices', 'Guides', and 'Glossary'. Below the navigation is a horizontal menu with 'Crash Course', 'Problem Framing', 'Data Prep', 'Clustering', 'Recommendation', 'Testing and Debugging', and 'GANs'. A banner at the top states: 'Google is committed to advancing racial equity for Black communities. [See how.](#)' The main title 'Machine Learning Crash Course' is displayed prominently in large white text, with 'with TensorFlow APIs' in smaller text below it. A subtitle 'Google's fast-paced, practical introduction to machine learning' follows. Two buttons are visible: a blue 'Start Crash Course' button and a white 'View prerequisites' button. The background of the main content area features a photograph of two people, one with glasses, looking at a tablet screen.

A self-study guide for aspiring
machine learning practitioners

Machine Learning Crash Course – A self-study Guide

The screenshot shows a web browser displaying the Google Machine Learning Crash Course website at developers.google.com/machine-learning/crash-course/introduction-to-neural-networks/playground-exercises. The page title is "Neural Networks: Playground Exercises". The left sidebar, titled "Crash Course", contains a navigation menu with several sections, each with a red horizontal bar underneath it. The sections include "Quick Links", "ML Concepts", "Neural Networks", "Playground Exercises" (which is currently selected and highlighted in blue), and "ML Engineering". The main content area displays the "Neural Networks: Playground Exercises" page, which includes a "Google is committed to advancing racial equity for Black communities. See how." banner, a breadcrumb trail ("Home > Products > Machine Learning > Courses"), and buttons for "Rate and review", "Send feedback", and "Estimated Time: 20 minutes". The main content starts with "A First Neural Network" and describes the task of training a neural network to learn nonlinear models. It then lists four tasks for experimenting with neural network structures and activations.

Machine Learning Crash Course

Courses Practica Guides Glossary

Search

Crash Course Problem Framing Data Prep Clustering Recommendation Testing and Debugging GANs

Quick Links

- Overview
- Prerequisites and Prework
- Exercises

ML Concepts

- Introduction to ML (3 min)
- Framing (15 min)
- Descending into ML (20 min)
- Reducing Loss (60 min)
- First Steps with TF (65 min)
- Generalization (15 min)
- Training and Test Sets (25 min)
- Validation Set (35 min)
- Representation (35 min)
- Feature Crosses (70 min)
- Regularization: Simplicity (40 min)
- Logistic Regression (20 min)
- Classification (90 min)
- Regularization: Sparsity (20 min)

Neural Networks (65 min)

- Video Lecture
- Structure
- Playground Exercises
- Programming Exercise
- Training Neural Nets (10 min)
- Multi-Class Neural Nets (45 min)
- Embeddings (50 min)

ML Engineering

Google is committed to advancing racial equity for Black communities. [See how.](#)

Home > Products > Machine Learning > Courses

Rate and review

[Send feedback](#)

Estimated Time: 20 minutes

Neural Networks: Playground Exercises

A First Neural Network

In this exercise, we will train our first little neural net. Neural nets will give us a way to learn nonlinear models without the use of explicit feature crosses.

Task 1: The model as given combines our two input features into a single neuron. Will this model learn any nonlinearities? Run it to confirm your guess.

Task 2: Try increasing the number of neurons in the hidden layer from 1 to 2, and also try changing from a Linear activation to a nonlinear activation like ReLU. Can you create a model that can learn nonlinearities? Can it model the data effectively?

Task 3: Try increasing the number of neurons in the hidden layer from 2 to 3, using a nonlinear activation like ReLU. Can it model the data effectively? How model quality vary from run to run?

Task 4: Continue experimenting by adding or removing hidden layers and neurons per layer. Also feel free to change learning rates, regularization, and other learning settings. What is the *smallest* number of neurons and layers you can use that gives test loss of 0.177 or lower?

Google, 2017: Attention is All You Need

Attention Is All You Need

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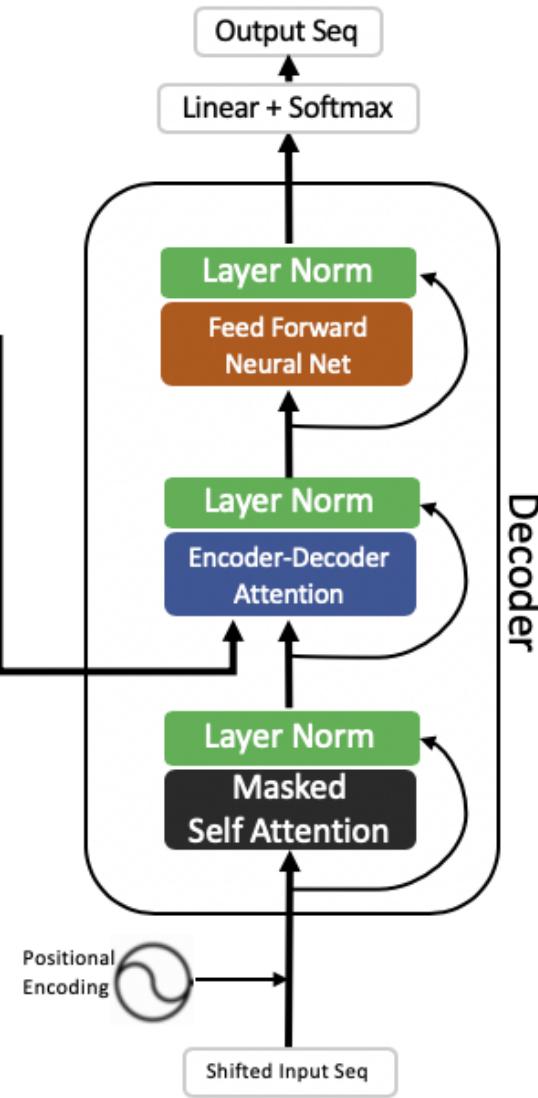
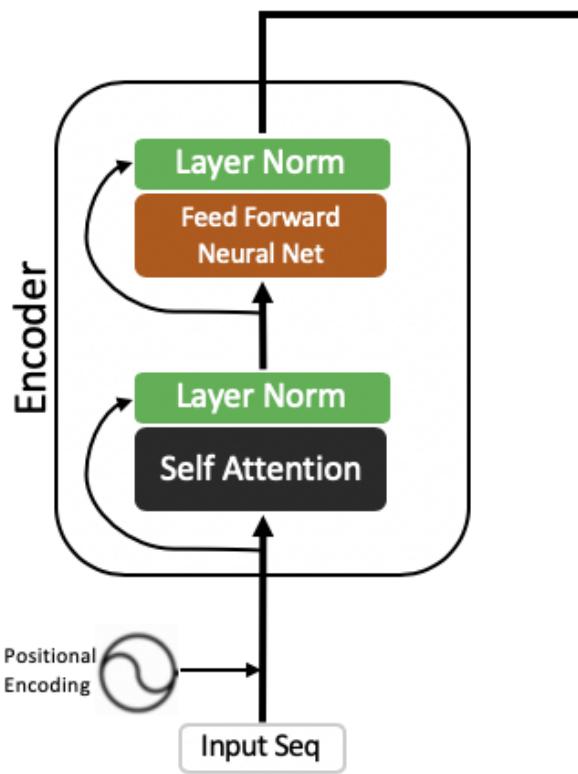
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Illia Polosukhin* ‡
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Abstract

The dominant sequence transduction models are based on recurrent convolutional neural networks that include an encoder and decoder. Recurrent models also connect the encoder and decoder via a shared recurrent mechanism. We propose a new simple network architecture based solely on attention mechanisms, dispensing with recurrence entirely. Experiments on two machine translation tasks show that our model is superior in quality while being more parallelizable and requiring less time to train. Our model achieves 28.4 BLEU on the English-to-German translation task, improving over the existing best ensembles, by over 2 BLEU. On the WMT 2014 English-to-French task, our model establishes a new single-model state-of-the-art BLEU score after training for 3.5 days on eight GPUs, a small fraction of the best models from the literature. We show that the Transformer can also succeed on other tasks by applying it successfully to English constituent ordering and limited training data.

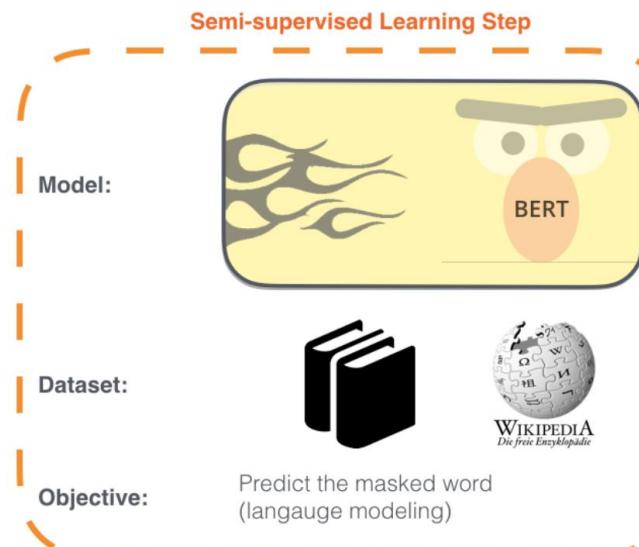




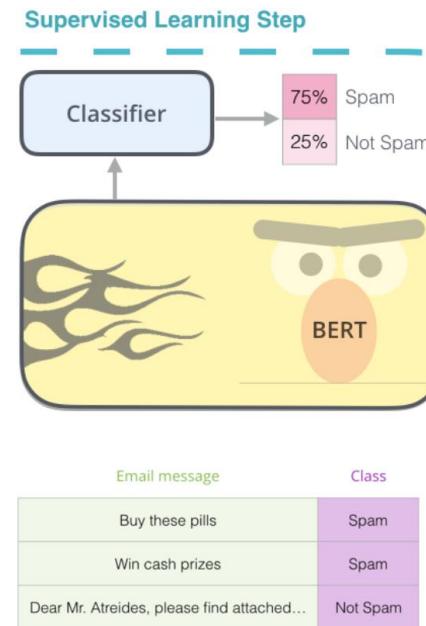
BERT Transformer, Google 2018

1 - Semi-supervised training on large amounts of text (books, wikipedia..etc).

The model is trained on a certain task that enables it to grasp patterns in language. By the end of the training process, BERT has language-processing abilities capable of empowering many models we later need to build and train in a supervised way.



2 - Supervised training on a specific task with a labeled dataset.



The two steps of how BERT is developed. You can download the model pre-trained in step 1 (trained on un-annotated data), and only worry about fine-tuning it for step 2. [Source for book icon].

Das Training läuft in zwei Schritten: Pre-Training und Fine-Tuning (eine Form von Transfer Learning)

Elon Musk: “OpenAI wird im Prinzip von Microsoft übernommen”

28.09.2020 | von [Matthias Bastian](#) | [Twitter](#) | [LinkedIn](#) | [E-Mail](#)

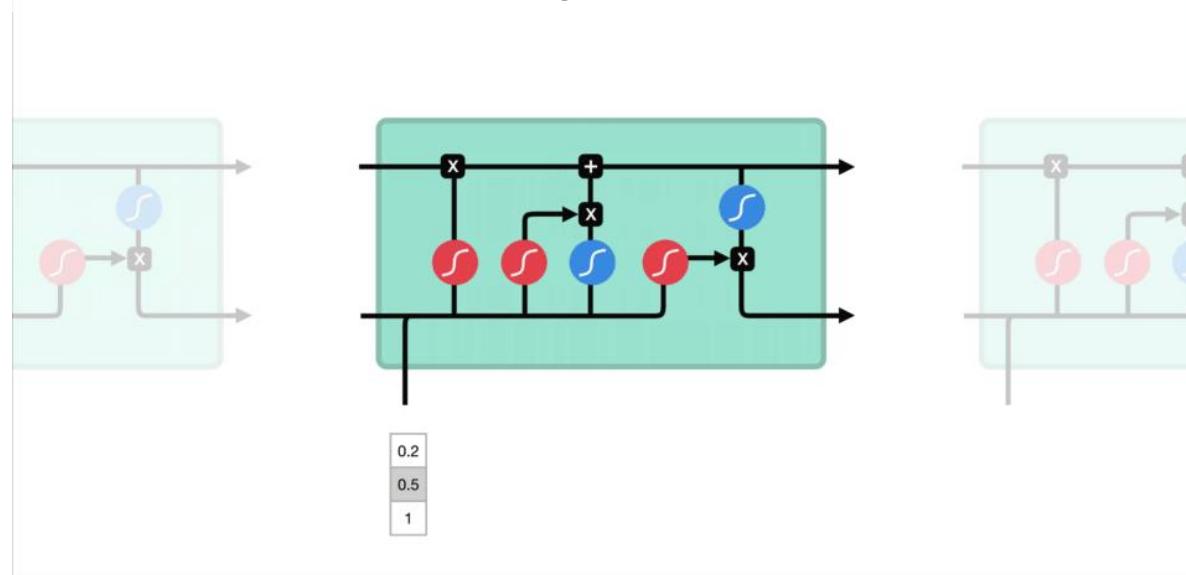
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Als Mitgründer von OpenAI wollte Elon Musk ein Gegengewicht setzen zu kommerziell orientierter Künstlicher Intelligenz großer Konzerne. Die jüngsten Entwicklungen bei OpenAI sieht er kritisch. Zu Recht?

Im März 2019 startete der Umbau von OpenAI: Die bis dato reine Non-Profit-Organisation öffnete sich für wirtschaftliche Ziele und [gründete die gewinnorientierte Einheit OpenAI LP](#). OpenAI begründete diese Umstrukturierung mit der Notwendigkeit, hohe Einnahmen generieren zu müssen, um mit Konzernen wie Google oder Facebook bei der KI-Entwicklung Schritt halten zu können.

Long-Short Term Memory (LSTM)



Laut Wikipedia: Seit etwa 2016 setzen **große Technologieunternehmen** wie **Google, Apple und Microsoft LSTM** als **grundlegende Komponente** ein.

So verwendete **Google** beispielsweise **LSTM** für die **Spracherkennung** auf dem **Smartphone**, für den **Smart Assistant Allo** und für **Google Translate**.

Apple verwendet **LSTM** für die „**Quicktype**“-Funktion auf dem **iPhone** und für **Siri**.

Amazon verwendet **LSTM** für **Amazon Alexa**.

Sketch-RNN Demos

A Neural Representation of Sketch Drawings

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Douglas Eck
Google Brain
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Abstract

We present sketch-rnn, a recurrent neural network (RNN) able to construct stroke-based drawings of common objects. The model is trained on a dataset of human-drawn images representing many different classes. We outline a framework for conditional and unconditional sketch generation, and describe new robust training methods for generating coherent sketch drawings in a vector format.

1 Introduction

Recently, there have been major advancements in generative models for image synthesis. Variational Autoencoders (VAE) [15], and Autoregressive (AR) [19] models have been proposed to generate images from latent variables. Most of the work thus far has been targeted towards modeling images as grids of pixels. However, we do not understand the world as a grid of pixels; we represent what we see. From a young age, we develop our understanding of the world by drawing on paper with a pencil or crayon. In this work, we propose a new way of representing an image as a short sequence of strokes, similar to traditional pixel image modelling approaches, and propose

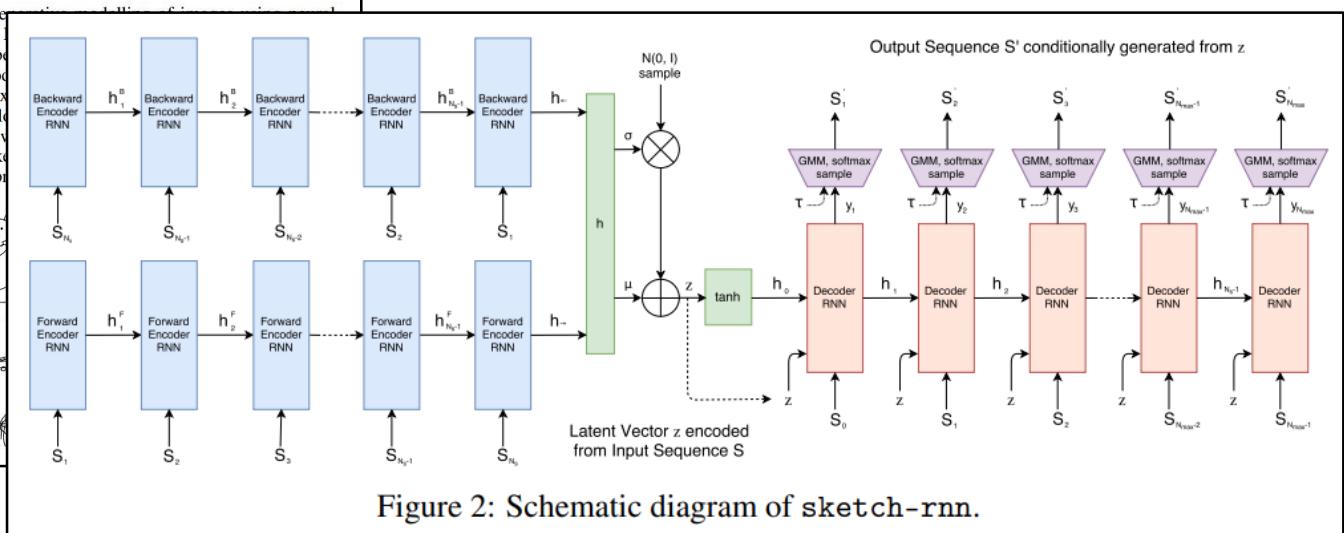
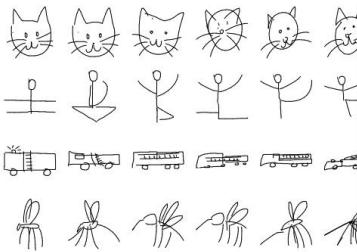
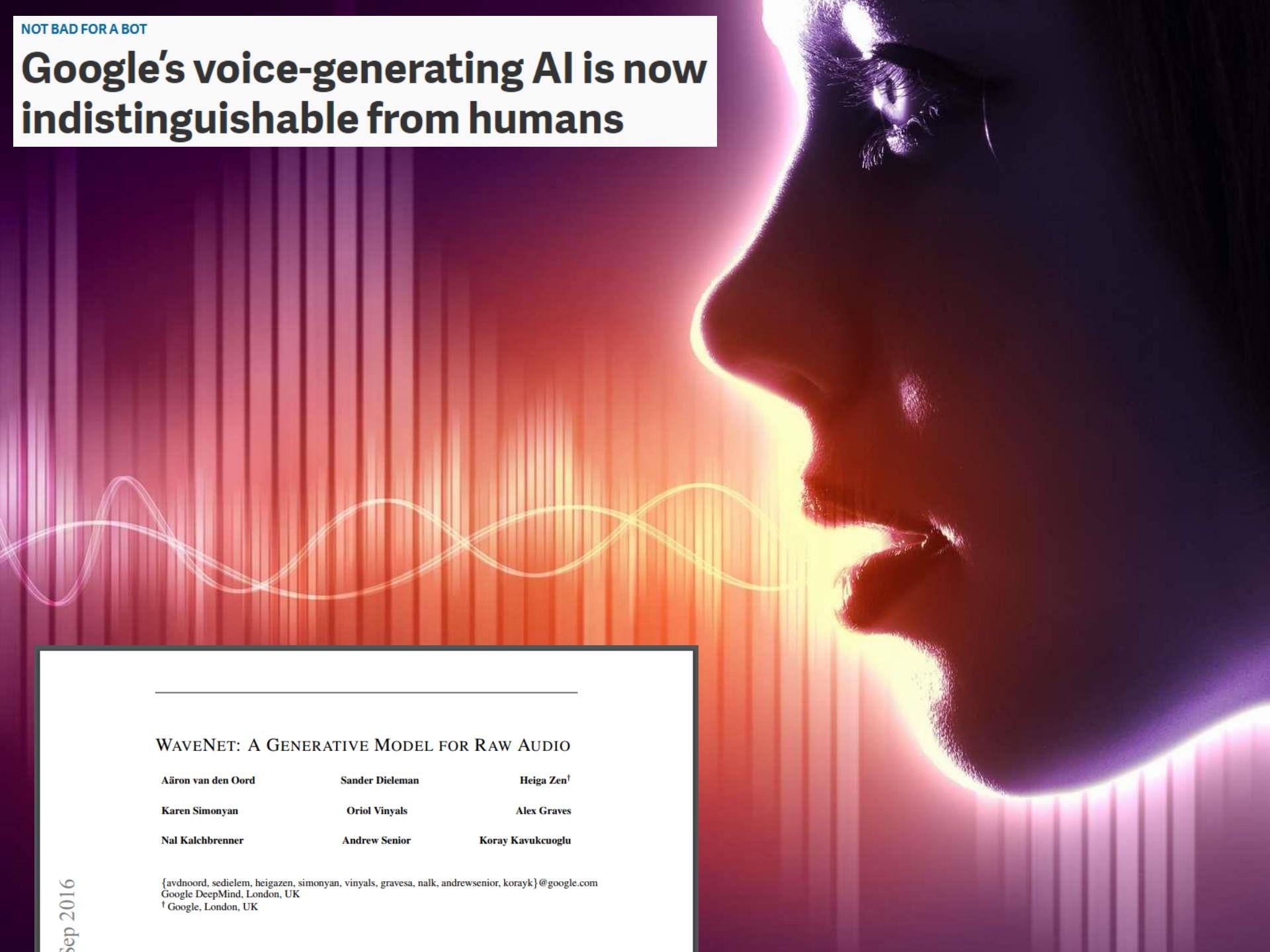


Figure 2: Schematic diagram of sketch-rnn.

Google's voice-generating AI is now indistinguishable from humans



WAVENET: A GENERATIVE MODEL FOR RAW AUDIO

Aäron van den Oord

Sander Dieleman

Heiga Zen[†]

Karen Simonyan

Oriol Vinyals

Alex Graves

Nal Kalchbrenner

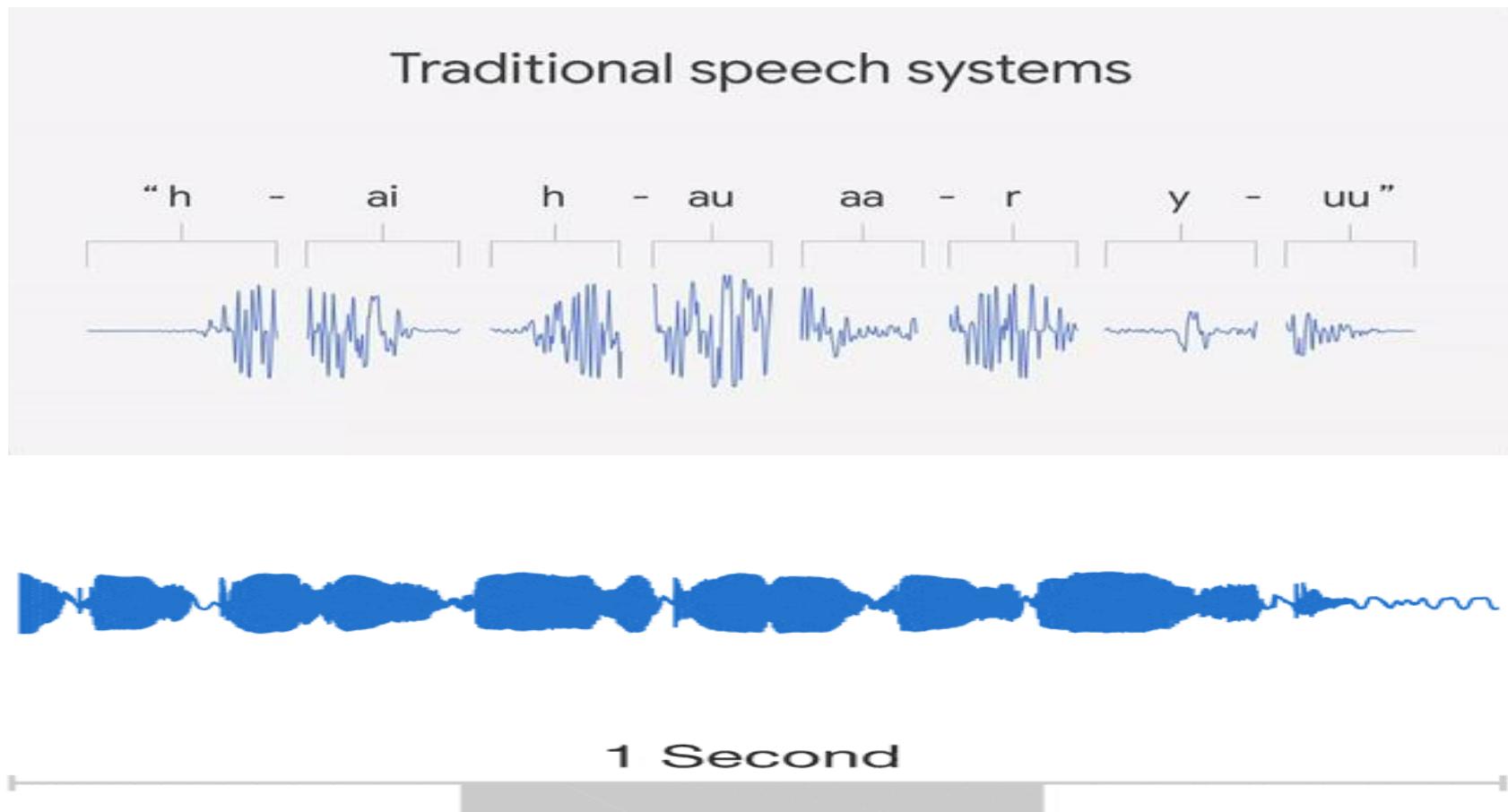
Andrew Senior

Koray Kavukcuoglu

{avdnoord, sedilem, heigazen, simonyan, vinyals, gravesa, nalk, andrewsenior, korayk}@google.com
Google DeepMind, London, UK

[†] Google, London, UK

Google WaveNet

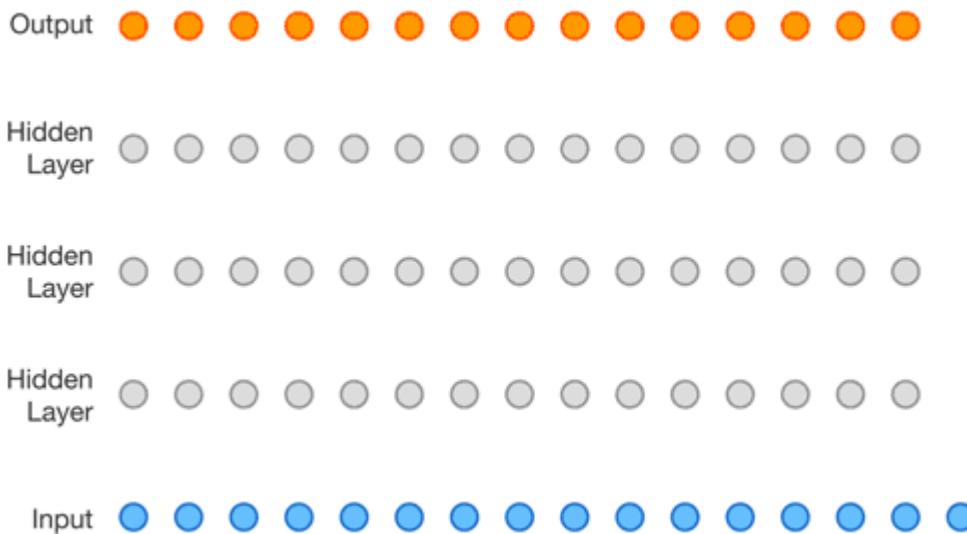


WaveNet is a powerful **predictive technique** that uses multiple Deep Learning (DL) strategies from Computer Vision (CV) and Audio Signal Processing models and applies them to **longitudinal (time-series) data**.

Google WaveNet: A generative model for raw audio, 2016

deepmind.com/blog/article/wavenet-generative-model-raw-audio

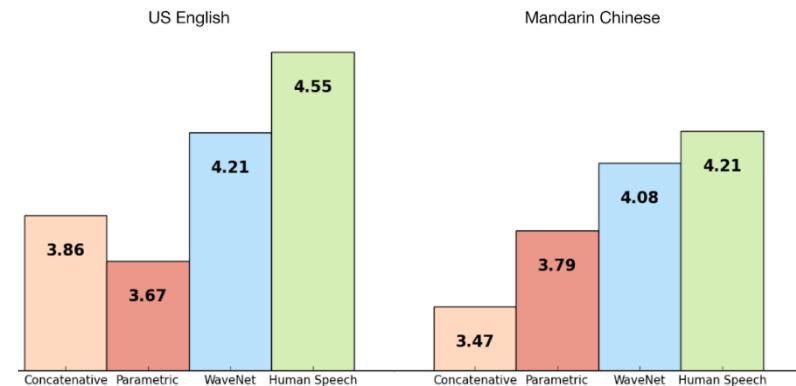
Google WaveNet mit einer CNN-Architektur



A **CNN** that **grows**. It was **trained** on a **large dataset of speech samples**. During training, the network determined the underlying **structure** of the speech and what **waveforms** were **realistic**. The trained network then **synthesised a voice** one sample at a time, with each generated sample taking into account the properties of the previous sample. The resulting voice contained **natural intonation** and other features such as **lip smacks**.

Speech samples	Subjective 5-scale MOS in naturalness	
	North American English	Mandarin Chinese
LSTM-RNN parametric	3.67 ± 0.098	3.79 ± 0.084
HMM-driven concatenative	3.86 ± 0.137	3.47 ± 0.108
WaveNet (L+F)	4.21 ± 0.081	4.08 ± 0.085
Natural (8-bit μ -law)	4.46 ± 0.067	4.25 ± 0.082
Natural (16-bit linear PCM)	4.55 ± 0.075	4.21 ± 0.071

Table 1: Subjective 5-scale mean opinion scores of speech samples from LSTM-RNN-based statistical parametric, HMM-driven unit selection concatenative, and proposed WaveNet-based speech synthesizers, 8-bit μ -law encoded natural speech, and 16-bit linear pulse-code modulation (PCM) natural speech. WaveNet improved the previous state of the art significantly, reducing the gap between natural speech and best previous model by more than 50%.



Google WaveNet



Google Wavenet | Google I/O 2018
www.youtube.com/watch?v=JjK8apEishQ

Google, 2017: Attention is All You Need

Attention Is All You Need

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Clémentine

Niki Dyer*

Torko Elmiussin*

The dominant sequence transduction models are based on complex recurrent or convolutional neural networks that include an encoder and a decoder. The best performing models also connect the encoder and decoder through an attention mechanism. We propose a new simple network architecture, the Transformer, based solely on attention mechanisms, dispensing with recurrence and convolutions entirely. Experiments on two machine translation tasks show these models to be superior in quality while being more parallelizable and requiring significantly less time to train. Our model achieves 28.4 BLEU on the WMT 2014 English-to-German translation task, improving over the existing best results, including ensembles, by over 2 BLEU. On the WMT 2014 English-to-French translation task, our model establishes a new single-model state-of-the-art BLEU score of 41.8 after training for 3.5 days on eight GPUs, a small fraction of the training costs of the best models from the literature. We show that the Transformer generalizes well to other tasks by applying it successfully to English constituency parsing both with large and limited training data.

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Google, 2017: Attention is All You Need

Attention Is All You Need

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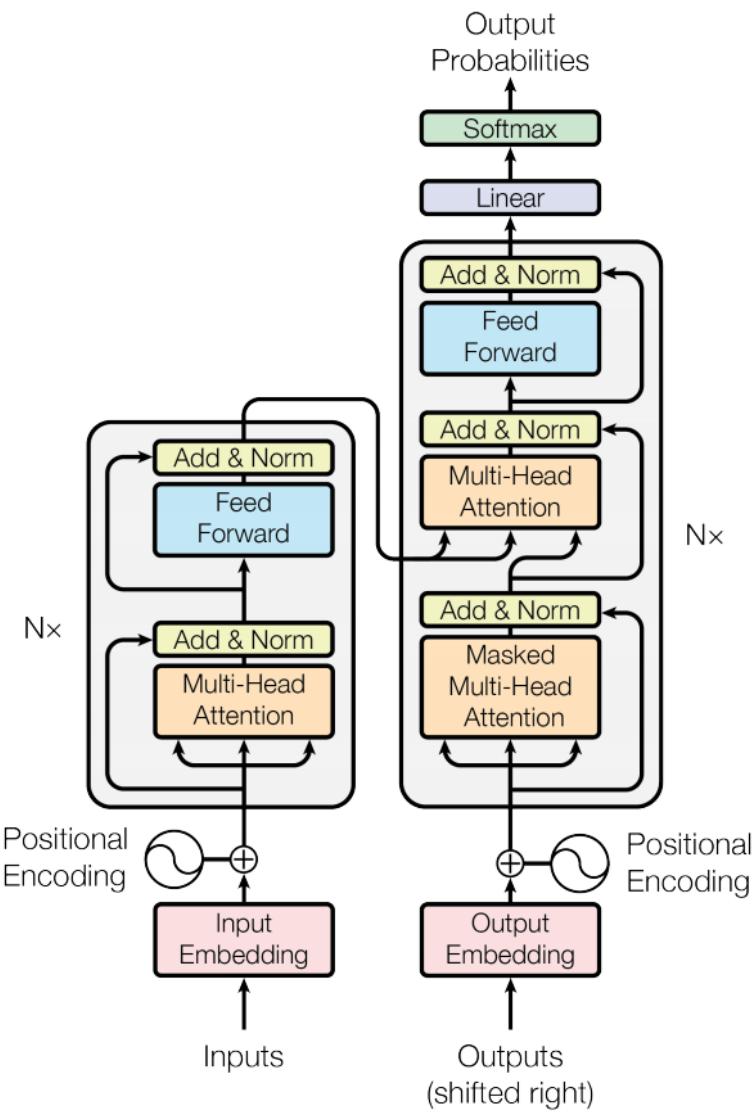


Figure 1: The Transformer - model architecture.

Google, 2017: Attention is All You Need

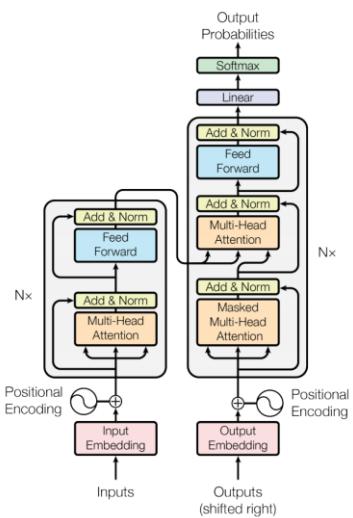
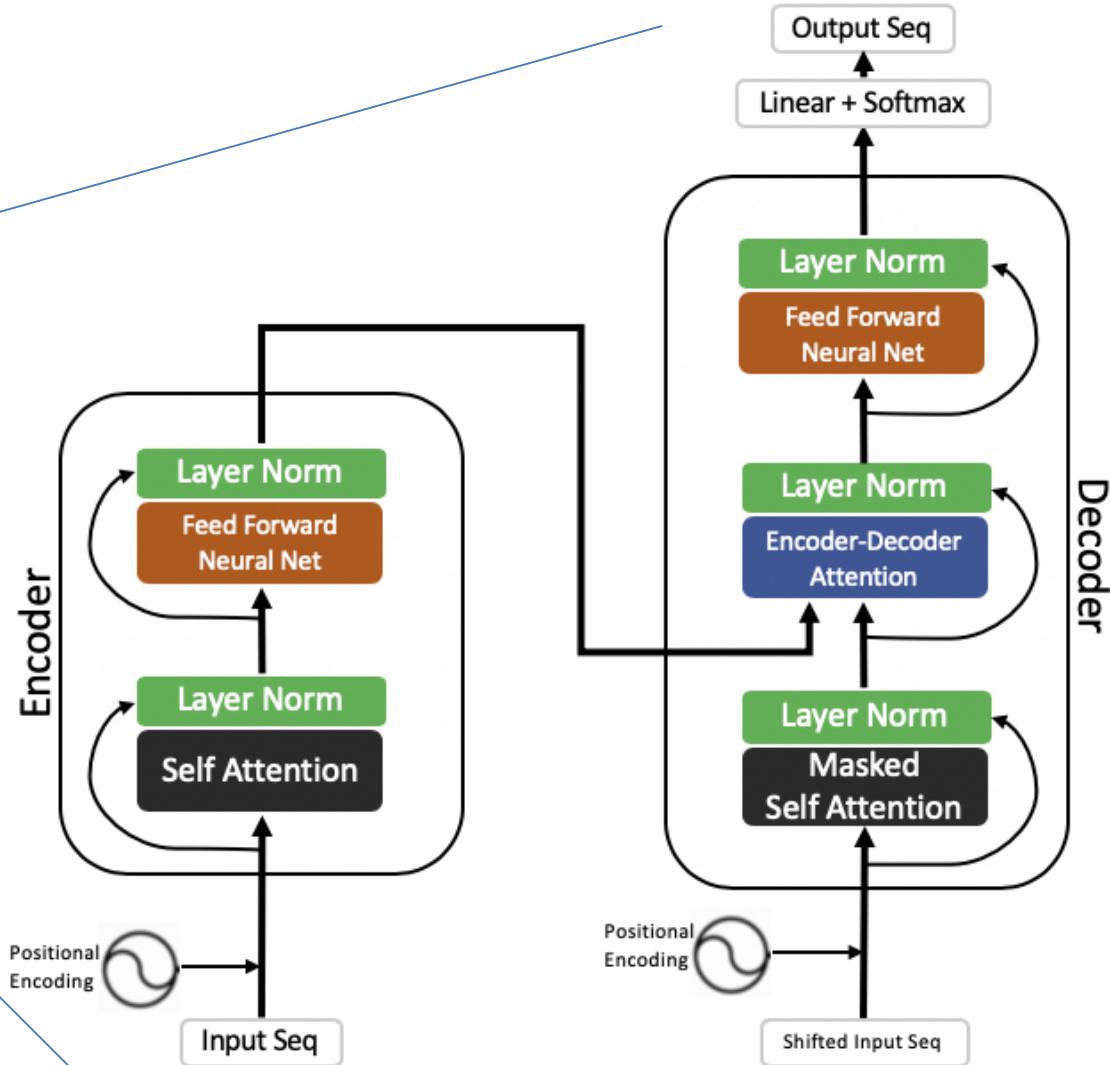


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5. Transformer BERT, Google



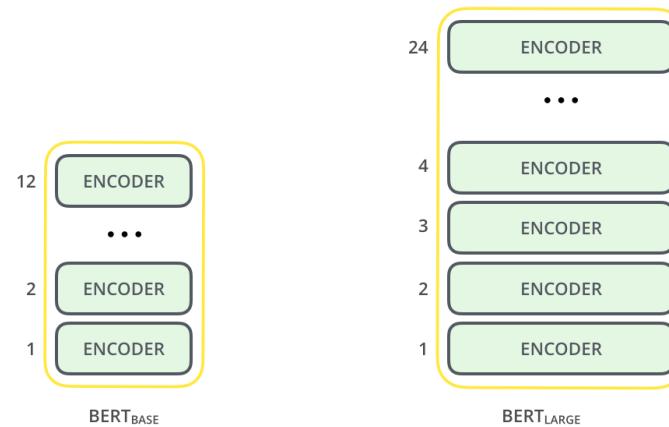
BERT Transformer, Google 2018

BERT (language model)

From Wikipedia, the free encyclopedia

Bidirectional Encoder Representations from Transformers (BERT) is a [Transformer-based machine learning](#) technique for [natural language processing](#) (NLP) pre-training developed by [Google](#). BERT was created and published in 2018 by Jacob Devlin and his colleagues from Google.^{[1][2]} As of 2019, Google has been leveraging BERT to better understand user searches.^[3]

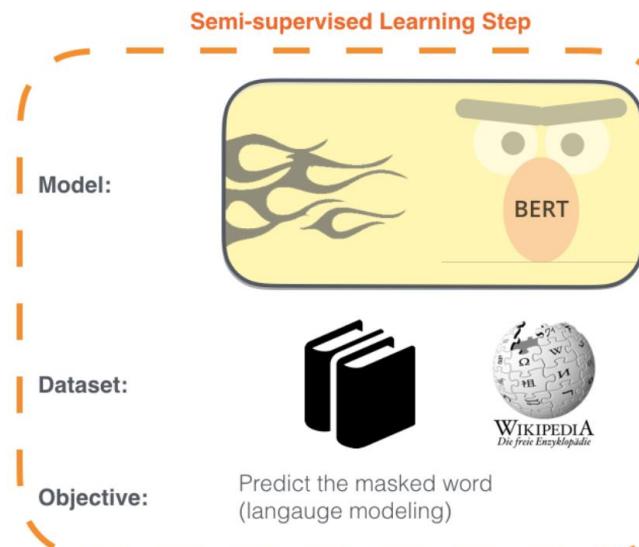
The original English-language BERT model comes with two pre-trained general types:^[1] (1) the [BERT_{BASE}](#) model, a 12-layer, 768-hidden, 12-heads, 110M parameter neural network architecture, and (2) the [BERT_{LARGE}](#) model, a 24-layer, 1024-hidden, 16-heads, 340M parameter neural network architecture; both of which were trained on the [BooksCorpus](#)^[4] with 800M words, and a version of the [English Wikipedia](#) with 2,500M words.



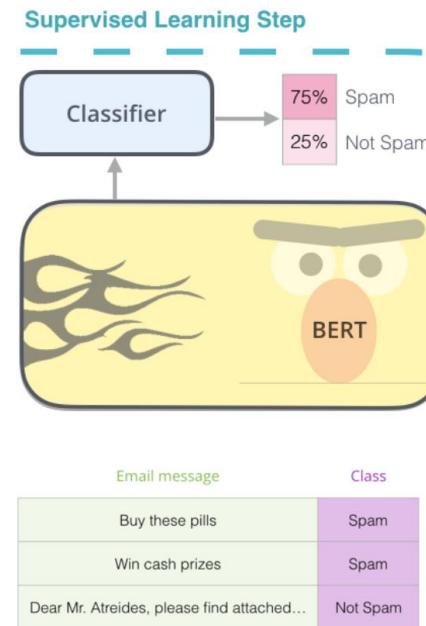
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The two steps of how BERT is developed. You can download the model pre-trained in step 1 (trained on un-annotated data), and only worry about fine-tuning it for step 2. [Source for book icon].

Das **Training** läuft in zwei Schritten: **Pre-Training** und **Fine-Tuning** (eine Form von **Transfer Learning**)

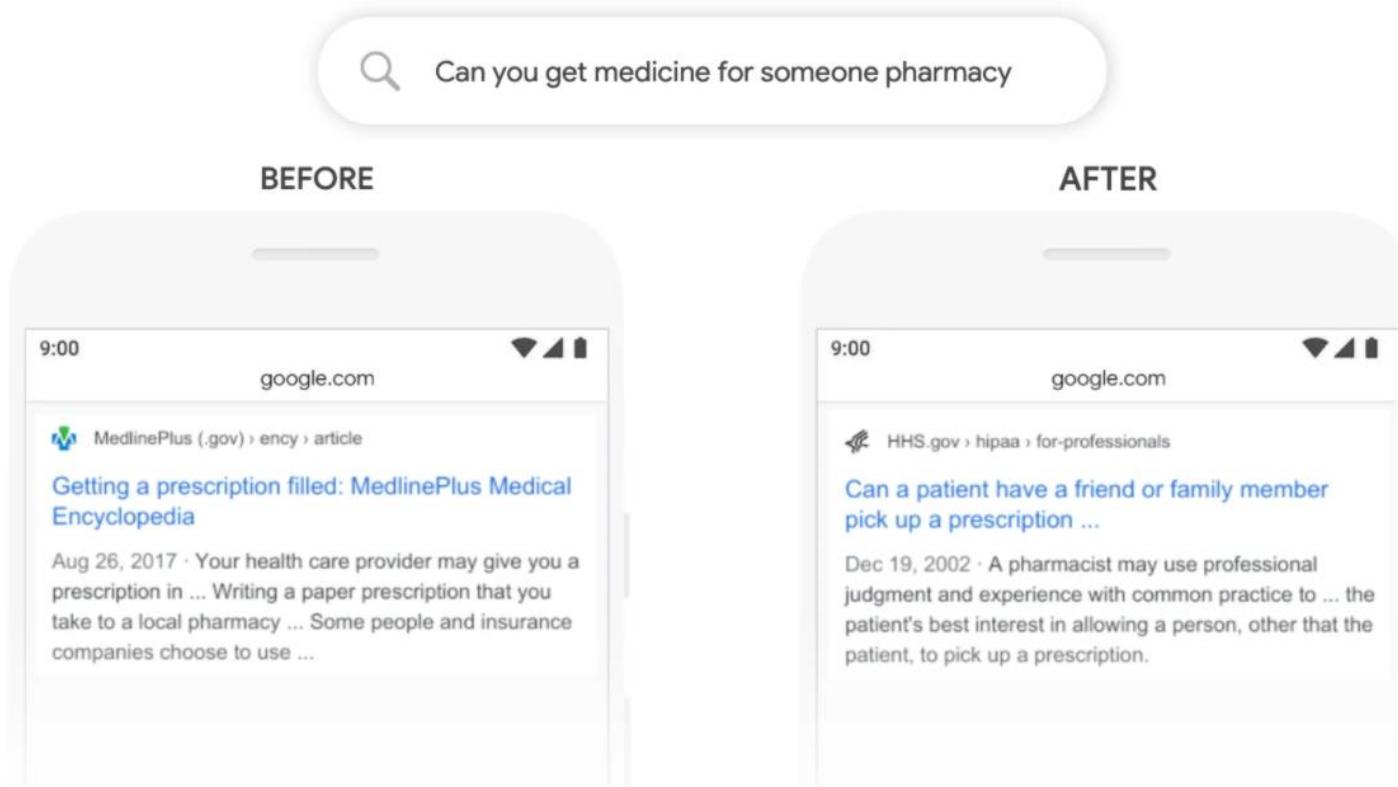
BERT Transformer, GLUE Benchmark

The General Language Understanding Evaluation (GLUE) benchmark is a collection of resources for training, evaluating, and analyzing natural language understanding systems. GLUE consists of:

- A benchmark of nine sentence- or sentence-pair language understanding tasks built on established existing datasets and selected to cover a diverse range of dataset sizes, text genres, and degrees of difficulty,
- A diagnostic dataset designed to evaluate and analyze model performance with respect to a wide range of linguistic phenomena found in natural language, and
- A public leaderboard for tracking performance on the benchmark and a dashboard for visualizing the performance of models on the diagnostic set.

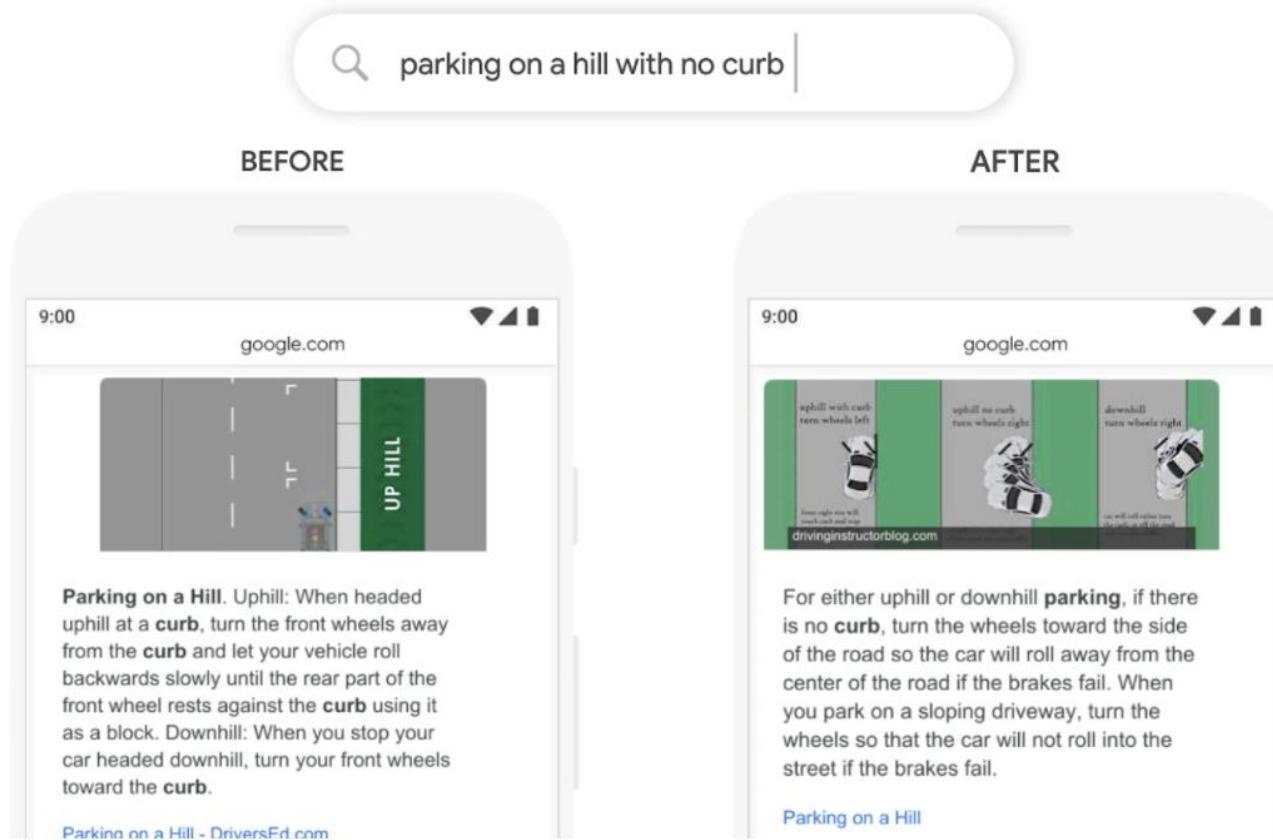
Rank	Name	Model	URL	Score	CoLA	SST-2	MRPC	STS-B	QQP	MNLI-m	M
1	DeBERTa Team - Microsoft	DeBERTa / TuringNLVRv4		90.8	71.5	97.5	94.0/92.0	92.9/92.6	76.2/90.8	91.9	
2	HFL iFLYTEK	MacALBERT + DKM		90.7	74.8	97.0	94.5/92.6	92.8/92.6	74.7/90.6	91.3	
+ 3	Alibaba DAMO NLP	StructBERT + TAPT		90.6	75.3	97.3	93.9/91.9	93.2/92.7	74.8/91.0	90.9	
+ 4	PING-AN Omni-Sinitic	ALBERT + DAAF + NAS		90.6	73.5	97.2	94.0/92.0	93.0/92.4	76.1/91.0	91.6	
5	ERNIE Team - Baidu	ERNIE		90.4	74.4	97.5	93.5/91.4	93.0/92.6	75.2/90.9	91.4	
6	T5 Team - Google	T5		90.3	71.6	97.5	92.8/90.4	93.1/92.8	75.1/90.6	92.2	
7	Microsoft D365 AI & MSR AI & GATECHMT-DNN-SMART			89.9	69.5	97.5	93.7/91.6	92.9/92.5	73.9/90.2	91.0	
+ 8	Huawei Noah's Ark Lab	NEZHA-Large		89.8	71.7	97.3	93.3/91.0	92.4/91.9	75.2/90.7	91.5	

Google Search with BERT (1/3)



"Can you get medicine for someone pharmacy": With the BERT model, we can better understand that "for someone" is an important part of this query, whereas previously we missed the meaning, showing general results about filling prescriptions.

Google Search with BERT (2/3)

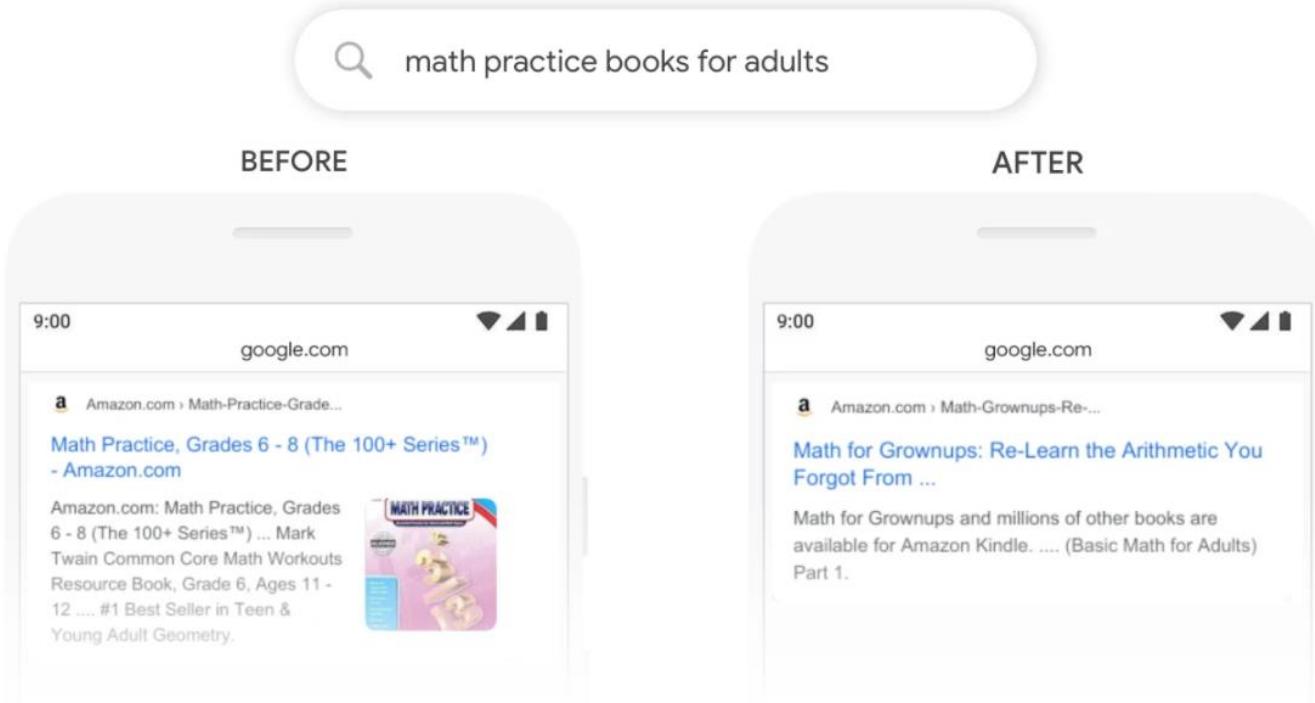


“Parking on a hill with no curb”: In the past, a query like this would confuse our systems—we placed too much importance on the word “curb” and ignored the word “no”, not understanding how critical that word was to appropriately responding to this query. So we’d return results for parking on a hill with a curb!

Google: Understanding searches better than ever before, 2019

blog.google/products/search/search-language-understanding-bert/

Google Search with BERT (3/3)



"math practice books for adults": While the previous results page included a book in the "Young Adult" category, BERT can better understand that "adult" is being matched out of context, and pick out a more helpful result.