



The Power of AI



Nancy Rademaker
International Keynote Speaker

“

AI is like **teenage sex**:
everyone talks about it, nobody
really knows how to do it, everyone
thinks everyone else is doing it, so
everyone claims they **are** doing it...

”

Source: Dan Airely



IN THIS BUILDING DURING THE SUMMER OF 1956

JOHN MCCARTHY (DARTMOUTH COLLEGE), MARVIN L. MINSKY (MIT),
 NATHANIEL ROCHESTER (IBM) AND CLAUDE SHANNON (BELL LABORATORIES)
 CONDUCTED

**THE DARTMOUTH SUMMER RESEARCH PROJECT
 ON ARTIFICIAL INTELLIGENCE**

FIRST USE OF THE TERM "ARTIFICIAL INTELLIGENCE"

FOUNDING OF ARTIFICIAL INTELLIGENCE AS A RESEARCH DISCIPLINE

*"To proceed on the basis of the conjecture
 that every aspect of learning or any other feature of intelligence
 can in principle be so precisely described that a machine can be made to simulate it."*

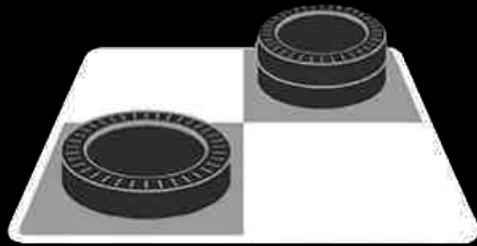
IN COMMEMORATION OF THE PROJECT'S 50th ANNIVERSARY
 JULY 13, 2006

1956



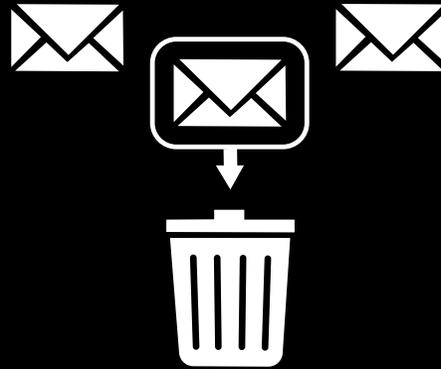
Artificial intelligence

Early artificial intelligence stirs excitement.



Machine learning

Machine learning begins to flourish.



Deep learning

Deep learning breakthroughs drive AI boom.

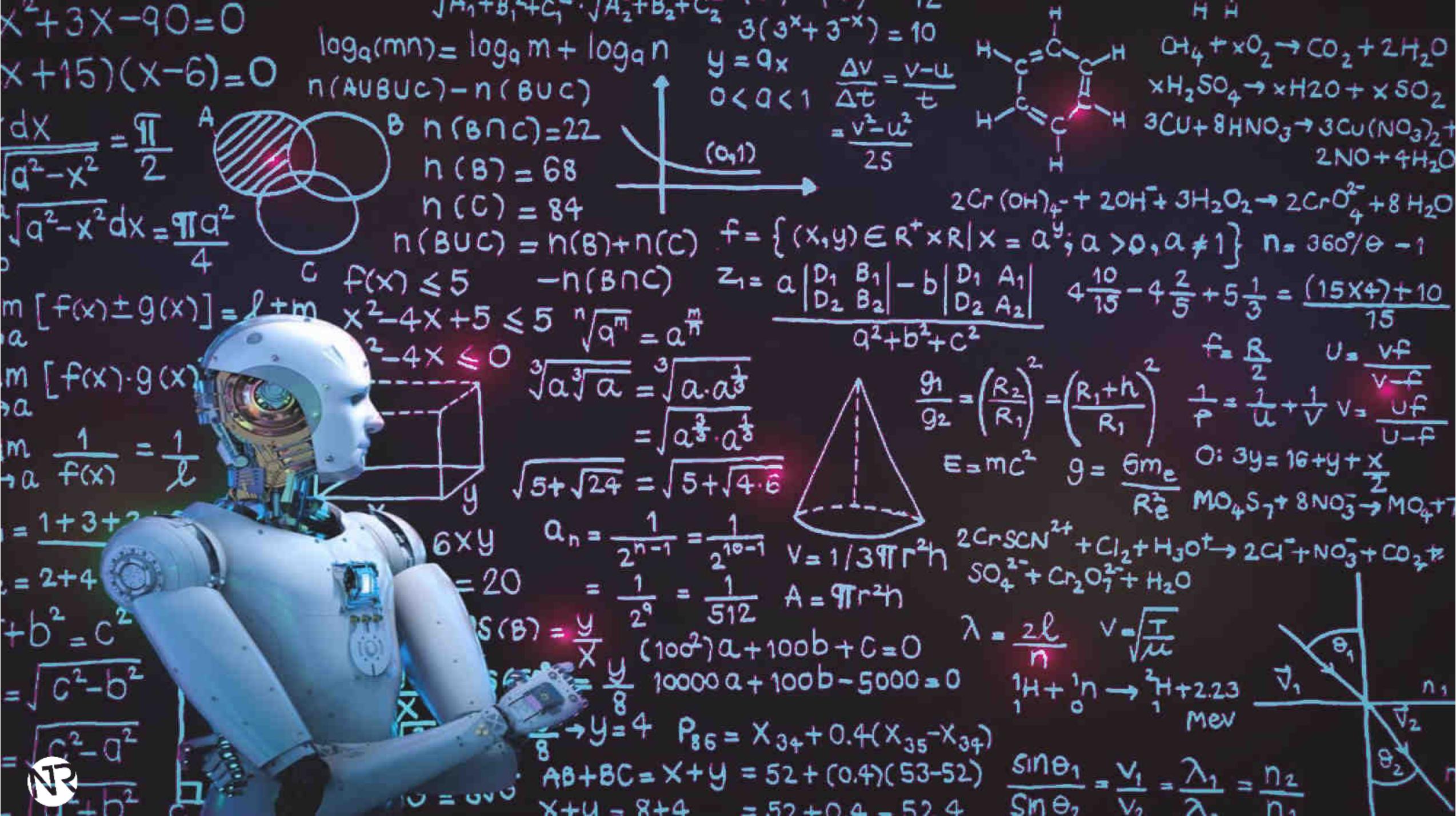


Autonomy



Adaptivity

Artificial intelligence = set of algorithms and techniques that enables computers to mimic human intelligence and the facets of human behaviour



$$x^2 + 3x - 90 = 0$$

$$(x + 15)(x - 6) = 0$$

$$\frac{dx}{\sqrt{a^2 - x^2}} = \frac{\pi}{2}$$

$$\int \sqrt{a^2 - x^2} dx = \frac{\pi a^2}{4}$$

$$m[f(x) \pm g(x)] = l \pm m$$

$$m[f(x) \cdot g(x)] = l \cdot m$$

$$m \frac{1}{f(x)} = \frac{1}{l}$$

$$= 1 + 3 + 2$$

$$= 2 + 4$$

$$+ b^2 = c^2$$

$$= \sqrt{c^2 - b^2}$$

$$= \sqrt{c^2 - a^2}$$

$$= \sqrt{c^2 - b^2}$$

$$\log_a(mn) = \log_a m + \log_a n$$

$$n(A \cup B \cup C) - n(B \cup C)$$

$$n(B \cap C) = 22$$

$$n(B) = 68$$

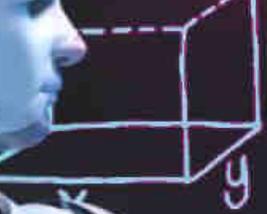
$$n(C) = 84$$

$$n(B \cup C) = n(B) + n(C)$$

$$f(x) \leq 5$$

$$x^2 - 4x + 5 \leq 5$$

$$x^2 - 4x \leq 0$$



$$6xy$$

$$= 20$$

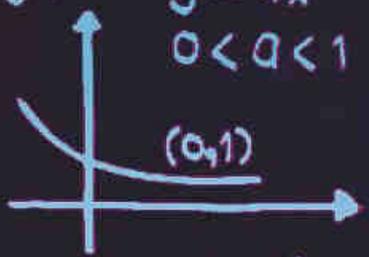
$$S(B) = \frac{y}{x}$$

$$= \frac{y}{8}$$

$$\frac{y}{8} \rightarrow y = 4$$

$$AB + BC = x + y = 52 + (0.4)(53 - 52)$$

$$x + y = 8 + 4 = 52 + 0.4 = 52.4$$



$$3(3^x + 3^{-x}) = 10$$

$$y = a^x$$

$$0 < a < 1$$

$$\frac{\Delta v}{\Delta t} = \frac{v - u}{t}$$

$$= \frac{v^2 - u^2}{2S}$$

$$f = \{(x, y) \in \mathbb{R}^+ \times \mathbb{R} \mid x = a^y, a > 0, a \neq 1\}$$

$$z_1 = \frac{a \begin{vmatrix} D_1 & B_1 \\ D_2 & B_2 \end{vmatrix} - b \begin{vmatrix} D_1 & A_1 \\ D_2 & A_2 \end{vmatrix}}{a^2 + b^2 + c^2}$$

$$4 \frac{10}{15} - 4 \frac{2}{5} + 5 \frac{1}{3} = \frac{(15 \times 4) + 10}{15}$$

$$\sqrt[3]{a^3 a} = \sqrt[3]{a \cdot a^3}$$

$$= \sqrt[3]{a^3 \cdot a^3}$$

$$\sqrt{5 + \sqrt{24}} = \sqrt{5 + \sqrt{4 \cdot 6}}$$

$$a_n = \frac{1}{2^{n-1}} = \frac{1}{2^{10-1}}$$

$$= \frac{1}{2^9} = \frac{1}{512}$$

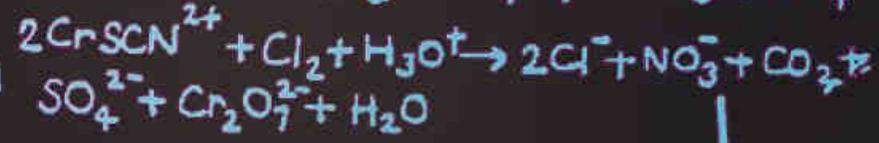
$$V = \frac{1}{3} \pi r^2 h$$

$$A = \pi r^2 h$$

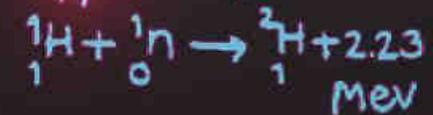


$$\frac{g_1}{g_2} = \left(\frac{R_2}{R_1}\right)^2 = \left(\frac{R_1 + h}{R_1}\right)^2$$

$$E = mc^2 \quad g = \frac{6m_e}{R_e^2}$$

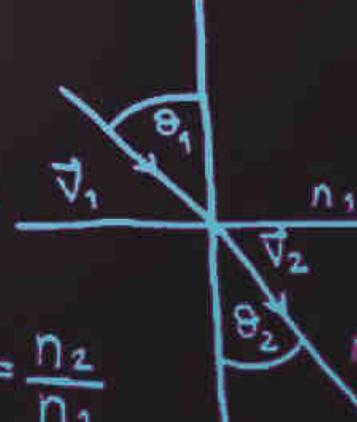
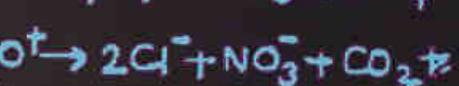
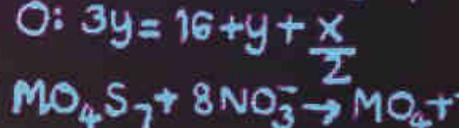


$$\lambda = \frac{2l}{n} \quad v = \sqrt{\frac{T}{\mu}}$$



$$\frac{\sin \theta_1}{v_1} = \frac{\lambda_1}{v_2} = \frac{\lambda_1}{\lambda_2} = \frac{n_2}{n_1}$$

$$\frac{1}{p} = \frac{1}{u} + \frac{1}{v} \quad v = \frac{uf}{u-f}$$



MACHINE LEARNING

=

PATTERNS

Techniques to allow statistical analysis of data to **find patterns** that computers **could not see before.**



Patterns



“Is this car going to turn right?”



“Is there a dog in this picture?”



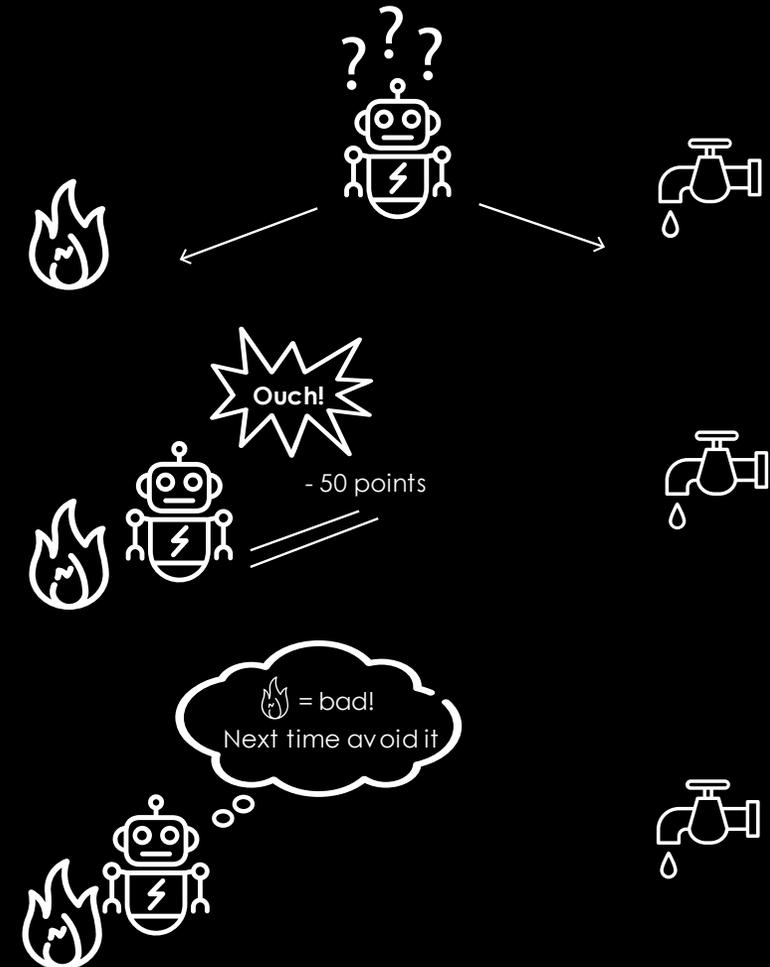
“Is this customer going to extend his subscription?”



“Will this patient develop prostate cancer?”

How machines learn

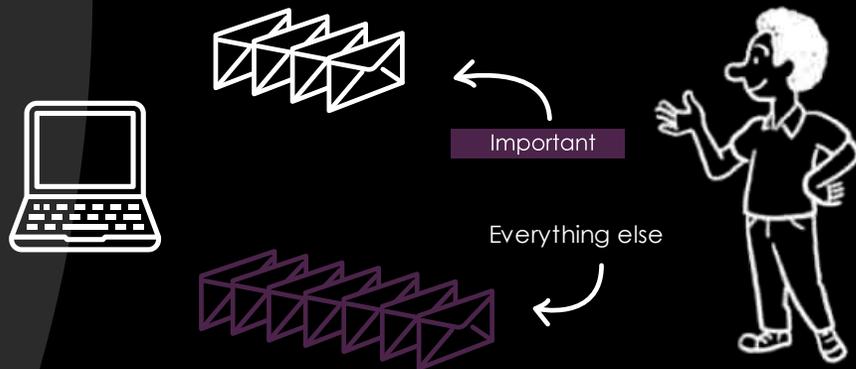
Reinforcement learning



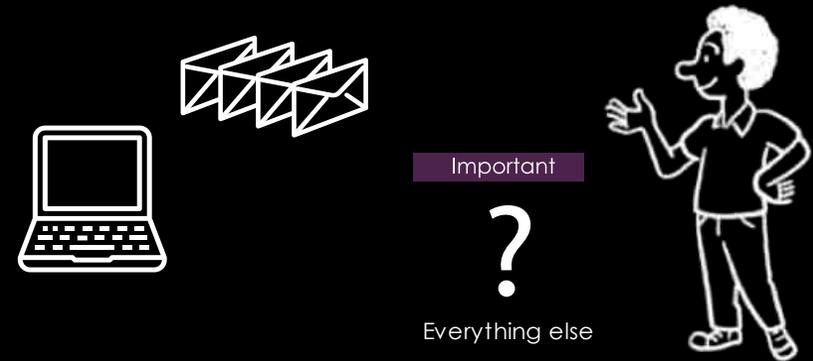
How machines learn

Supervised learning

Training the machine (model)



Ask the machine to predict?



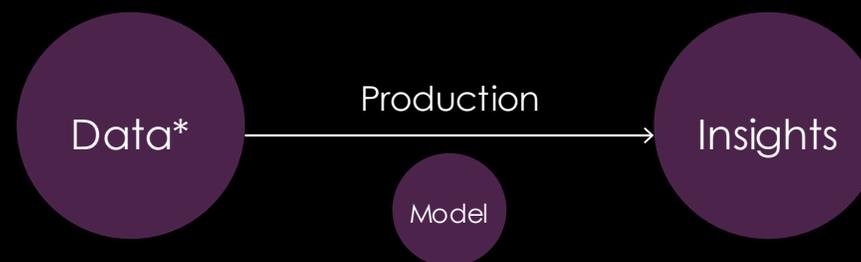
How machines learn

Supervised learning

Create a model **automatically** from examples.

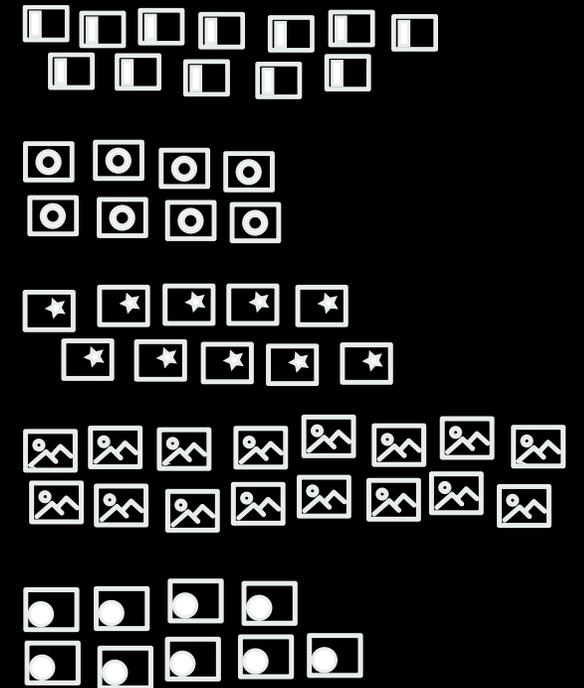
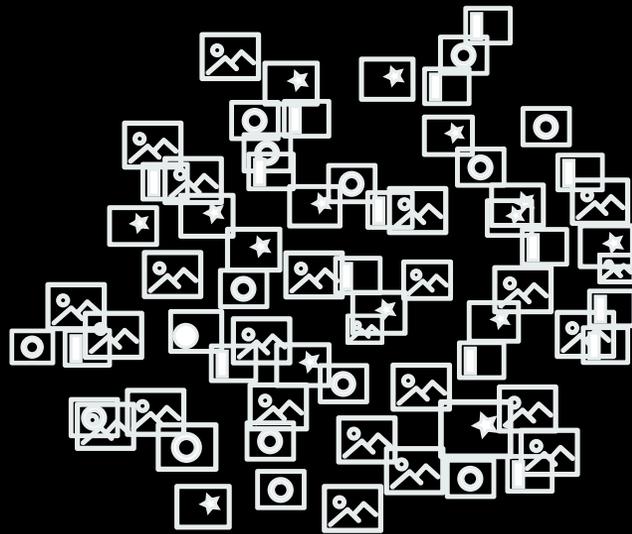


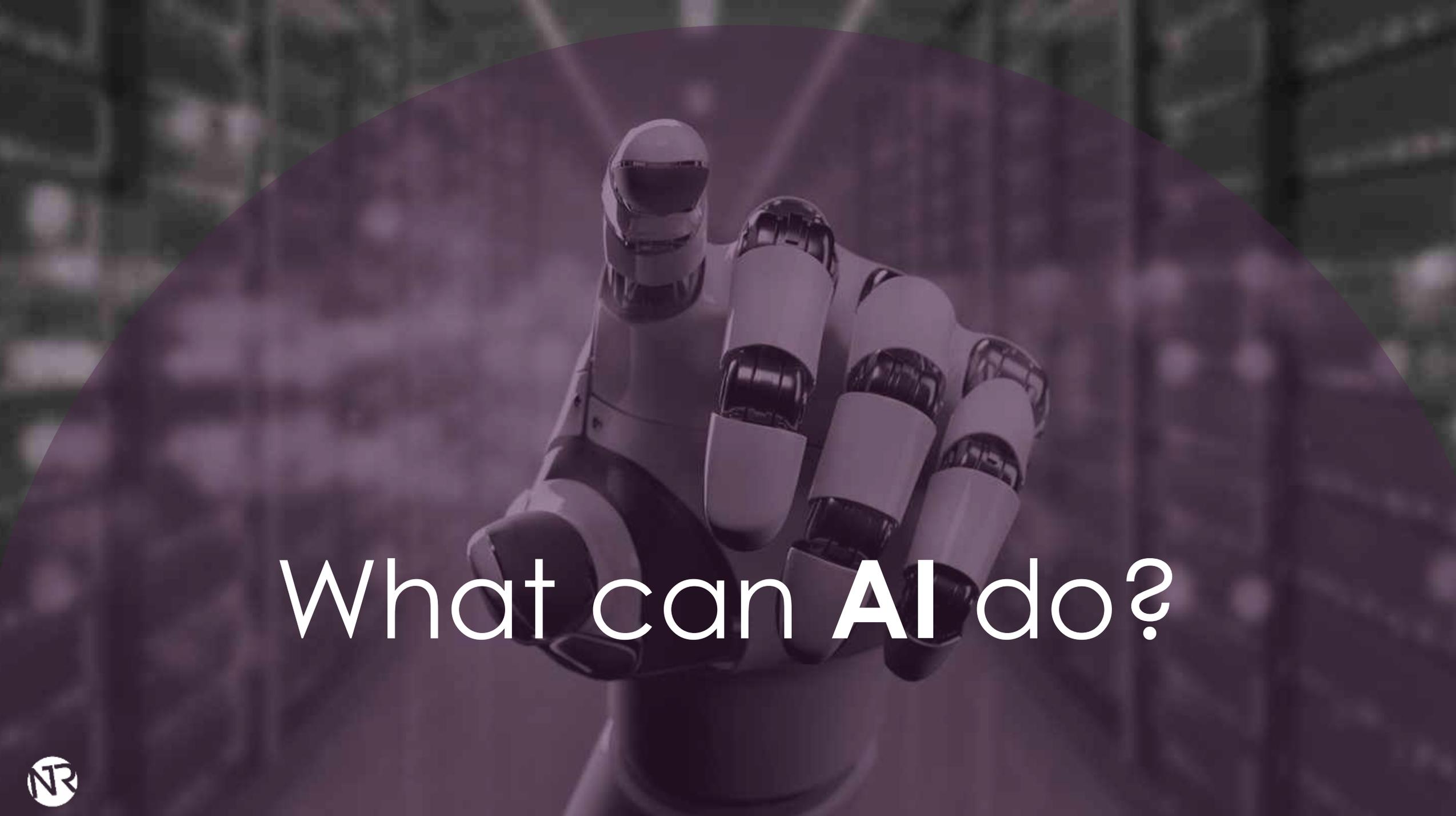
Use the model to make **predictions** about new data.



How machines learn

Unsupervised learning





What can **AI** do?

It is not
hocus pocus



It is just POCUS

- P**redictions
- O**bject recognition
- C**reating content
- U**nderstanding people
- S**elf-moving objects





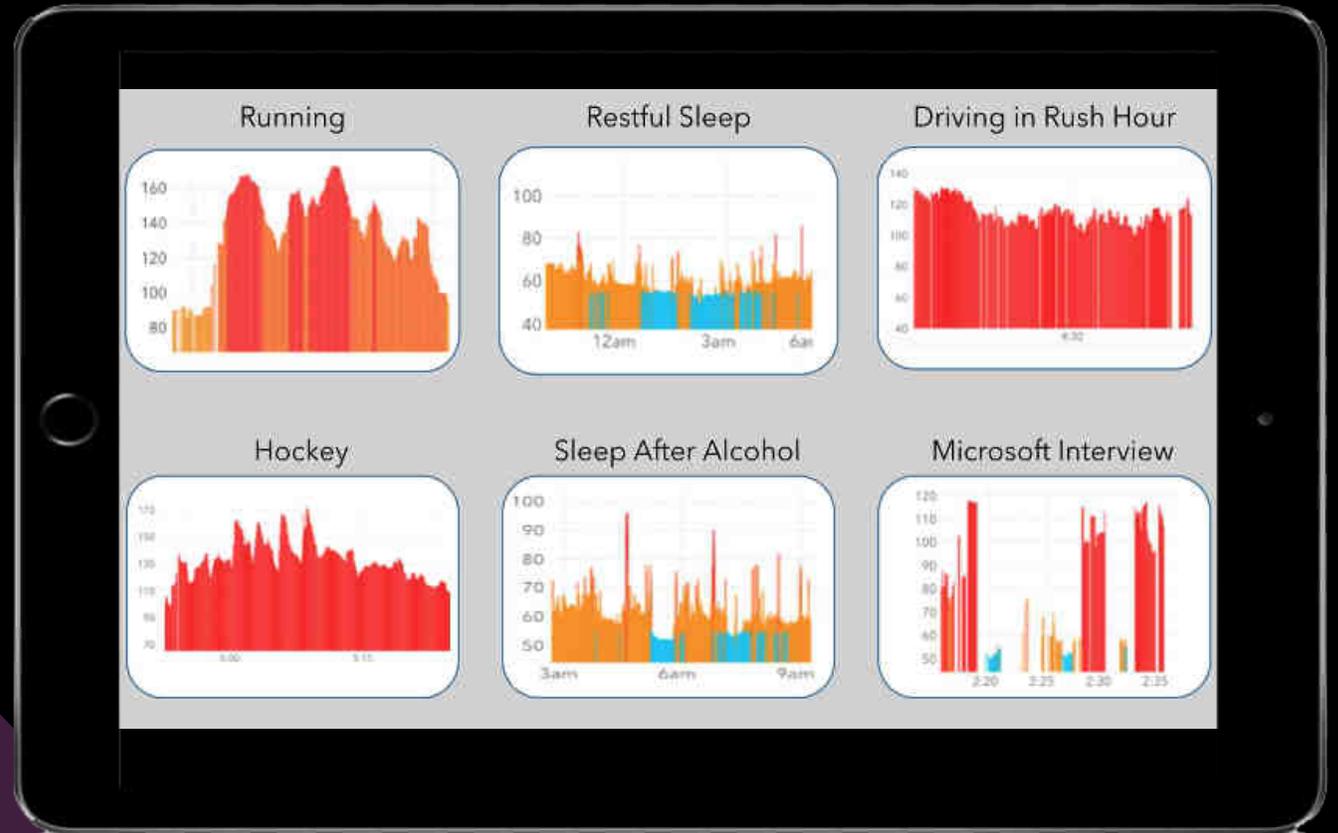


Temperature
affecting sales





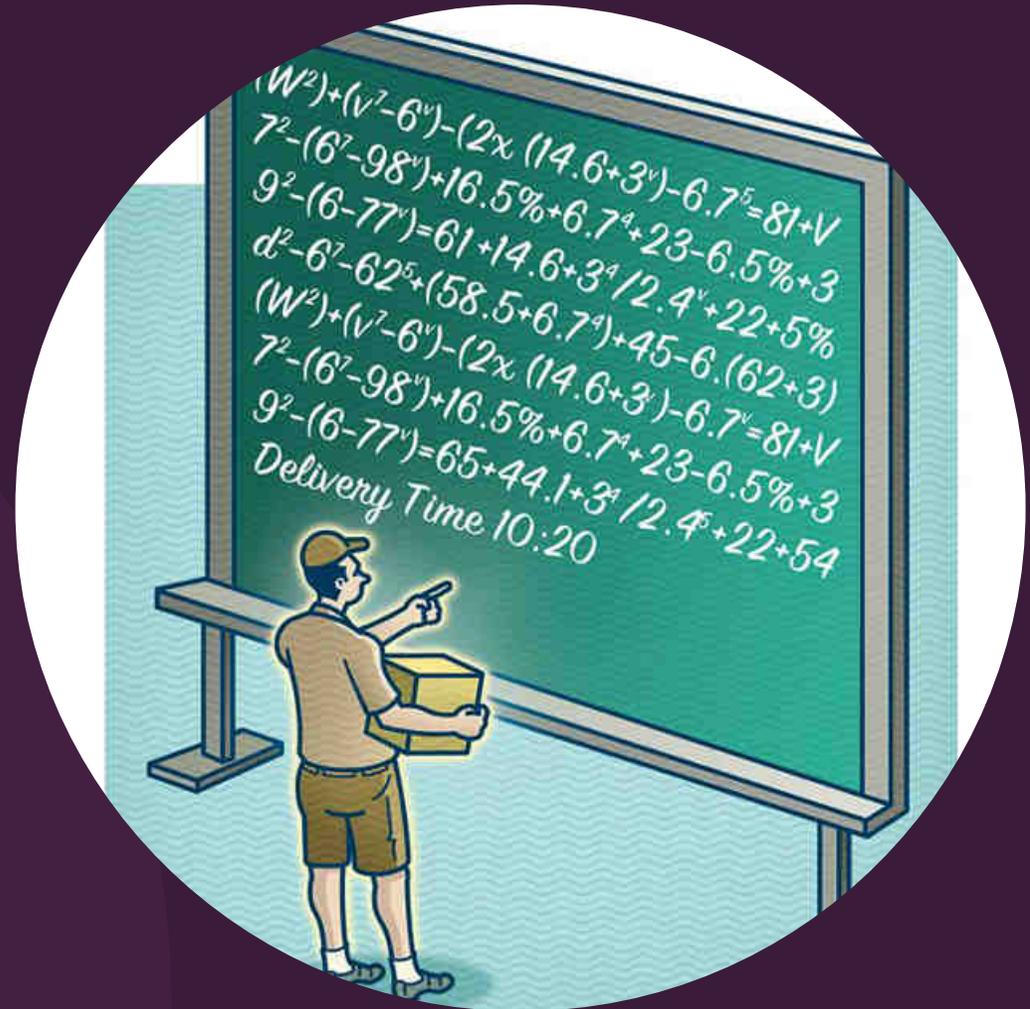
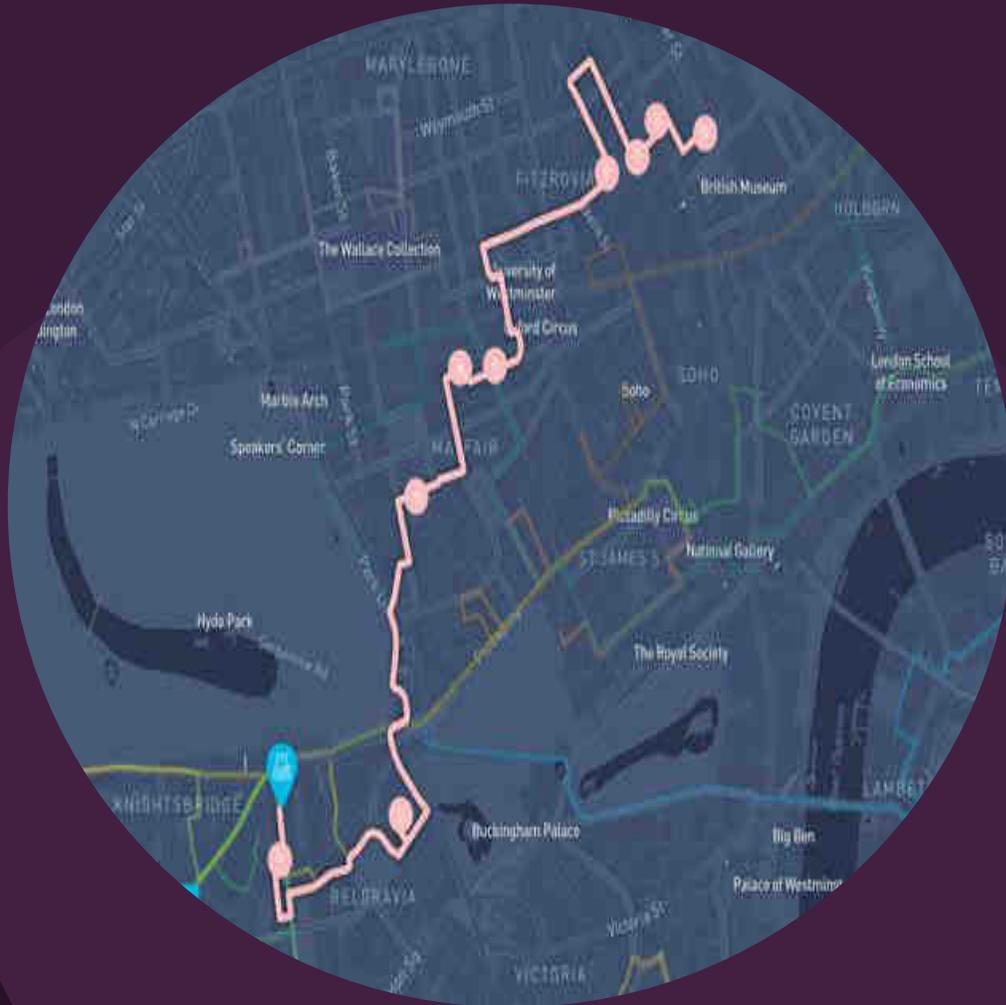
cardiogram



What is your **heart** telling you?



Optimize routes



Predictive Ordering





“A new standard of beauty for lending”

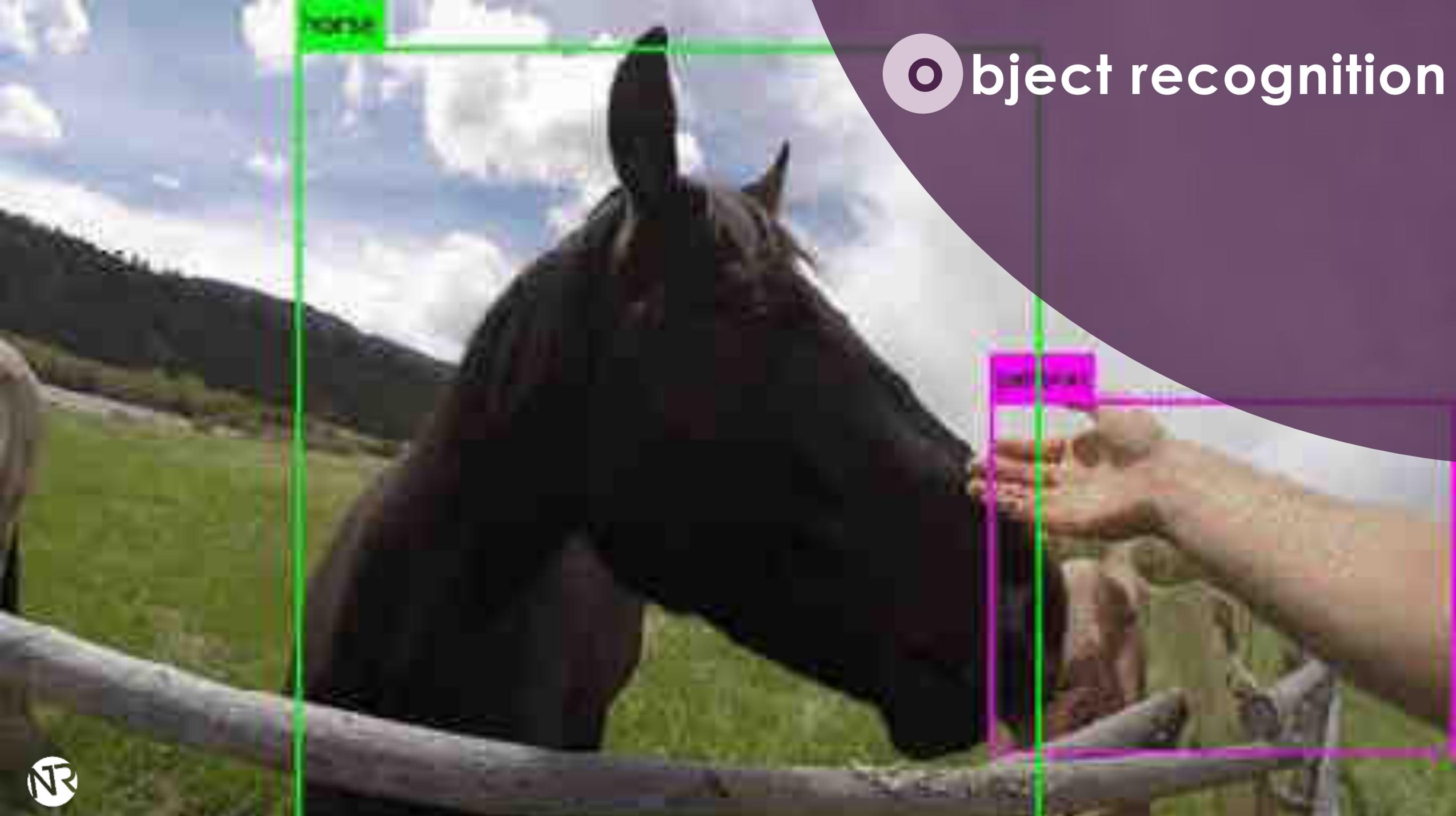
Ke Jiao

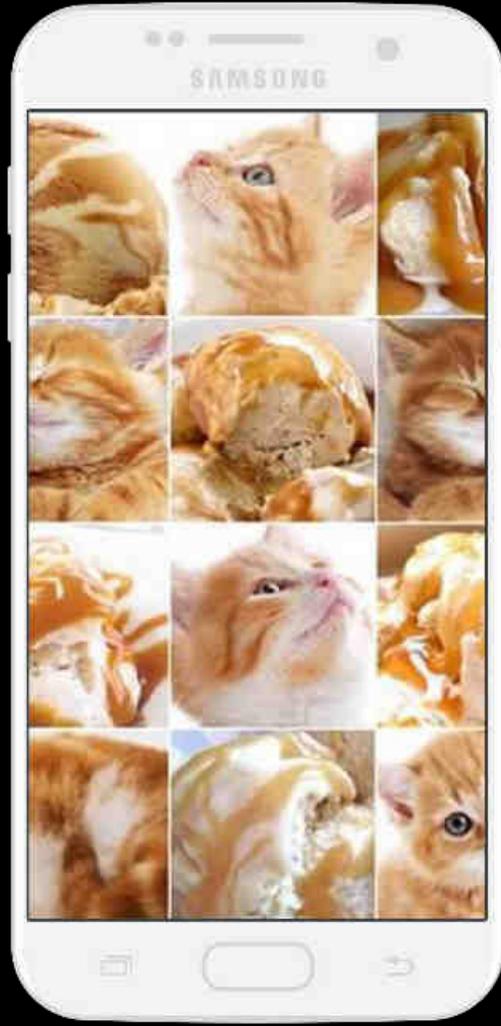


AI is strong at weak features



Object recognition



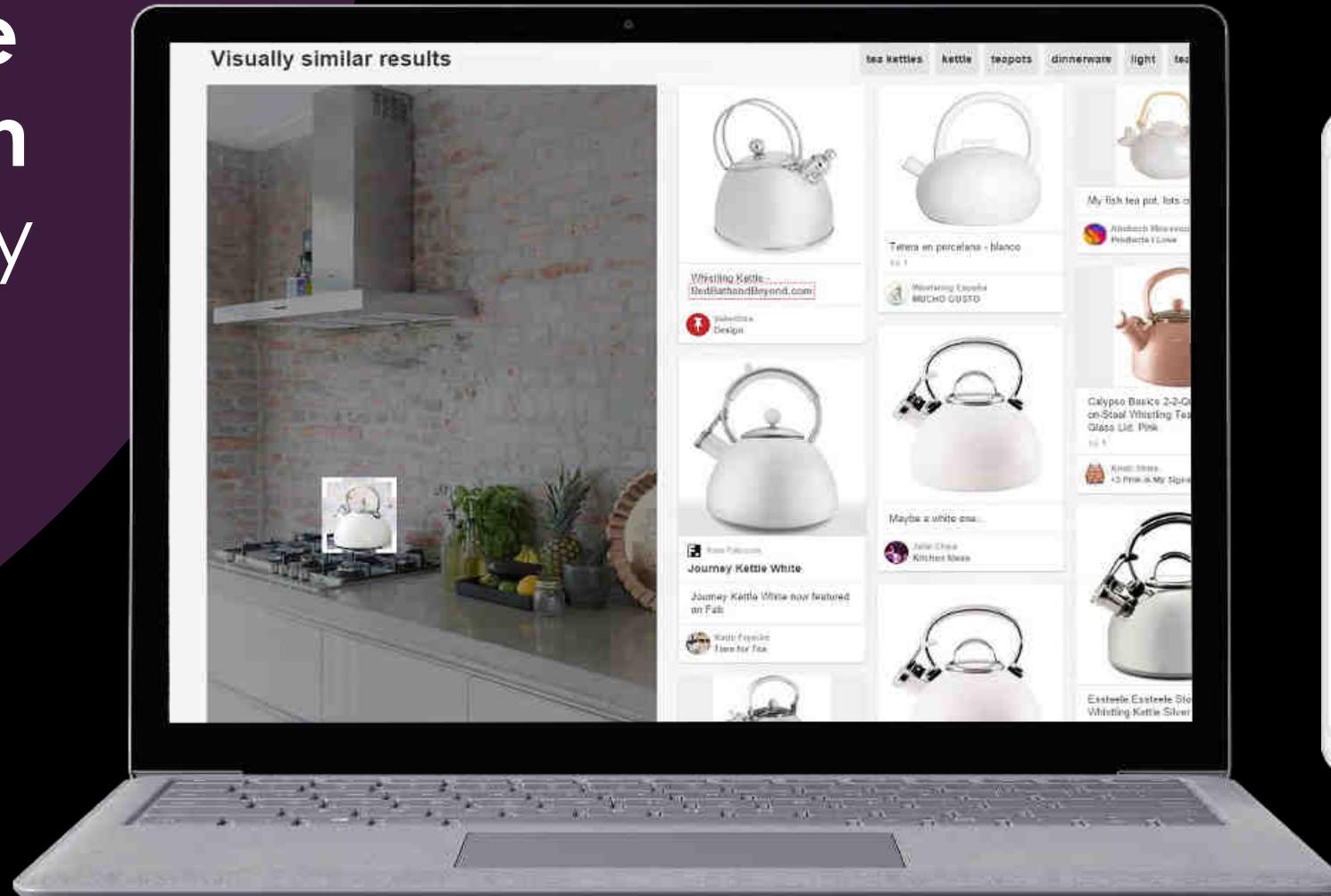


Autonomous cars

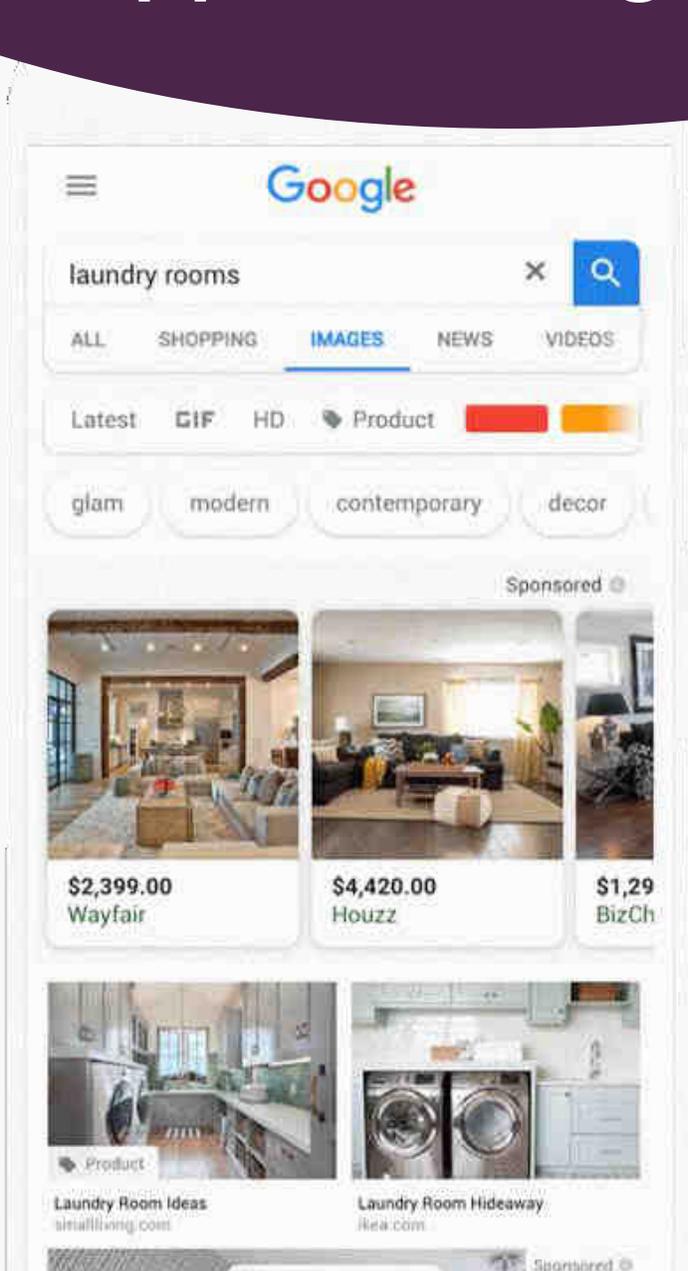
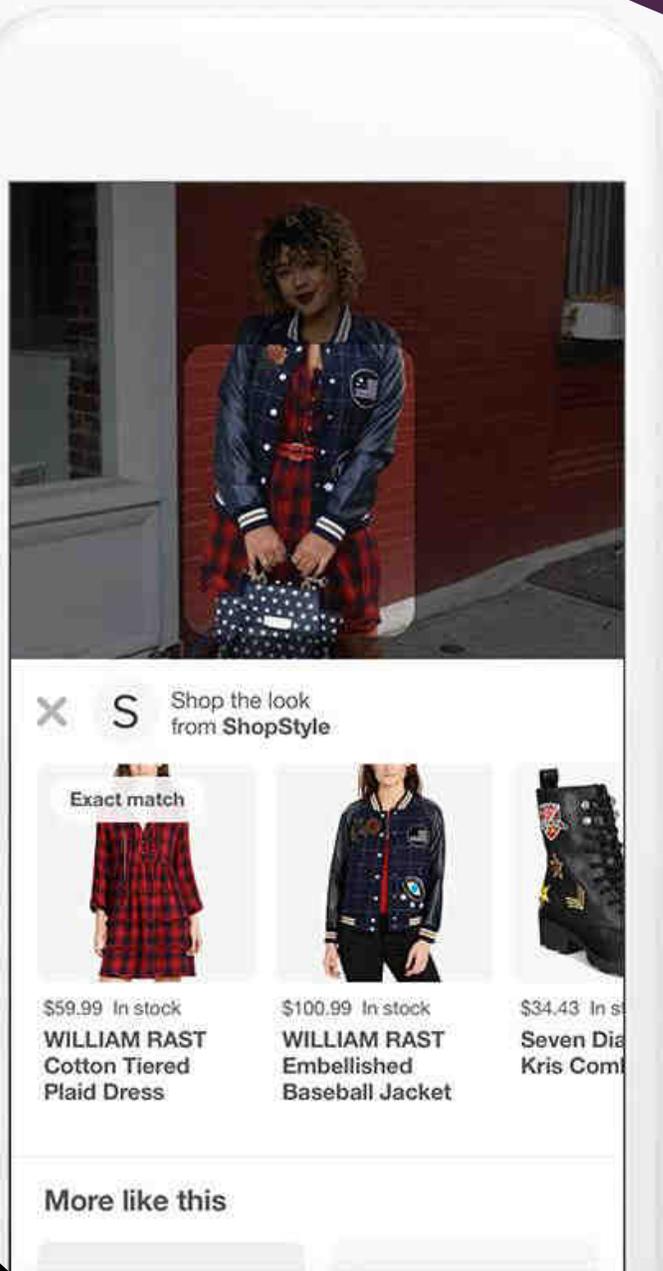
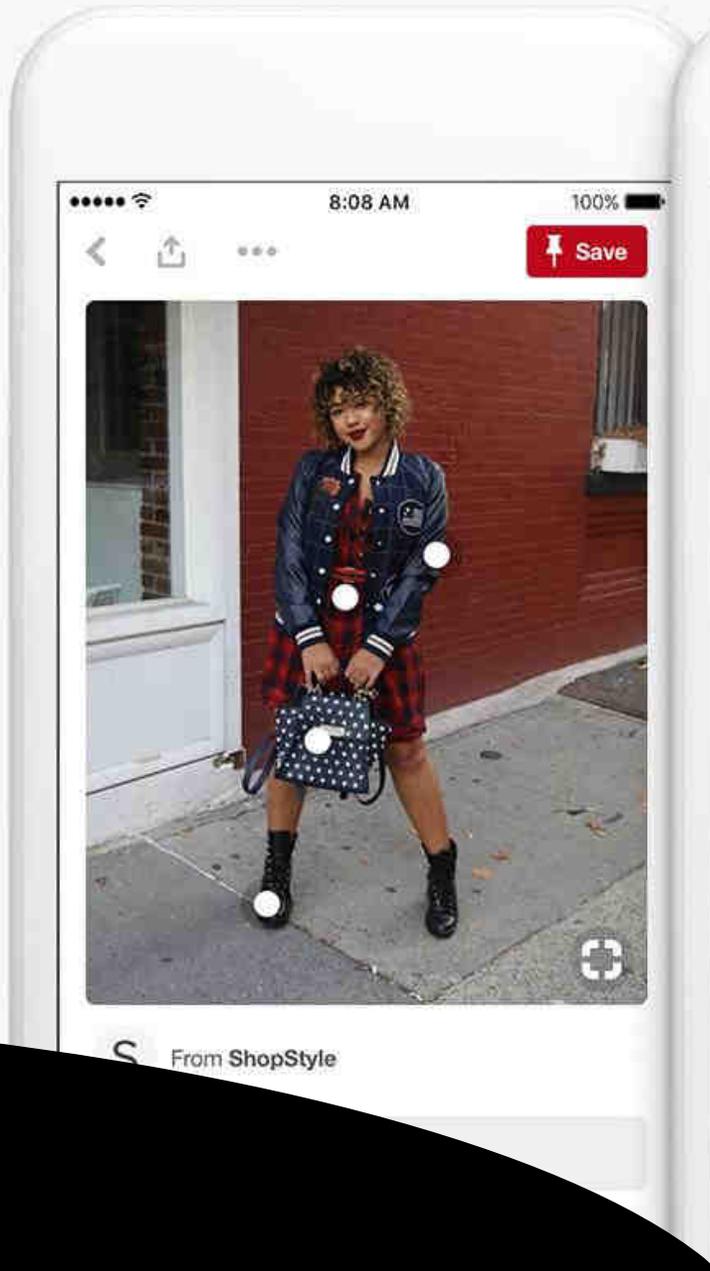


-  = PROCESSING OBJECT ID
-  = CAUTIONARY OBJECT
-  = STATIONARY OBJECT
-  = MOVING OBJECT
-  = TRIVIAL OBJECT

Applications with **image recognition** technology inside



Shoppable images



Precision agriculture:

TRACTORS FERTILIZE INDIVIDUAL
PLANTS, NOT WHOLE FIELDS



The robot will help you now...

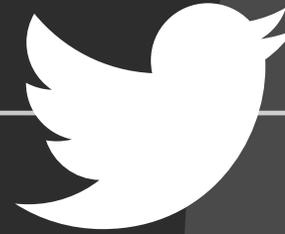




Creating content

Gartner Predicts by 2022:
*20% of all business content will
be generated by algorithms*





> 体育 > 正文

奥运乒乓女团半决赛 德国队(单晓娜/索尔加/韩英)3:2顺利晋级下一轮

AI小记者Xiaomingbot 2016-08-15 10:27

北京时间8月15日06:30时, 2016里约奥运会结束了奥运会乒乓球女子团体半决赛的激烈争夺。经过5场大战精彩而又令人紧张的角逐, 单晓娜/索尔加/韩英的德国队以3:2的成绩击败日本队, 顺利晋级下一轮。



奥运AI小记者Xiaomingbot

基于大数据分析, 自然语言理解和深度学习的人工智能机器人

已订阅

奥运乒乓女团半决赛 德国队(单晓娜/索尔加/韩英)3:2顺利晋级下一轮

奥运会羽毛球混双四分之一决赛 郑玄浩/李晋熙(中国)2-0韩国组合 轻松取胜

奥运会羽毛球女单小组赛 布拉那巴诺力克 斯特-普奥-高内



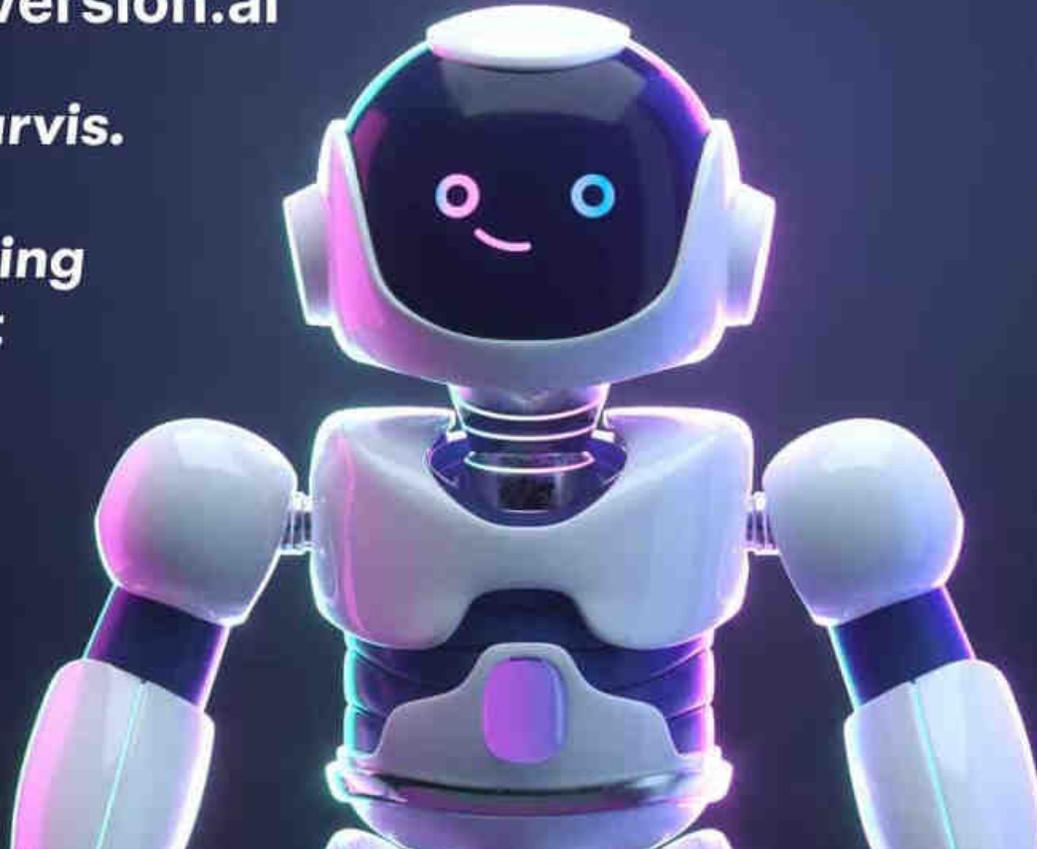
Post Olympics @wpolympicbot
Jiyeon Kim #KOR 🇰🇷 wins fencing gold in women's individual sabre, beating Sofya Velikaya #RUS 🇷🇺.

Post Olympics @wpolympicbot
Medal Leaderboard
1. #USA 🇺🇸: 46 G, 28 S, 29 B
2. #CHN 🇨🇳: 38 G, 30 S, 21 B
3. #GBR 🇬🇧: 29 G, 17 S, 19 B





**Hi, I'm Jarvis.
Your AI
copywriting
assistant**





Source A: gender, age, hair length, glasses, pose



Source B:
everything
else

Result of combining A and B

Fuelling creativity using musical AI

We're developing musical artificial intelligence to
build tools for creative people

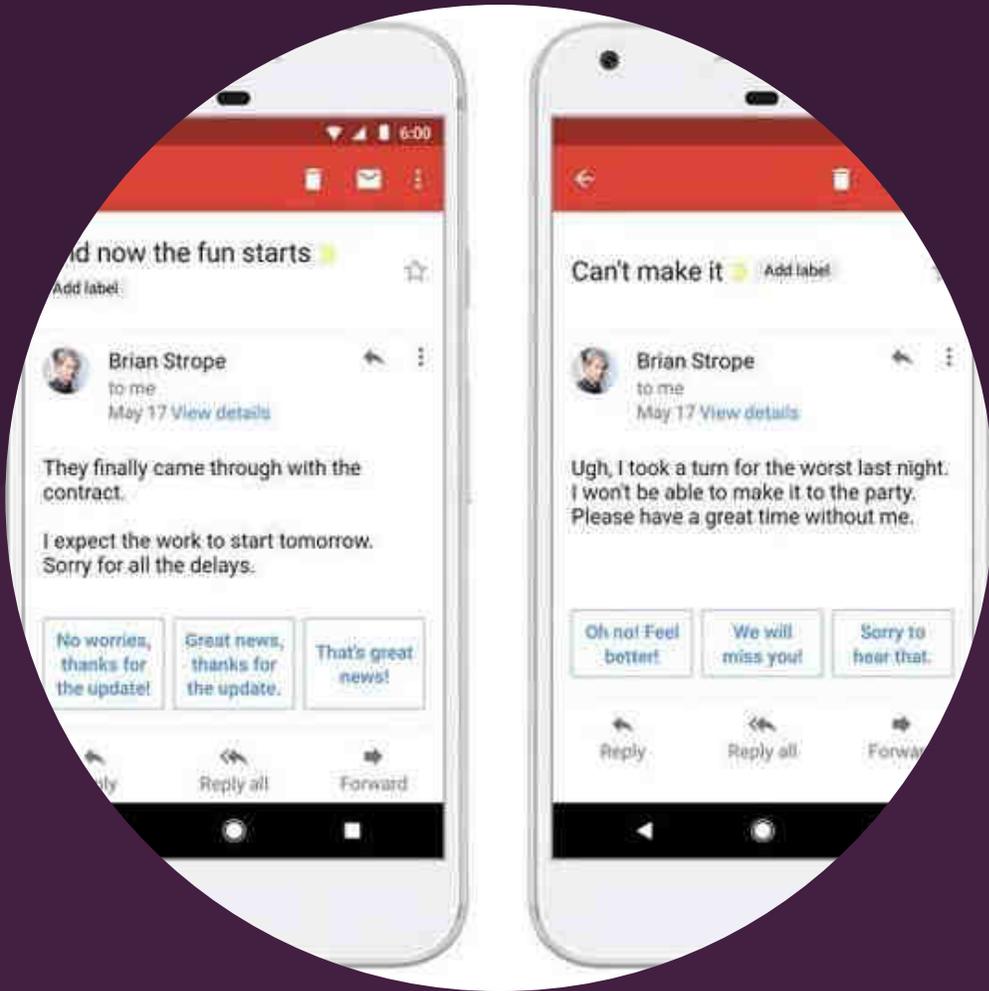




Understanding people

Natural Language

Emotions



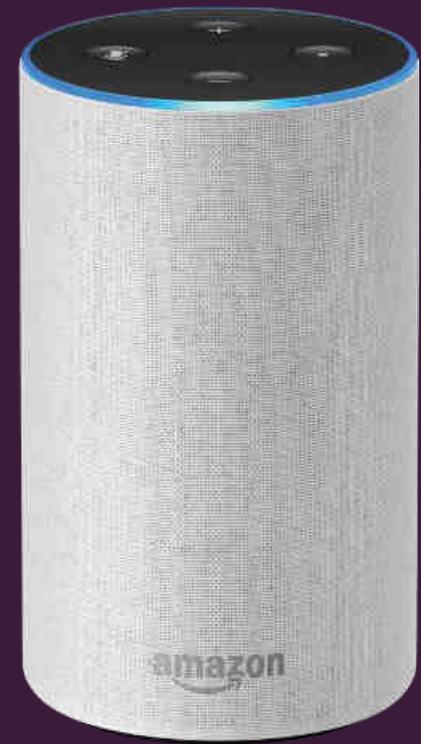
Smart replies



Real-time translation



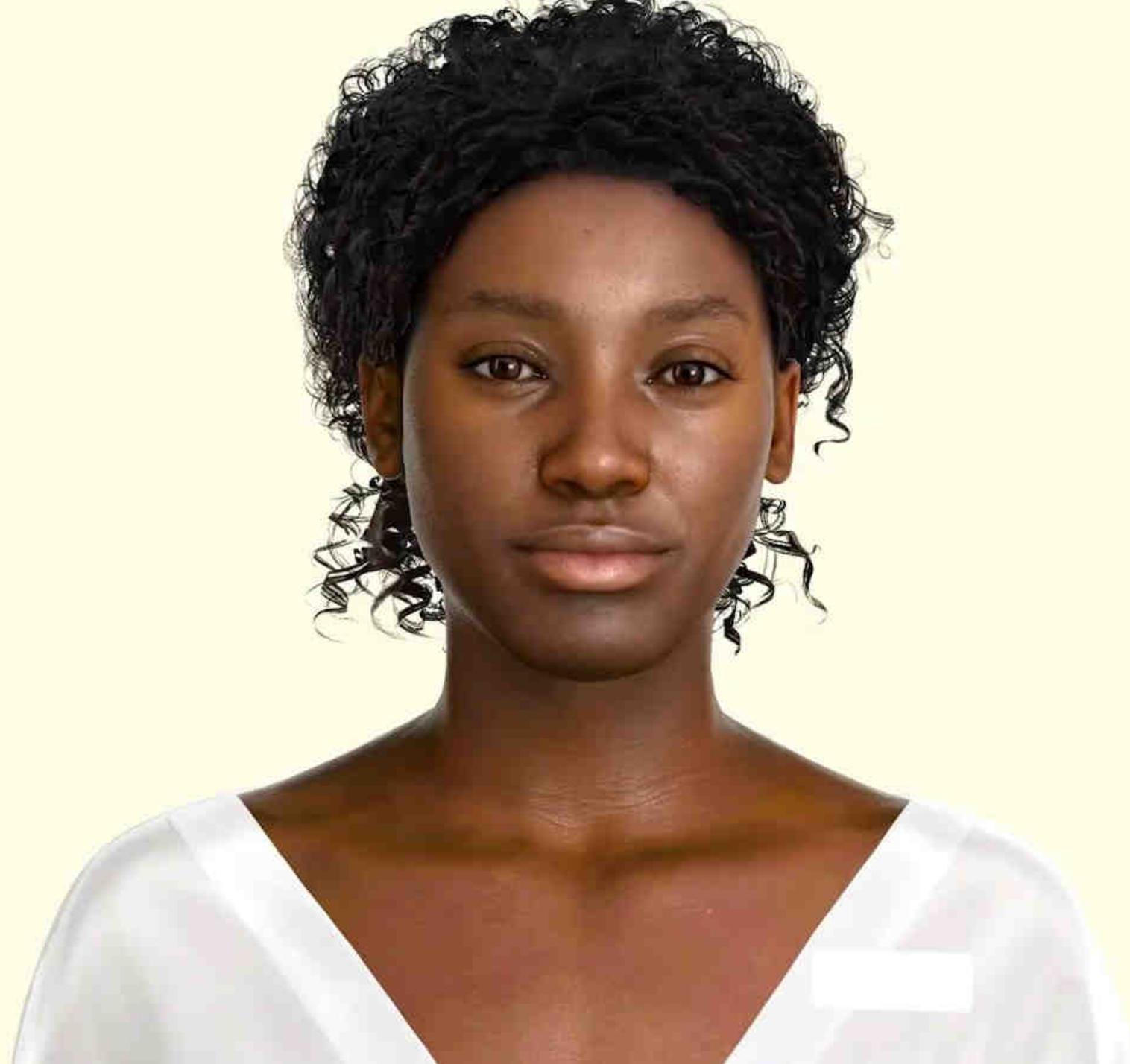
Google AR





 **MEDIA LABS**

IN PARTNERSHIP WITH 





FACE

- Skin
- Makeup
- Teeth

HAIR

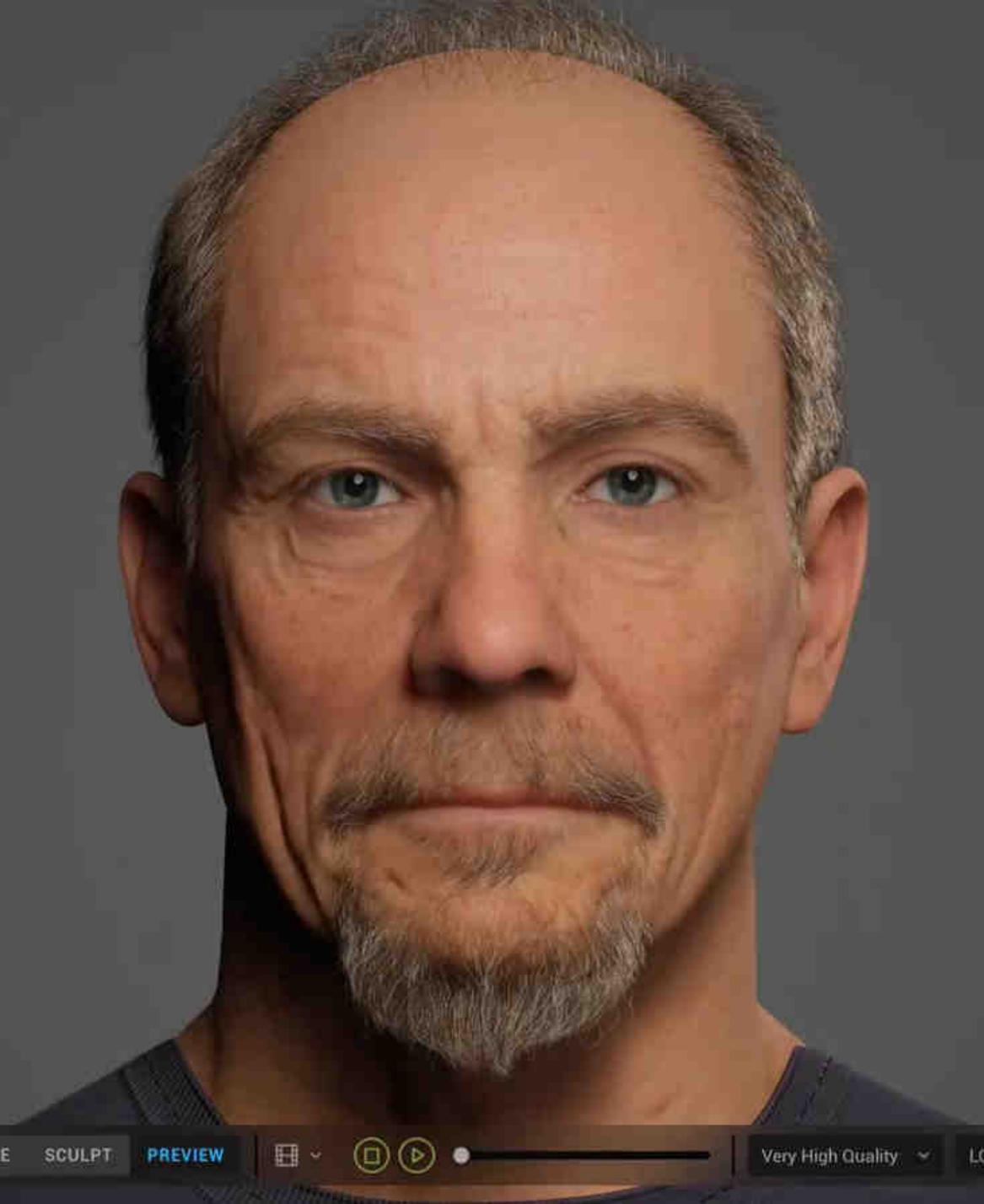
- Head
- Beard
- Mustache

EYES

- Eye Color
- Eyelashes
- Eyebrows

BODY

- Body Shape
- Tops
- Bottoms
- Shoes



BLEND

MOVE

SCULPT

PREVIEW



Very High Quality

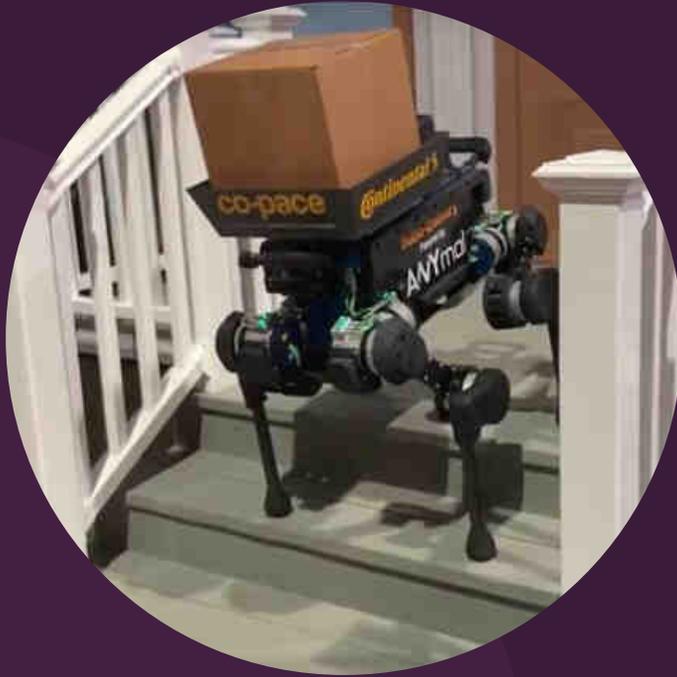
LOD 0

Face

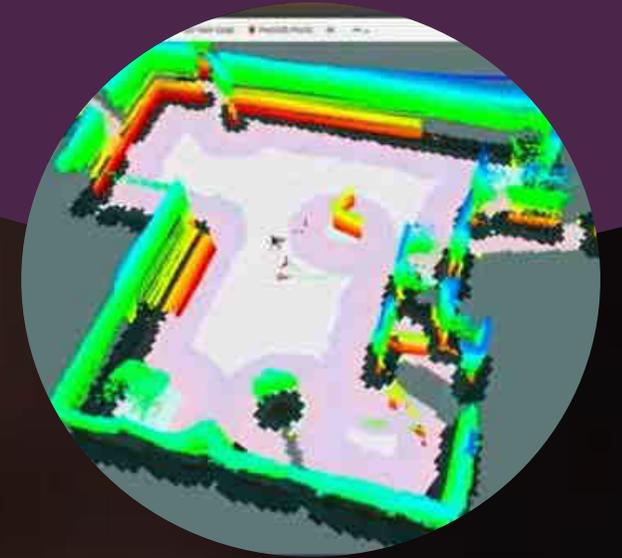


s self-moving objects





Saving Lives







- p**redictions
- o**bject recognition
- c**reating content
- u**nderstanding people
- s**elf-moving objects





WTF?
What's the Future?

BCI



VR



AR





**If you think “going forward” it will move forward.
If you want it to move to the right or to the left,
it will move from the left or right.**

BCI





Virtual reality





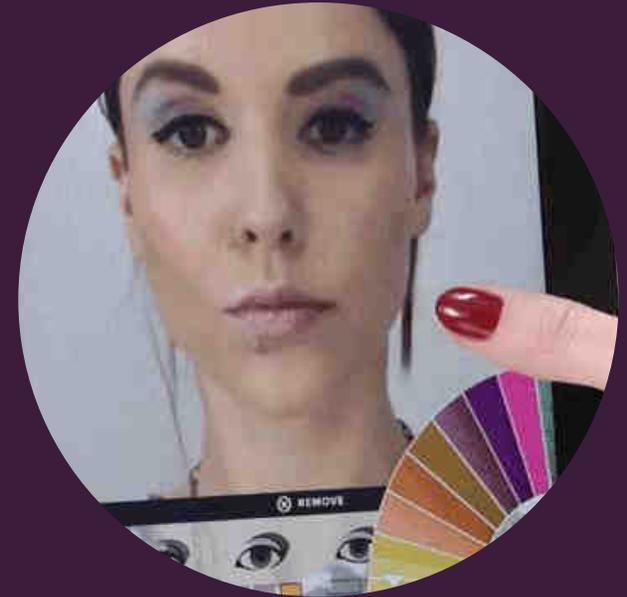
Try before you buy





Augmented reality





A silhouette of a person stands with their arms outstretched, facing a dramatic sunset sky. The sky is filled with clouds illuminated in shades of orange, red, and purple. A large, white, semi-circular shape is overlaid on the upper right portion of the image. In the foreground, there are dark silhouettes of grass and a car. The overall mood is contemplative and open.

**what could
possibly go wrong?**



TRAINING DATASETS



A herd of sheep grazing on a lush green hillside

Tags: grazing, sheep, mountain, cattle, horses



A close up of a lush green field

Tags: grass, field, sheep, standing, rainbow, man

The photo you want to upload does not meet our criteria because:

Please

You

- Subject eyes are closed

Check the photo [...](#)

Read more about [common photo problems and how to resolve them](#).

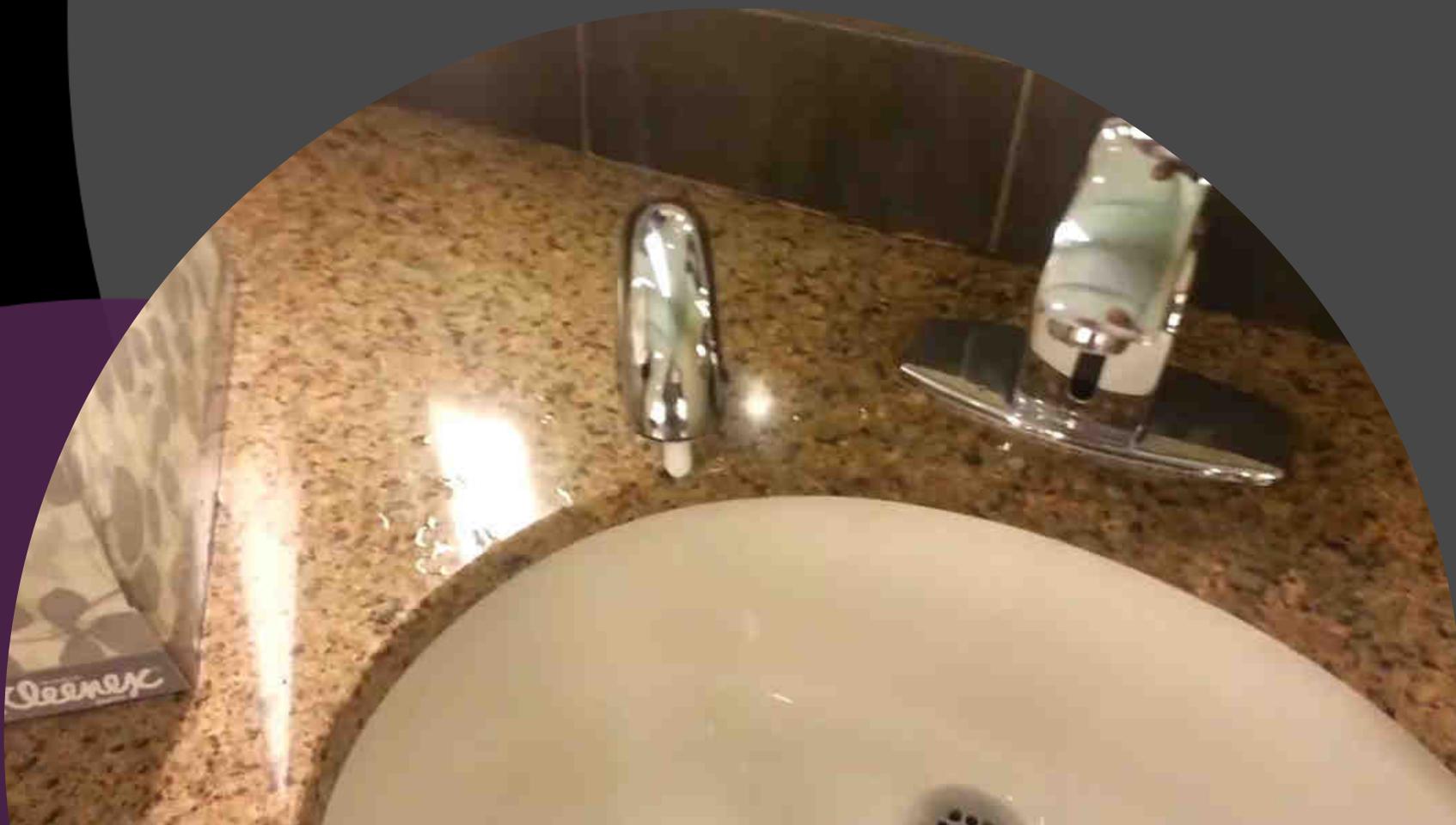
After your tenth attempt you will need to start again and re-enter the CAPTCHA security check.

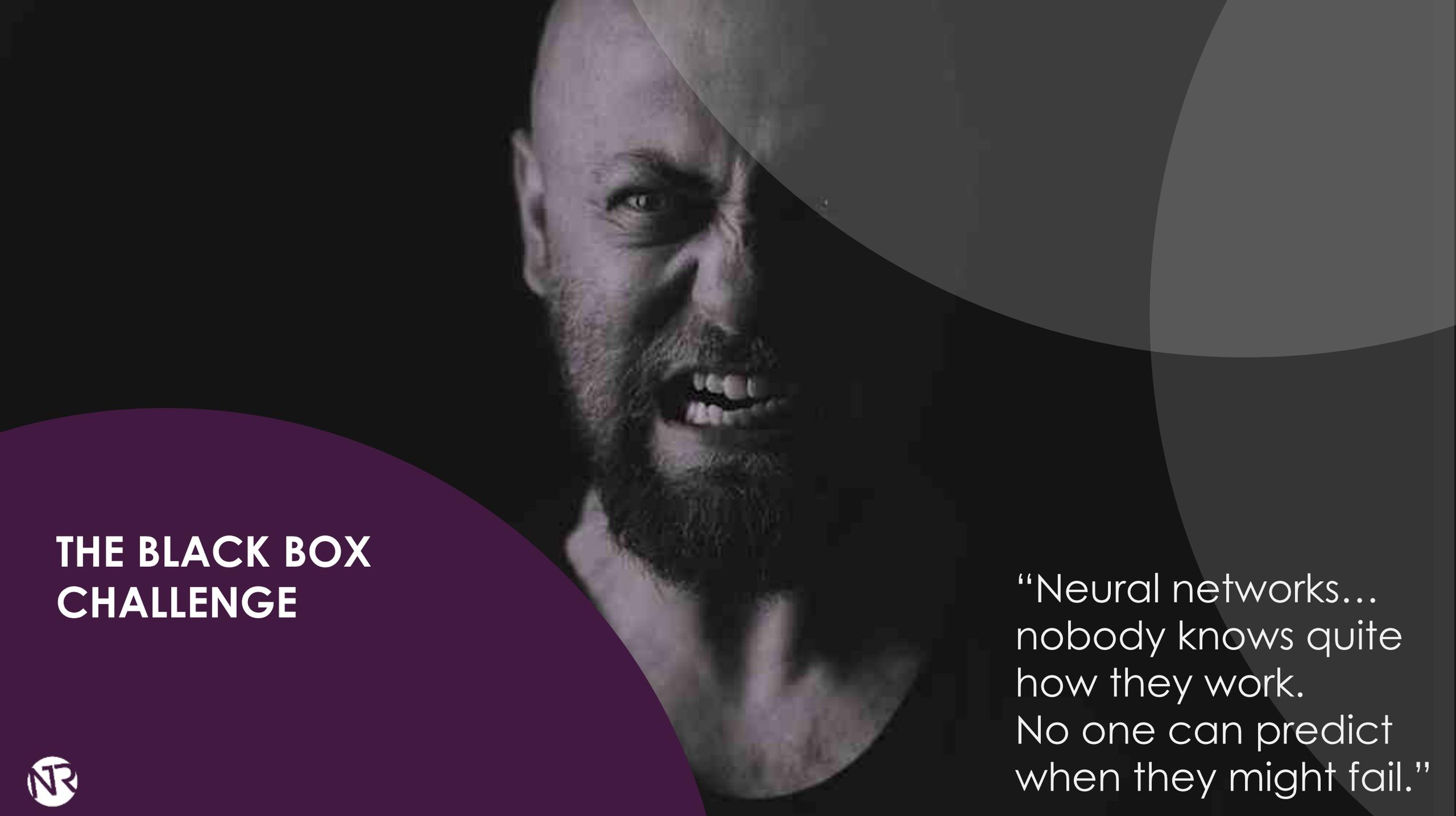
Reference number: 20161206-81

Filename: Untitled.jpg

If you wish to [contact us](#) about the photo, you







THE BLACK BOX CHALLENGE

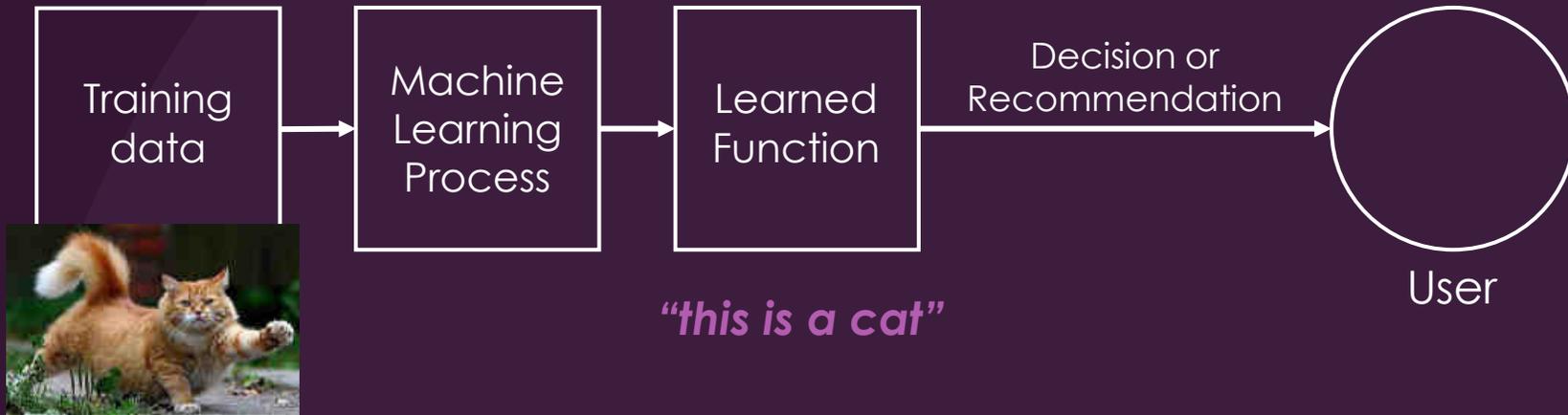
“Neural networks...
nobody knows quite
how they work.
No one can predict
when they might fail.”



Explainable AI

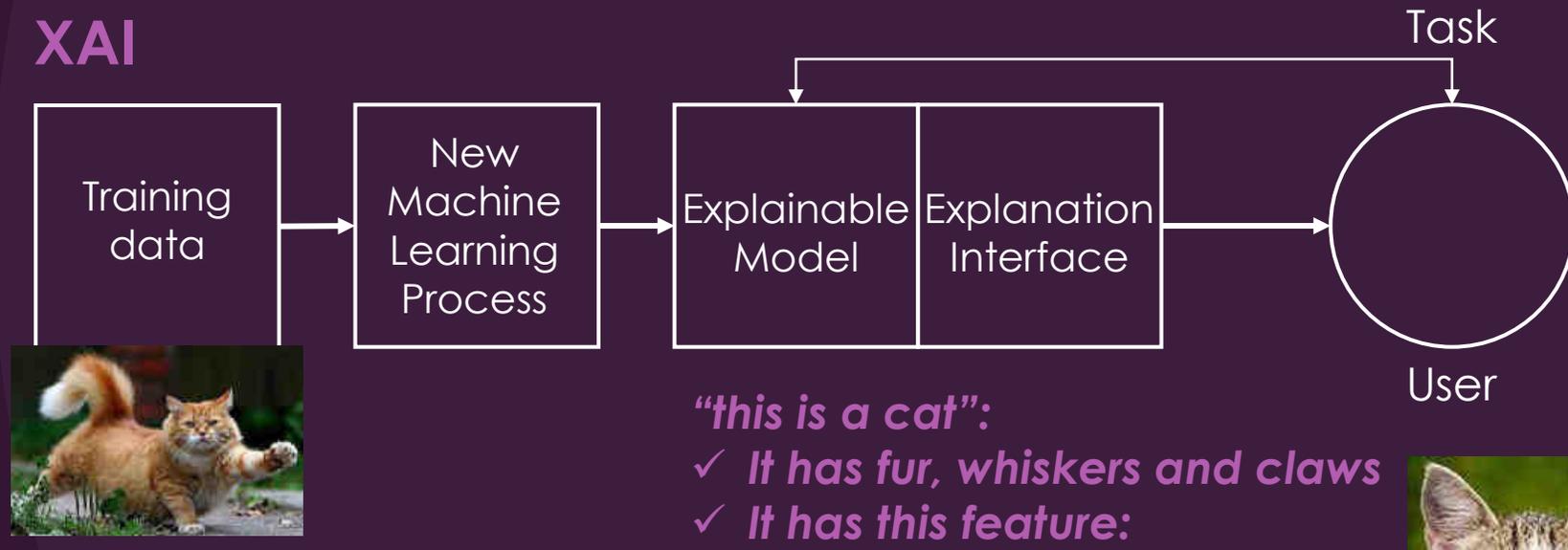


TODAY



Why did you do that?
Why not something else?
When do you succeed?
When do you fail?
When can I trust you?
How do I correct an error?

XAI



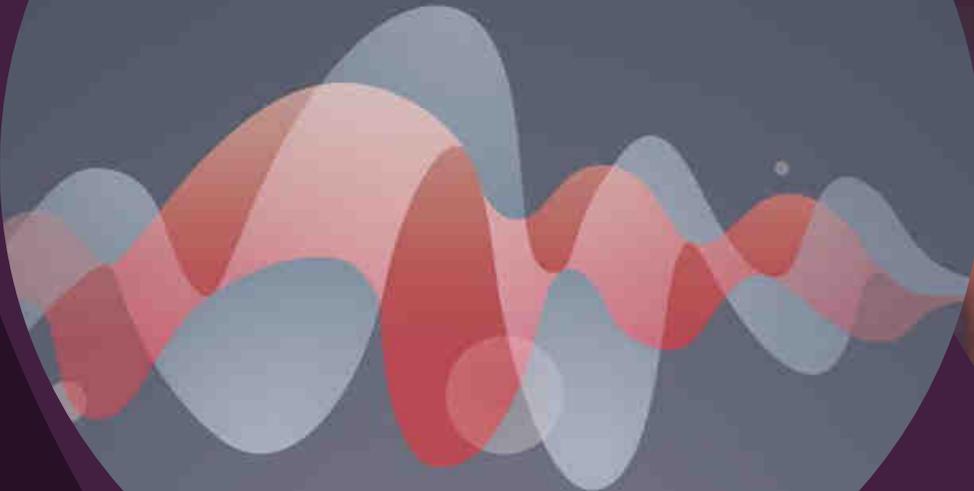
I understand WHY
I understand WHY NOT
I know when you SUCCEED
I know when you FAIL
I know when to TRUST you
I know why you ERRED



Lyrebird claims it can recreate any voice using just one minute of sample audio

USAGE

PROJECT
REVOICE





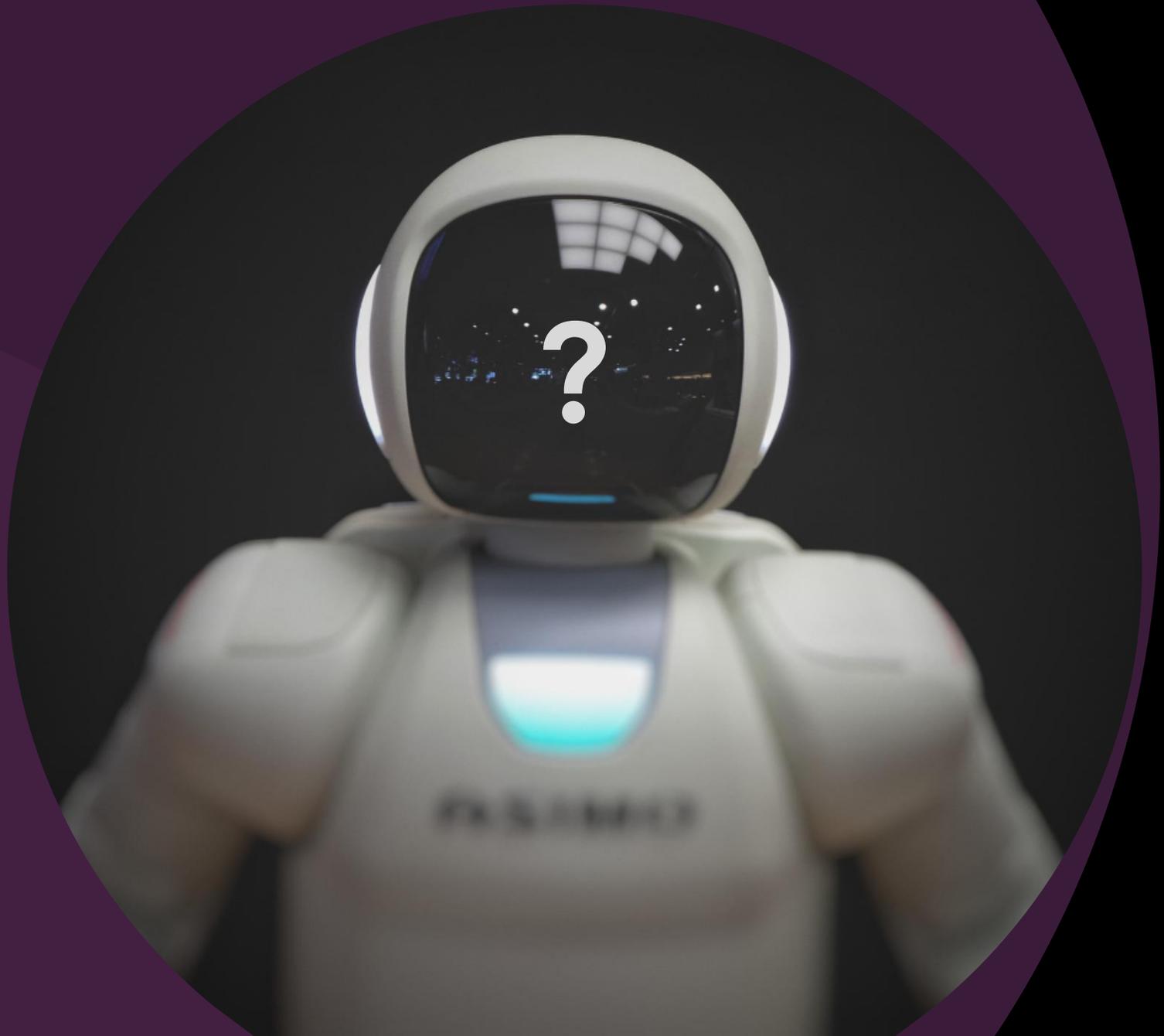
WOLFGANG

WH
GOV



NR

**IT JUST DOESN'T
GET IT**



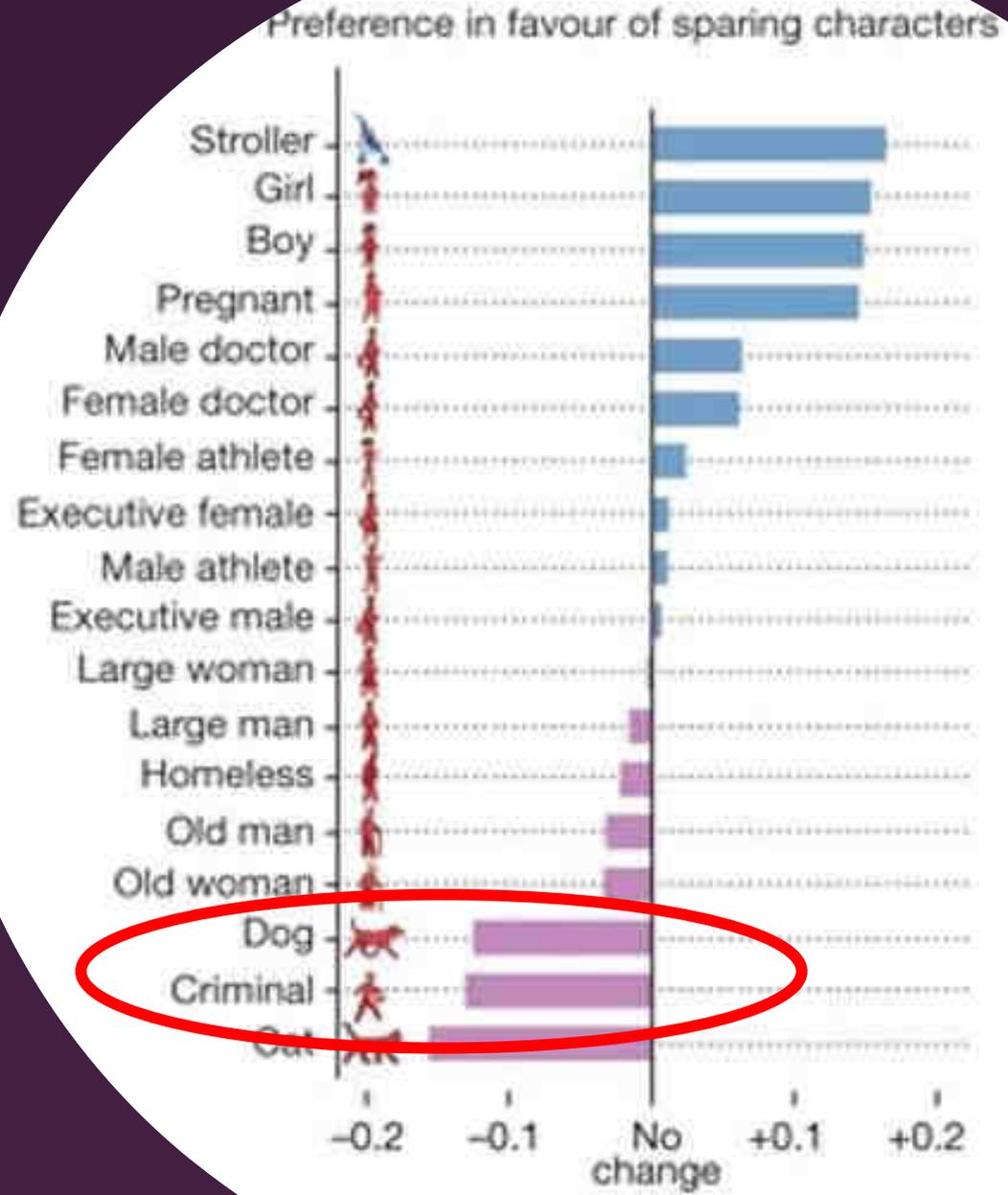
'Siri, I'm bleeding really bad can you call me an ambulance'

From now on, I'll call you 'An Ambulance'.
OK?



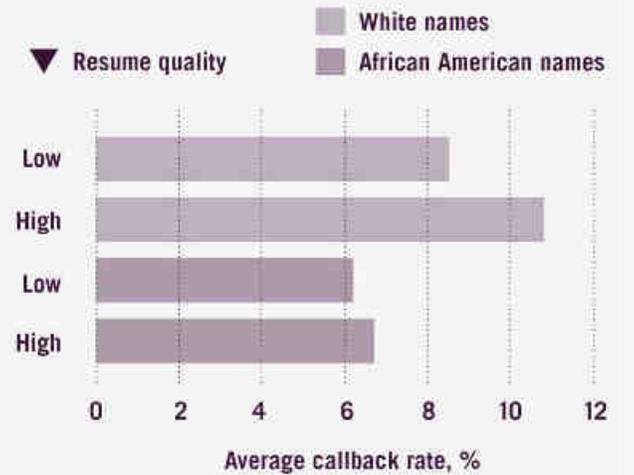


ETHICAL



Racism in a resume

Job applicants with African American-sounding names got fewer callbacks.

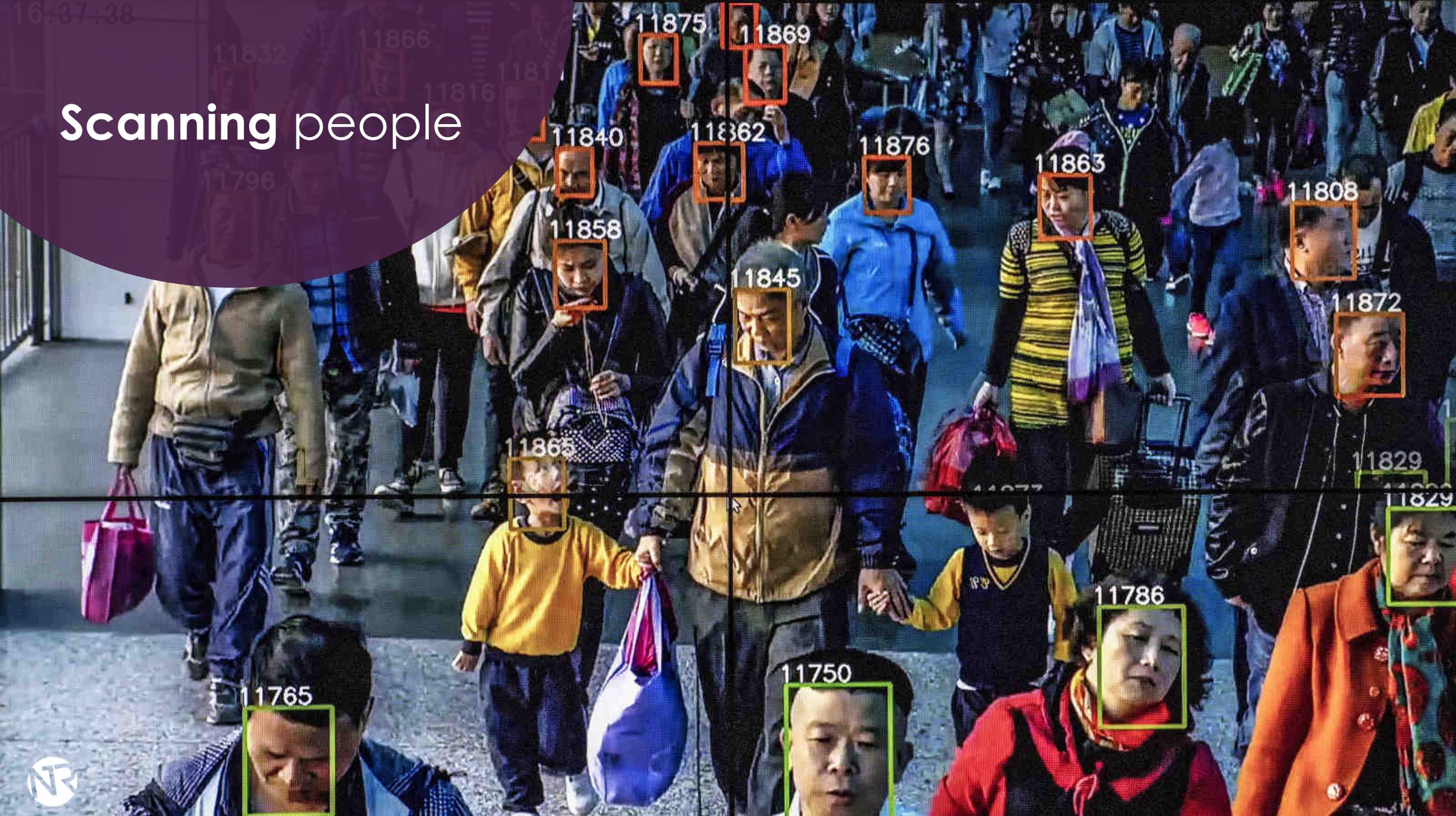


Algorithms give you a look in the mirror. They reflect the inequalities of our society.

PRIVACY



Scanning people



Scanning people



The digital display screen is divided into several sections. At the top right, there is a logo for '95' with the text '上海市公安局交通警察总队' (Shanghai Municipal Police Traffic Police General Team). Below this, a large image shows a crosswalk with a person crossing. To the right of this image is vertical text: '照片由上海市公安局交通警察总队提供' (Photos provided by the Shanghai Municipal Police Traffic Police General Team). Below the image is a blue banner with the text '道路交通违法公告栏' (Traffic Violation Notice Board). The main area of the screen displays a grid of colorful icons for various services: 产测管理 (Product Management), 证件管理 (Certificate Management), 护照办理 (Passport Processing), 法律通行证办理 (Legal Travel Permit Processing), 养老认证 (Pension Certification), 不动产登记 (Real Estate Registration), 空气质量 (Air Quality), 出行信息 (Travel Information), 上海居住证 (Shanghai Residence Permit), 快速落户 (Fast Household Registration), 违章处理 (Violation Processing), 违章申诉 (Violation Appeal), 车检预约 (Vehicle Inspection Appointment), 违章查询 (Violation Query), 违章记分 (Violation Points), 违章罚款 (Violation Fines), 违章申诉 (Violation Appeal), 违章记分 (Violation Points), 违章罚款 (Violation Fines). On the right side of the screen, there is a red '报警' (Report) button, a clock showing '17:57', the date '2017-05-09 星期三', and a QR code. At the bottom of the screen, there is a row of icons for '便民服务' (Public Service), '便民热线' (Public Service Hotline), '便民信息' (Public Service Information), '便民服务' (Public Service), '便民服务' (Public Service), '便民服务' (Public Service), and '便民服务' (Public Service).



Scanning people



Facial recognition



Chinese authorities nab fugitive in a crowd of 60k thanks to facial recognition AI



by **TRISTAN GREENE** — Apr 12, 2018 in **ARTIFICIAL INTELLIGENCE**







JOBS



Automation Has Been Eating All the Jobs



AUTOMATION LOOMING LARGE IN LABOR PICTURE
Automation Might End Most Unskilled Jobs In 10 Years

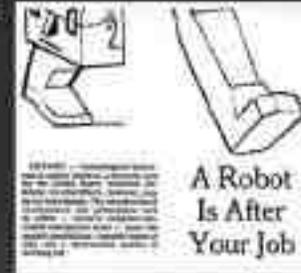
Automation Linked To Jobless Count

**Technology called threat to 5 mln. jobs
Imminent 'Robot Age' Awakens Concern
Computers: Worker Menace?**



Mal Baile
Machines Are Laughing at Men

LABOR 'SLAG HEAP' FEARED BY WIRTZ



1920 1930 1940 1950 1960 1970 1980 1990 2000

PRESIDENT DEPLORES FEAR OF AUTOMATION

PM acts to counter 'chips' that kill jobs

**World Ills Laid to Machine
By Einstein in Berlin Speech**

MACHINES AS MINISTERS TO MAN

By HENRY KISTEL
Founder of the Ford Motor Company

AUTOMATION IN BRITAIN STIRS UNREST IN LABOR

Workers See 'Robot Revolution'
Depriving Them of Jobs





**“AI is going to change
100 percent of jobs,
100 percent of industries,
and 100 percent of professions”**

-Ginny Rometty, CEO IBM



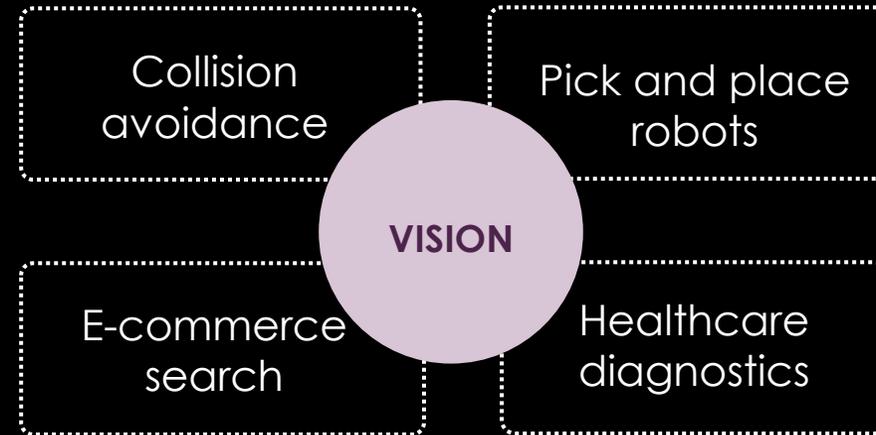
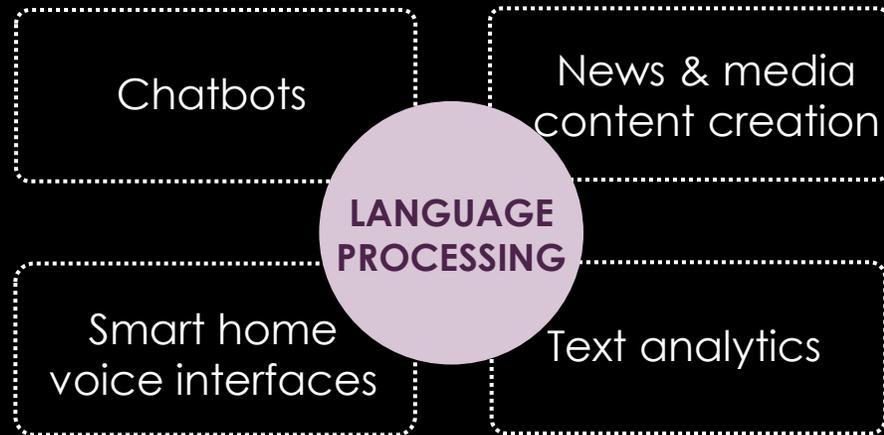
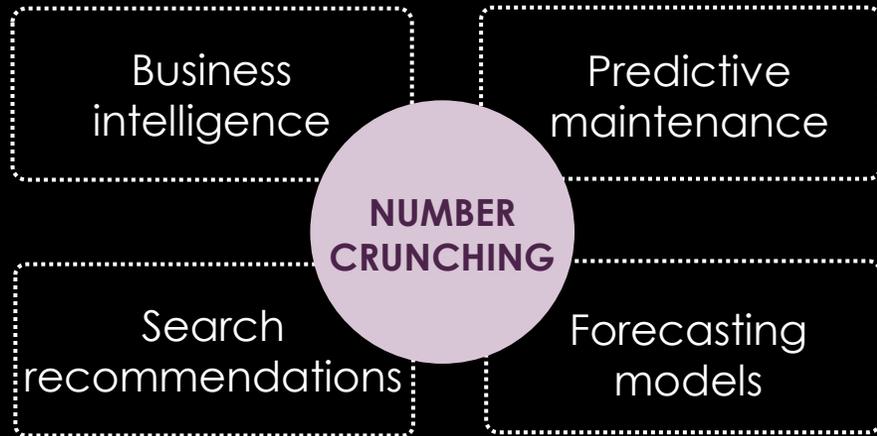
What to do
NEXT?



Let's
DO
AI



AI applications

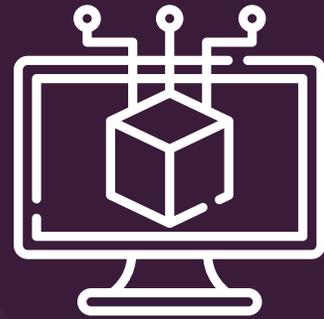




PROJECT



TRAINING



SOFTWARE

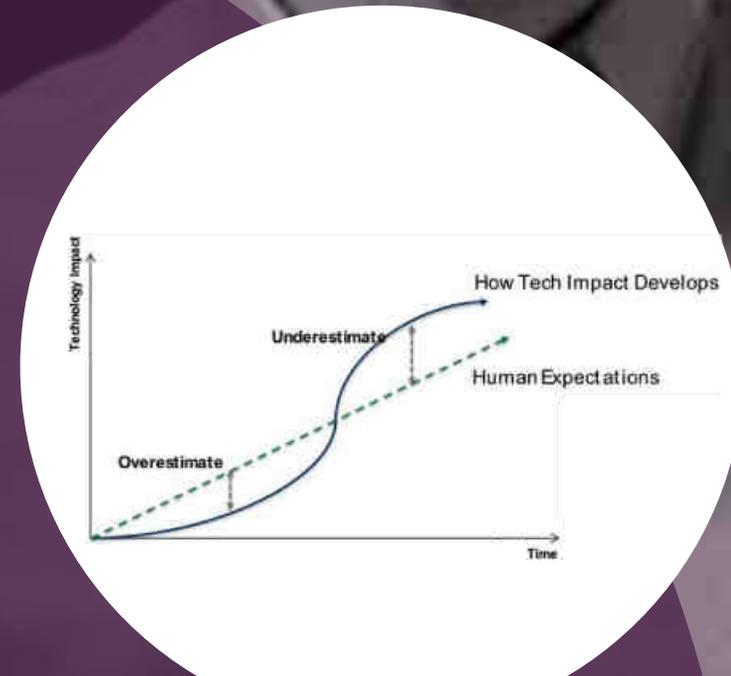


EXPERIMENT

First it was a hype now it is a necessity

“We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten. Don't let yourself be lulled into inaction.”

- Bill Gates



**An AI strategy is
not optional**



THANK YOU



Nancy Rademaker
International Keynote Speaker