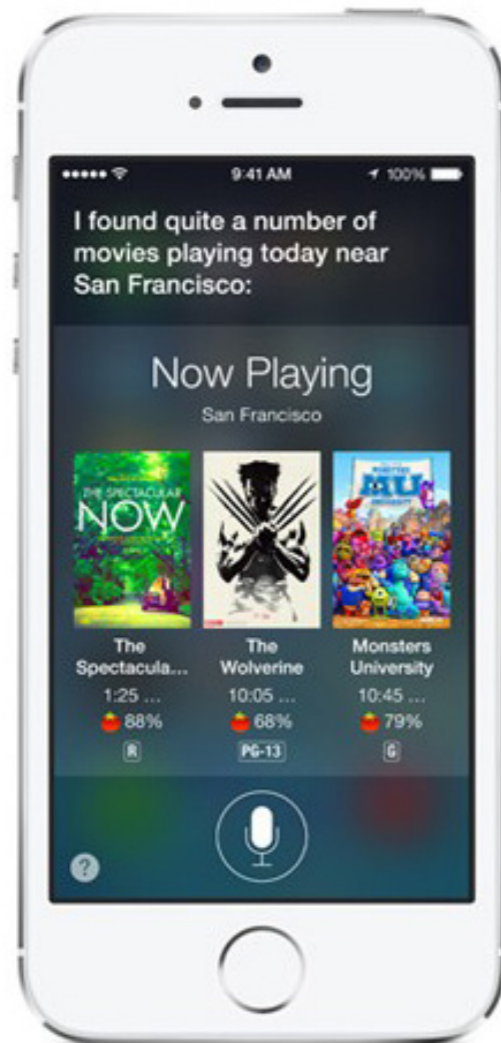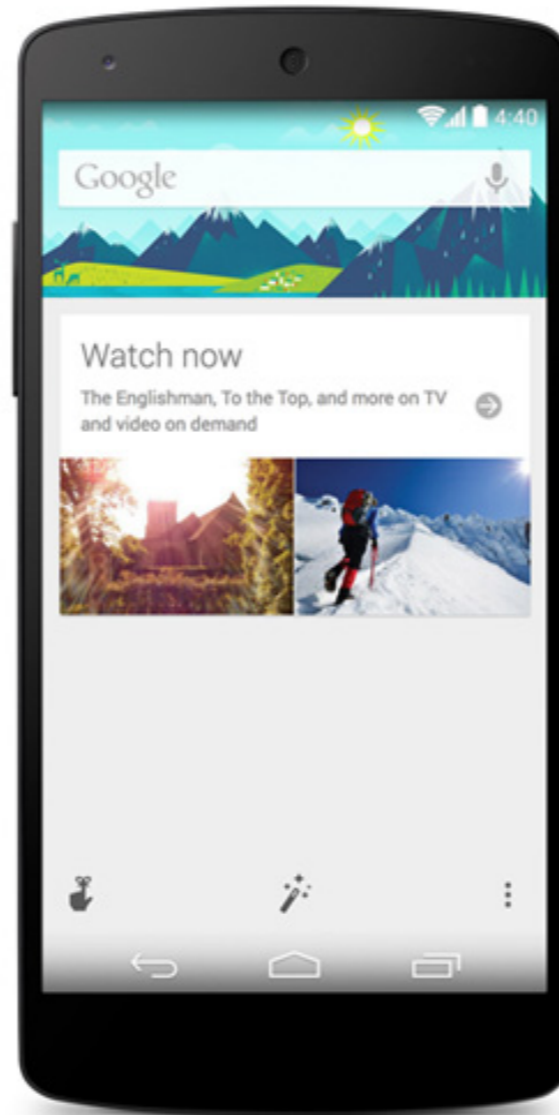# Lecture 1: Introduction to ML
Course: ES 654

Nipun Batra
Jan 6, 2020

Machine Learning Applications
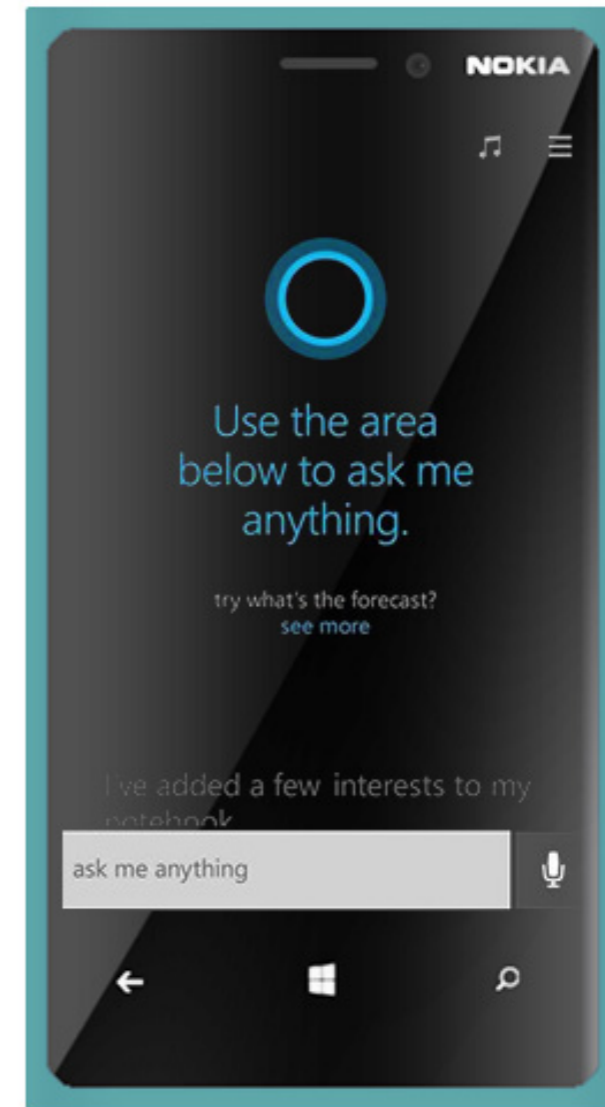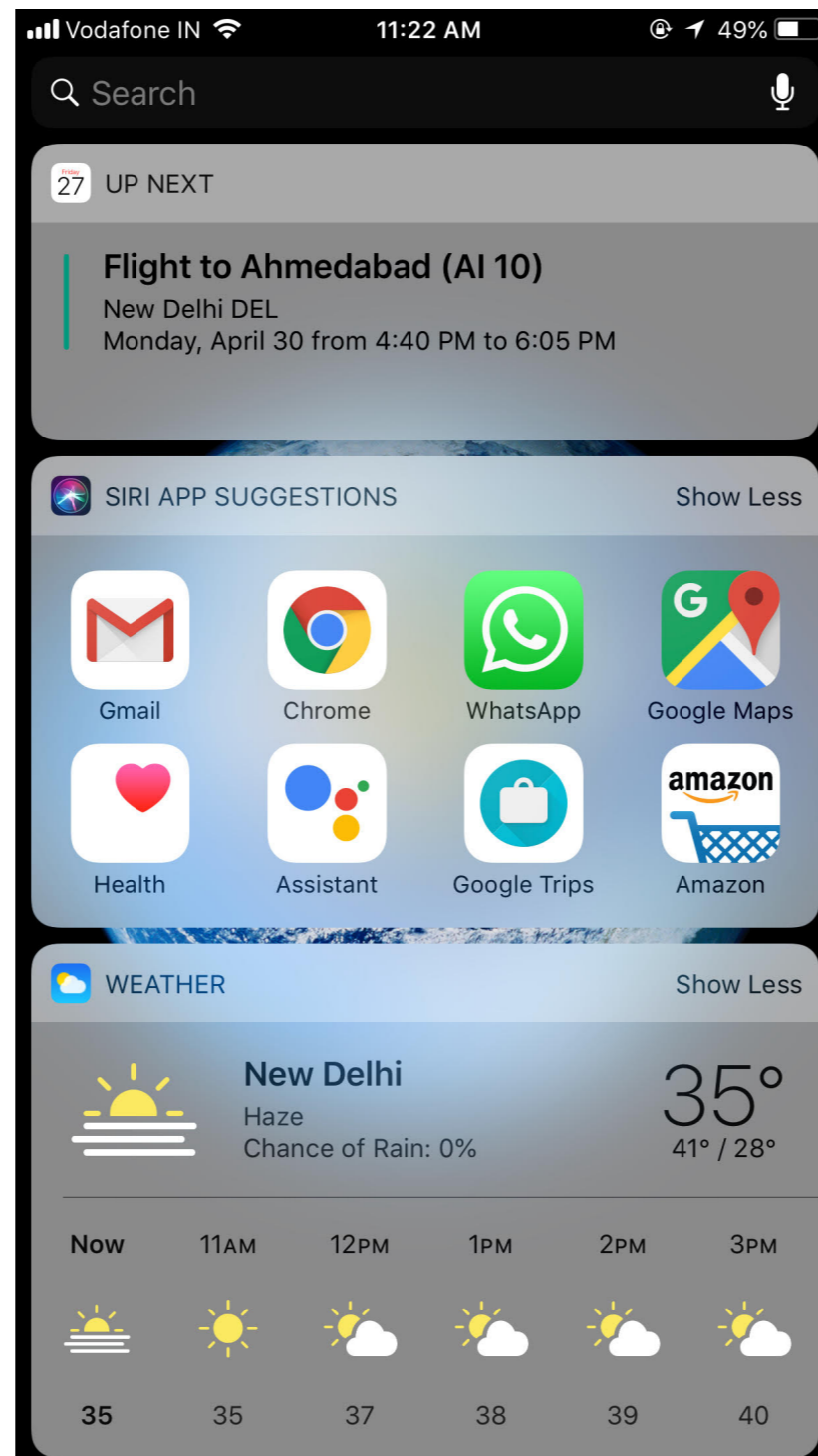

Apple Siri
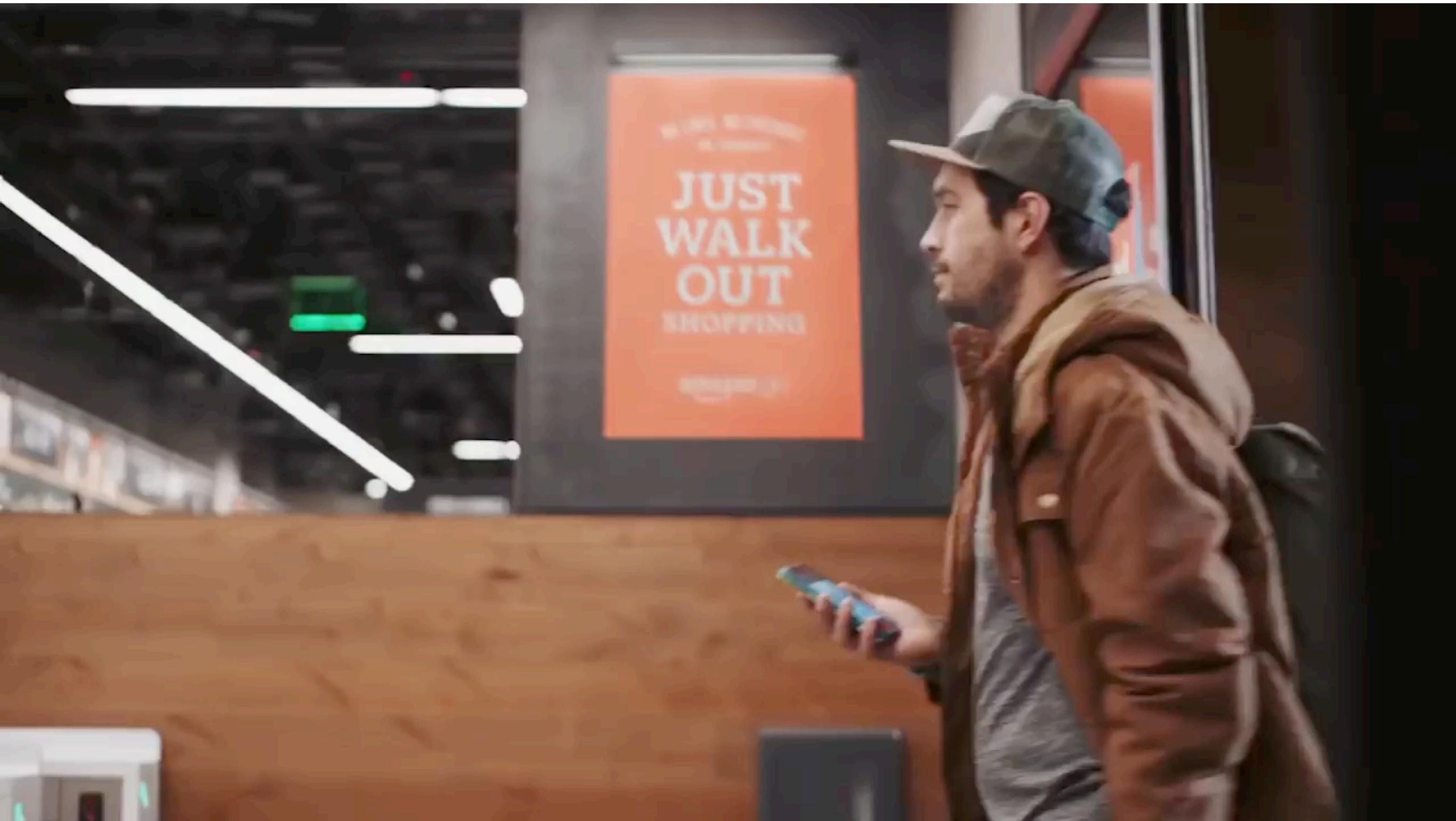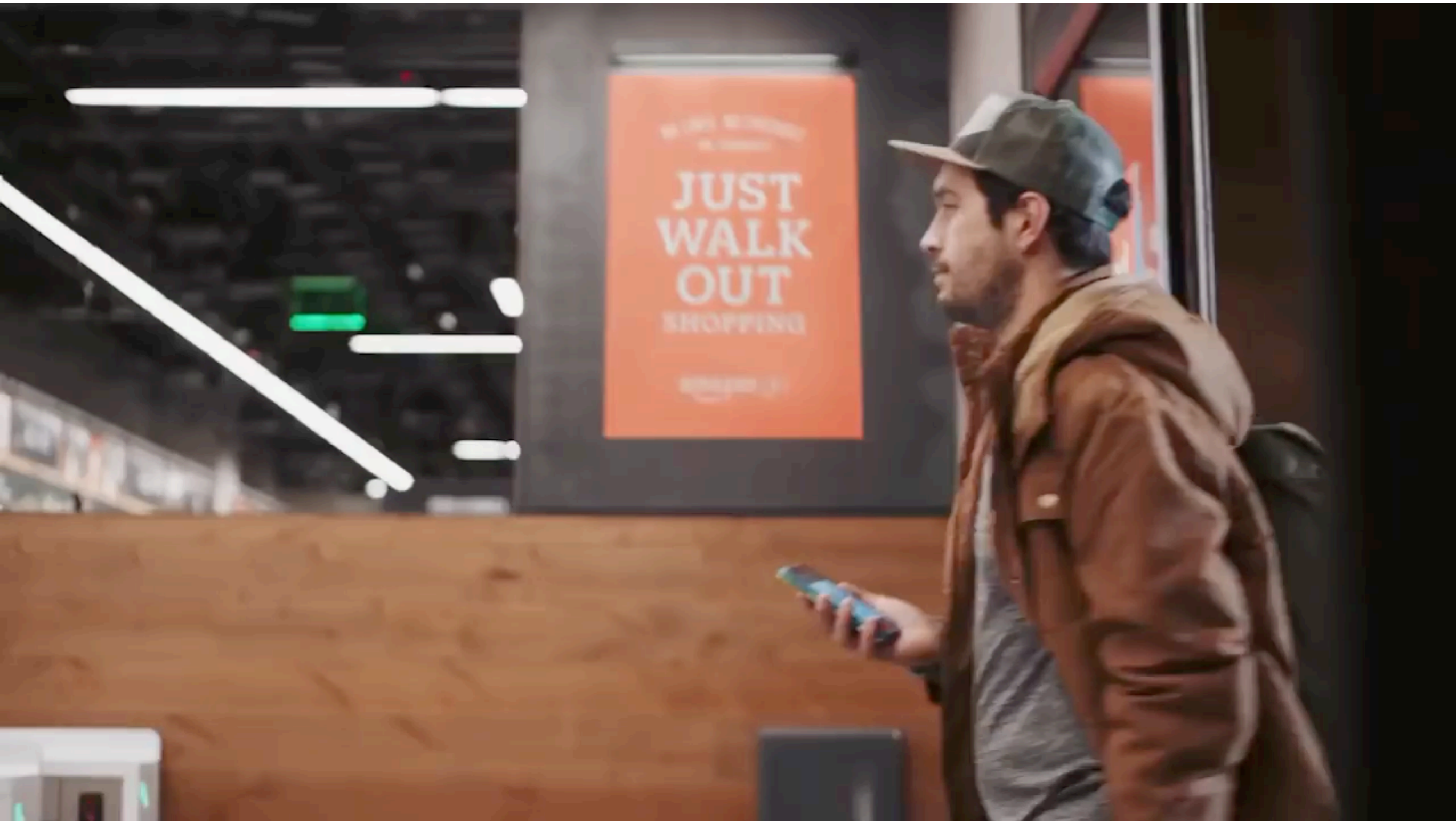
Google Now

Windows Cortana

Machine Learning Applications

The Long Wait …

Machine Learning Applications

Machine Learning Applications
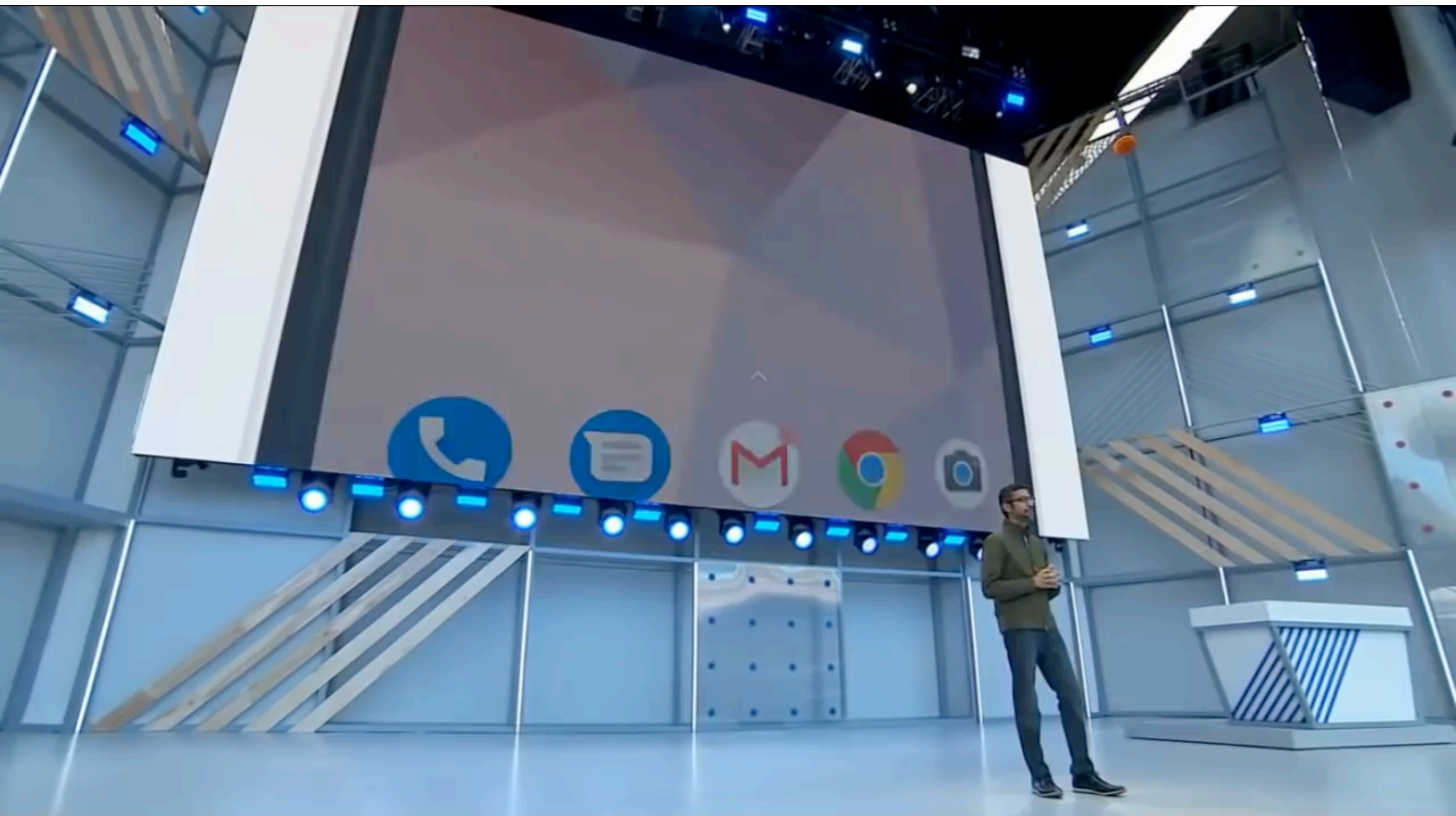
Machine Learning Applications

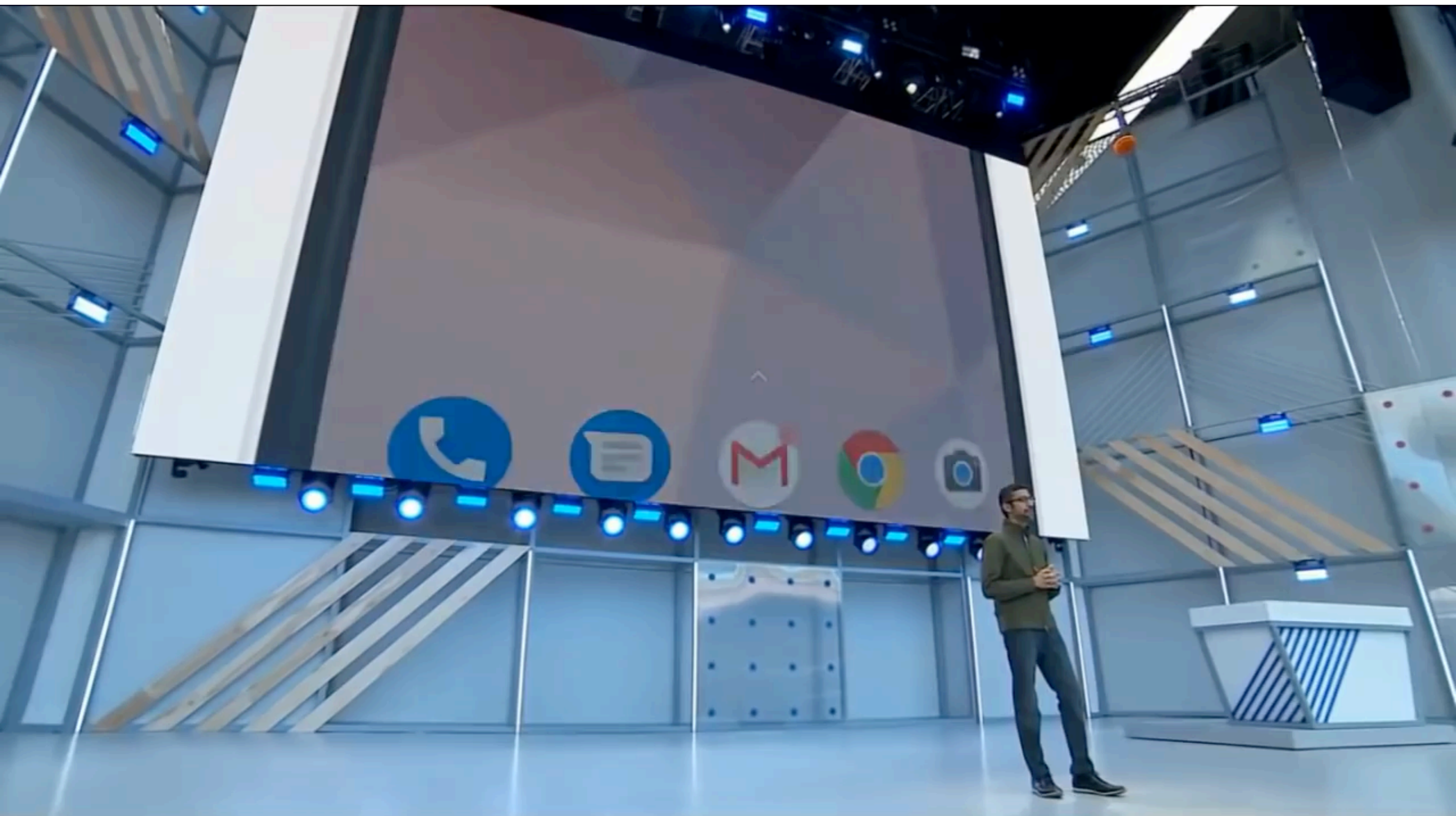# Machine Learning Applications

Never Liked To Call People!

Google Duplex!

Google Duplex!

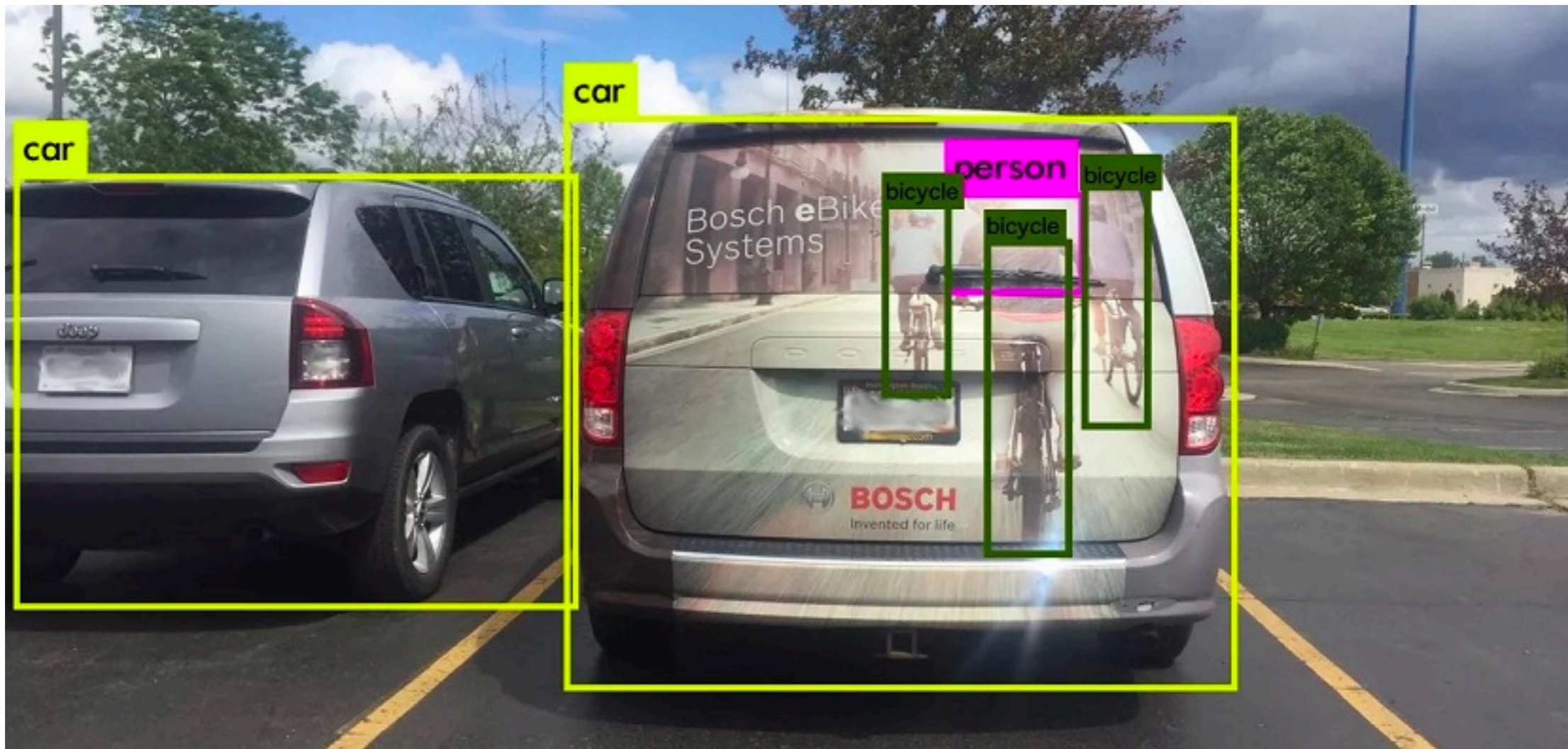# Saving The Planet - One Watt A time

Saving The Planet - One Watt A time

Self Driving Car

Self Driving Car

Self Driving Car

Courtesy: Cognata

ML for Farm

ML for Farm
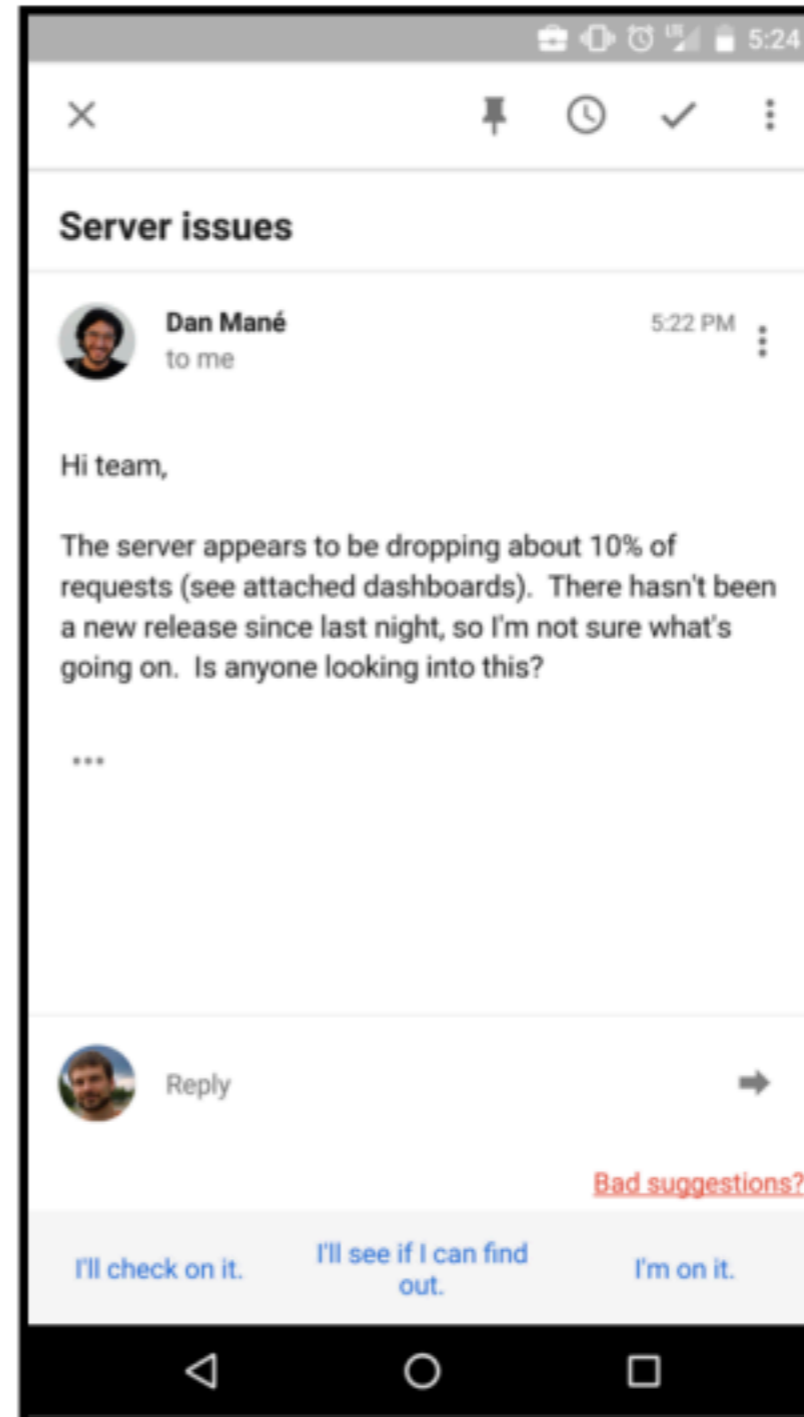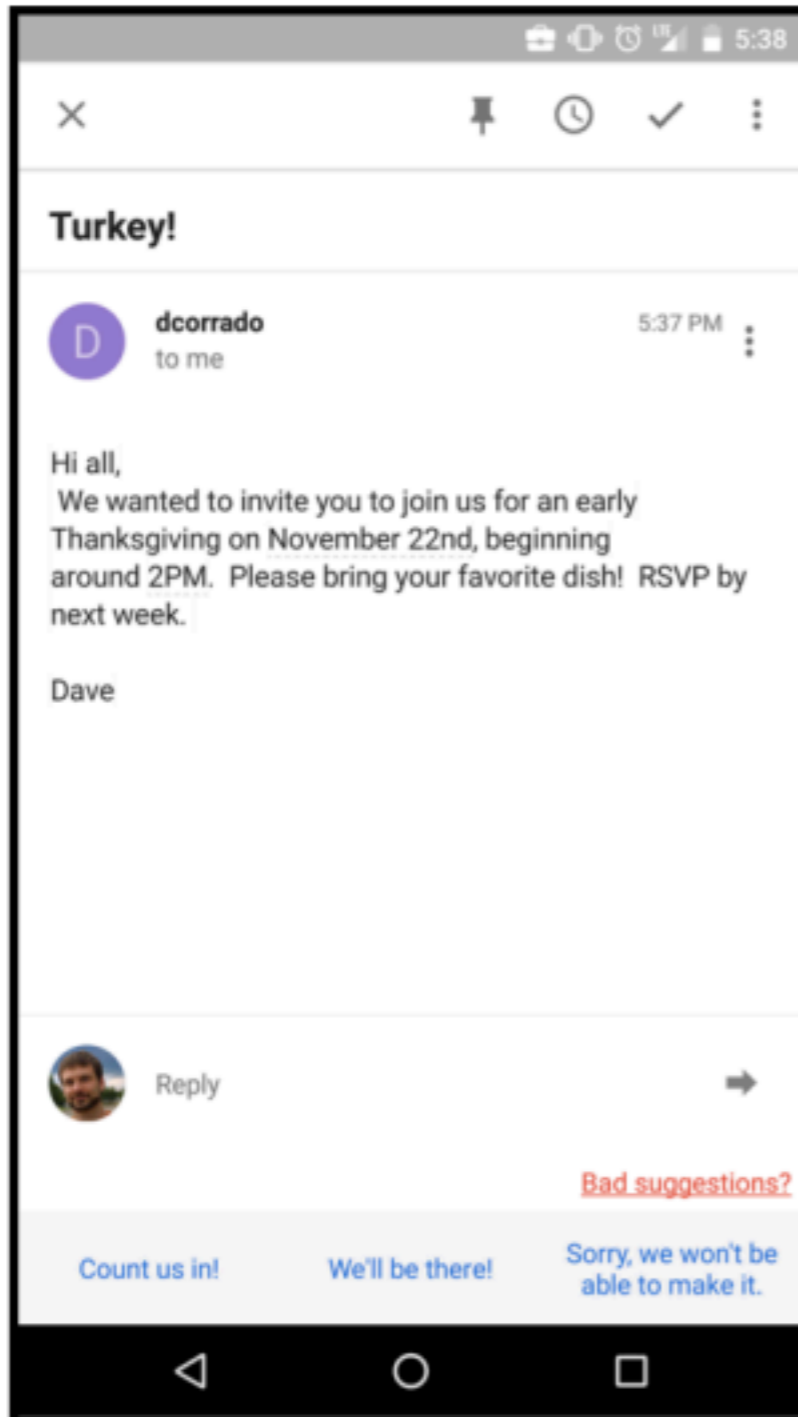
ML for Healthcare

ML for Healthcare

Auto Reply

Machine Learning Applications
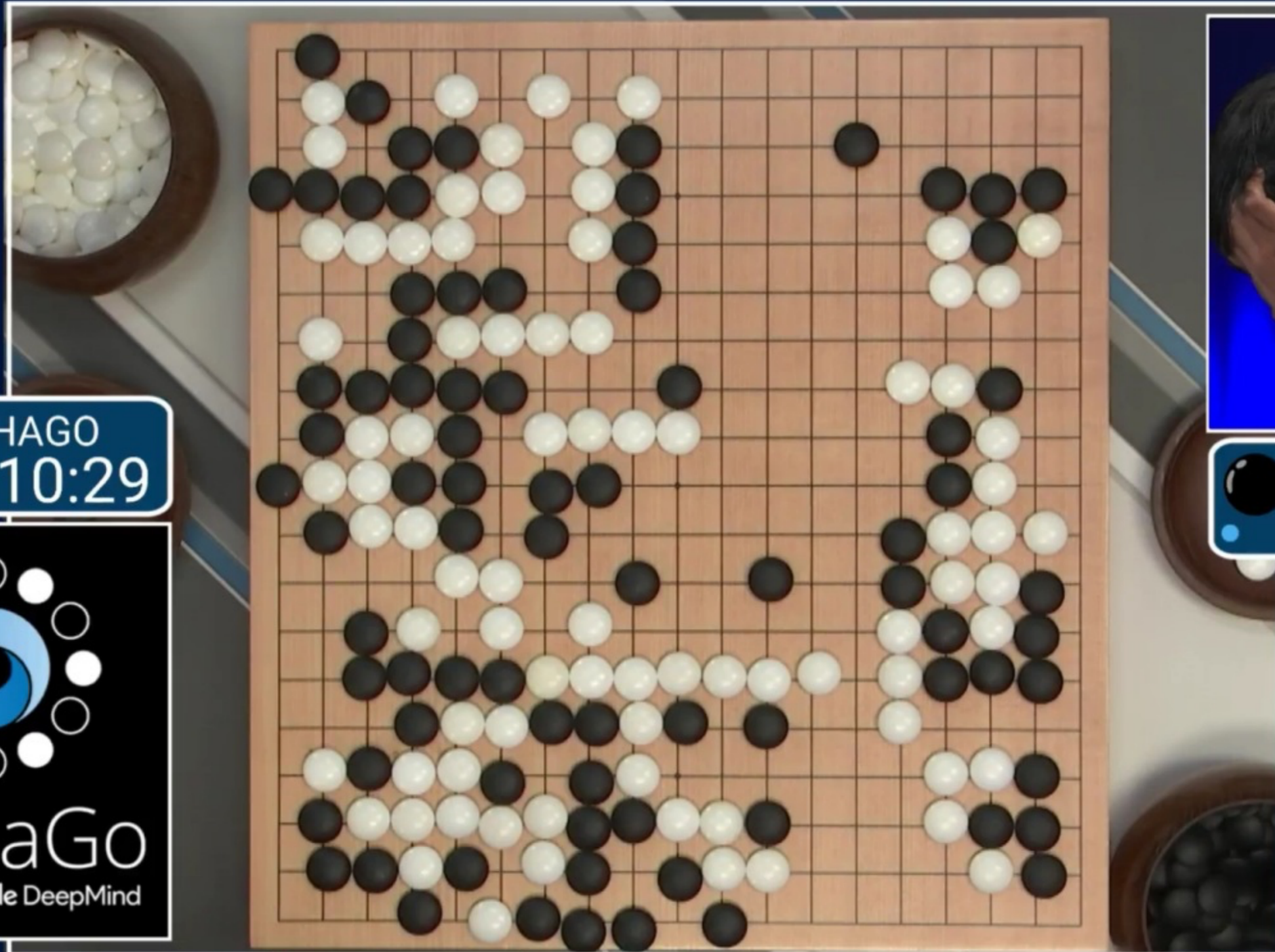
Machine Learning Applications

Input
Chest X-Ray Image

CheXNet
121-layer CNN

Output
Pneumonia Positive (85%)

Machine Learning Applications

Example images showing good and bad selfies in our training data. These will be given to the ConvNet as teaching material.

- Face should occupy about 1/3 of the image.
- Cut off your forehead

Machine Learning Applications

Detexify

classify | symbols

Score: 0.12107724371908918
\partial
mathmode

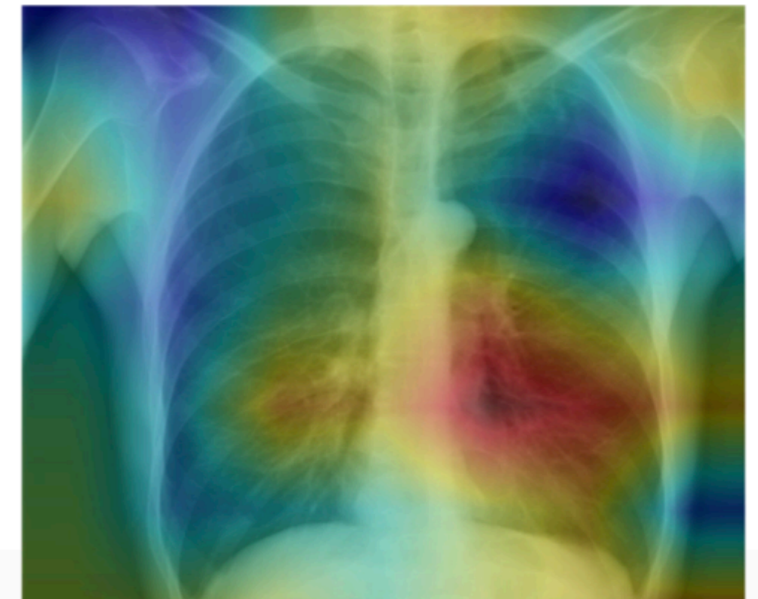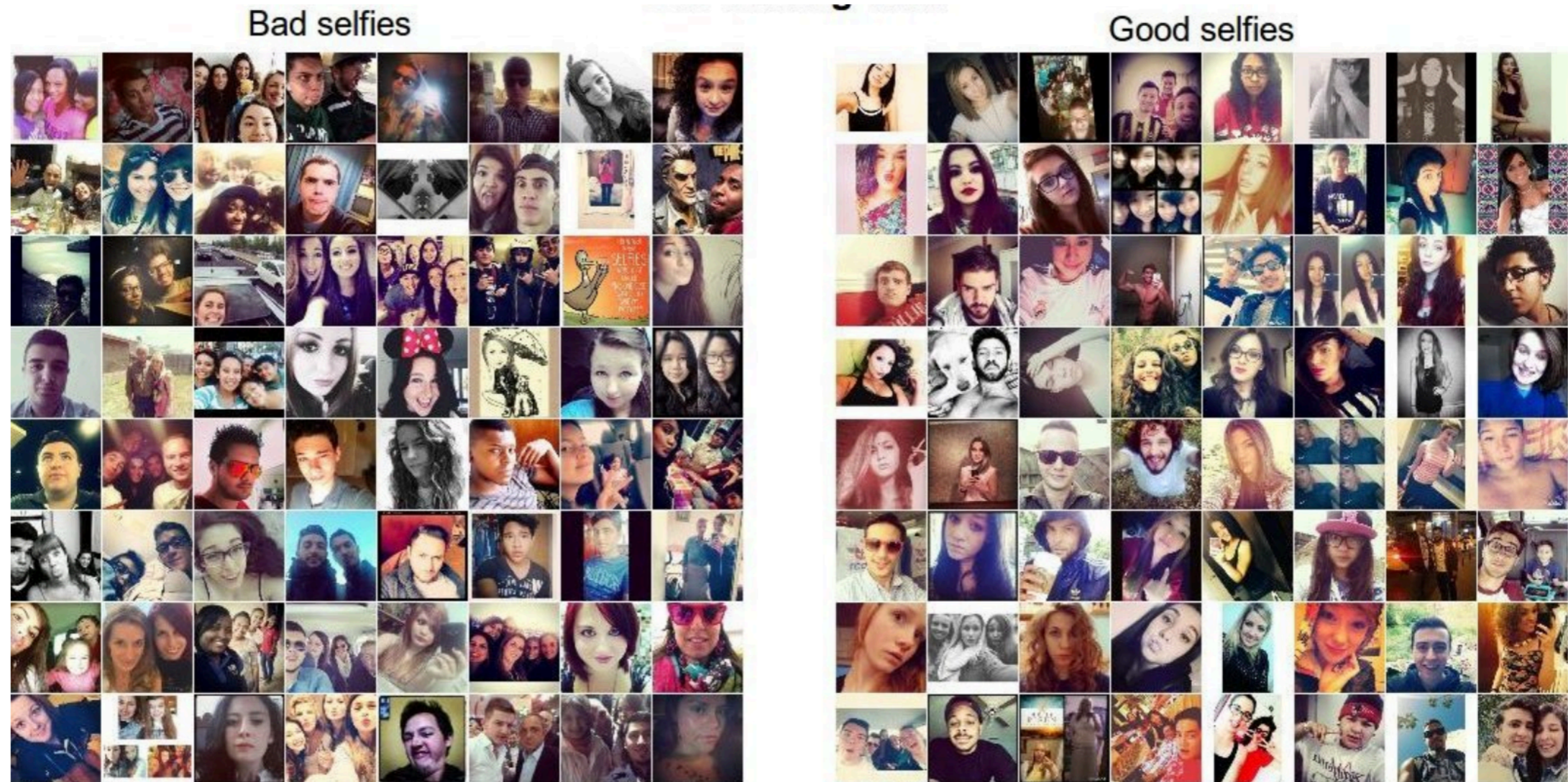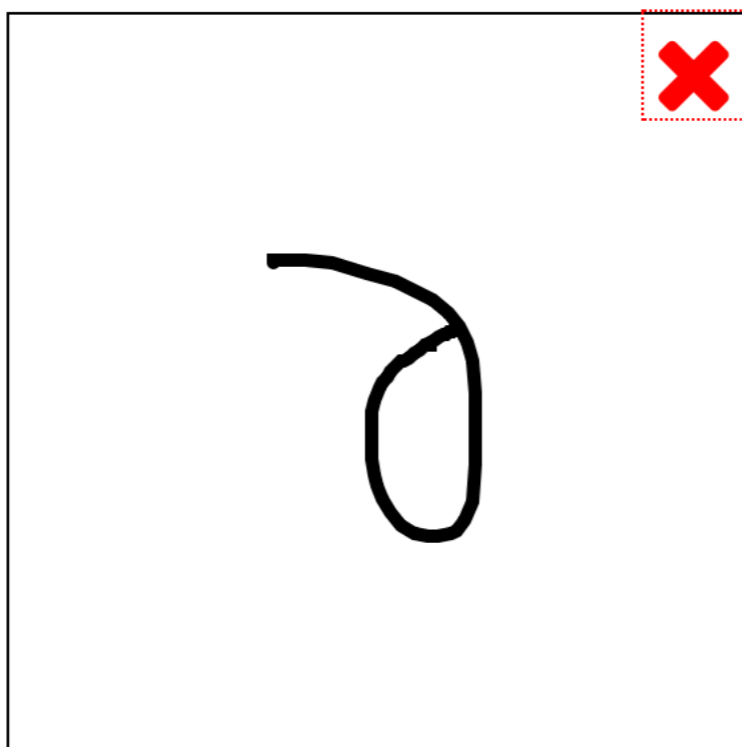Score: 0.1744210074369589
\usepackage{ amssymb }
\Game
mathmode

Score: 0.18567692685446785
\usepackage{ tipa }
\textbabygamma
textmode

Score: 0.19845446379011045
\usepackage{ upgreek }
\upgamma
mathmode

Score: 0.19849650347374576
\usepackage[T1]{fontenc}
\dh
textmode

The symbol is not in the list? Show more

Want a Mac app?

Lucky you. The Mac app is finally stable enough. See how it works on Vimeo. Download the latest version here.

Restriction: In addition to the LaTeX command the unlicensed version will copy a reminder to purchase a license to the clipboard when you select a symbol.

You can purchase a license here:

Buy Detexify for Mac

Did this help?

Machine Learning Applications
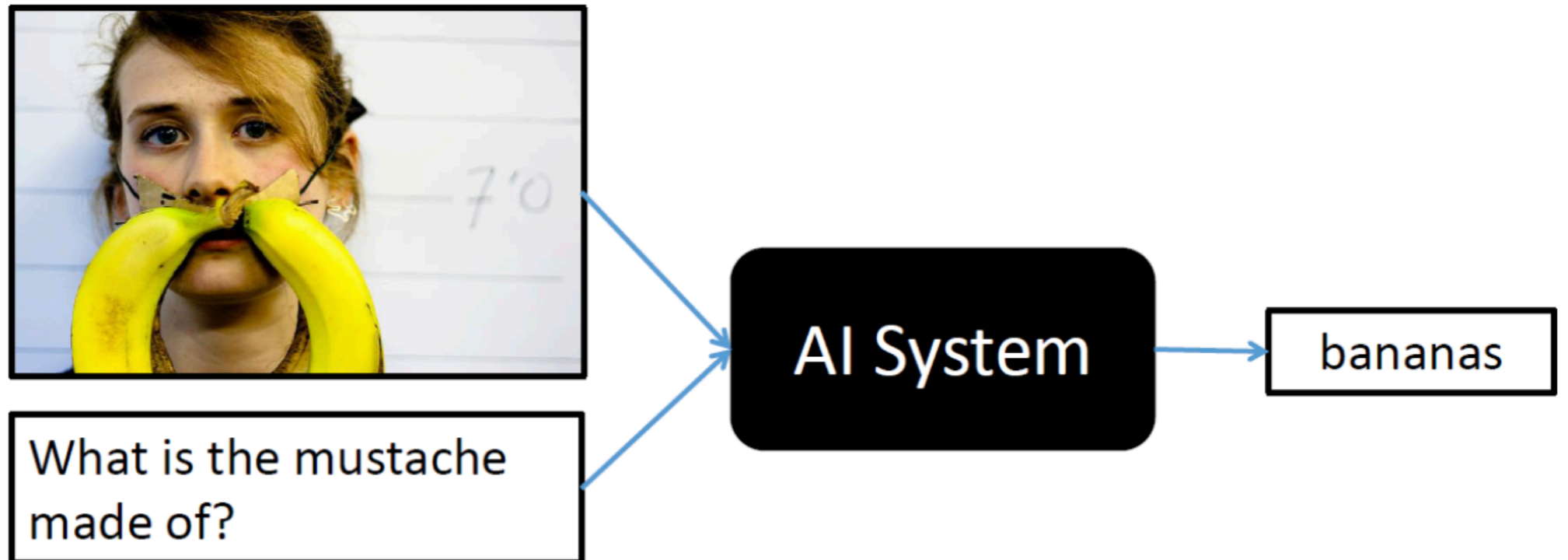

Labels	Web	Properties	Safe Search	JSON

image_20121216120914.jpg

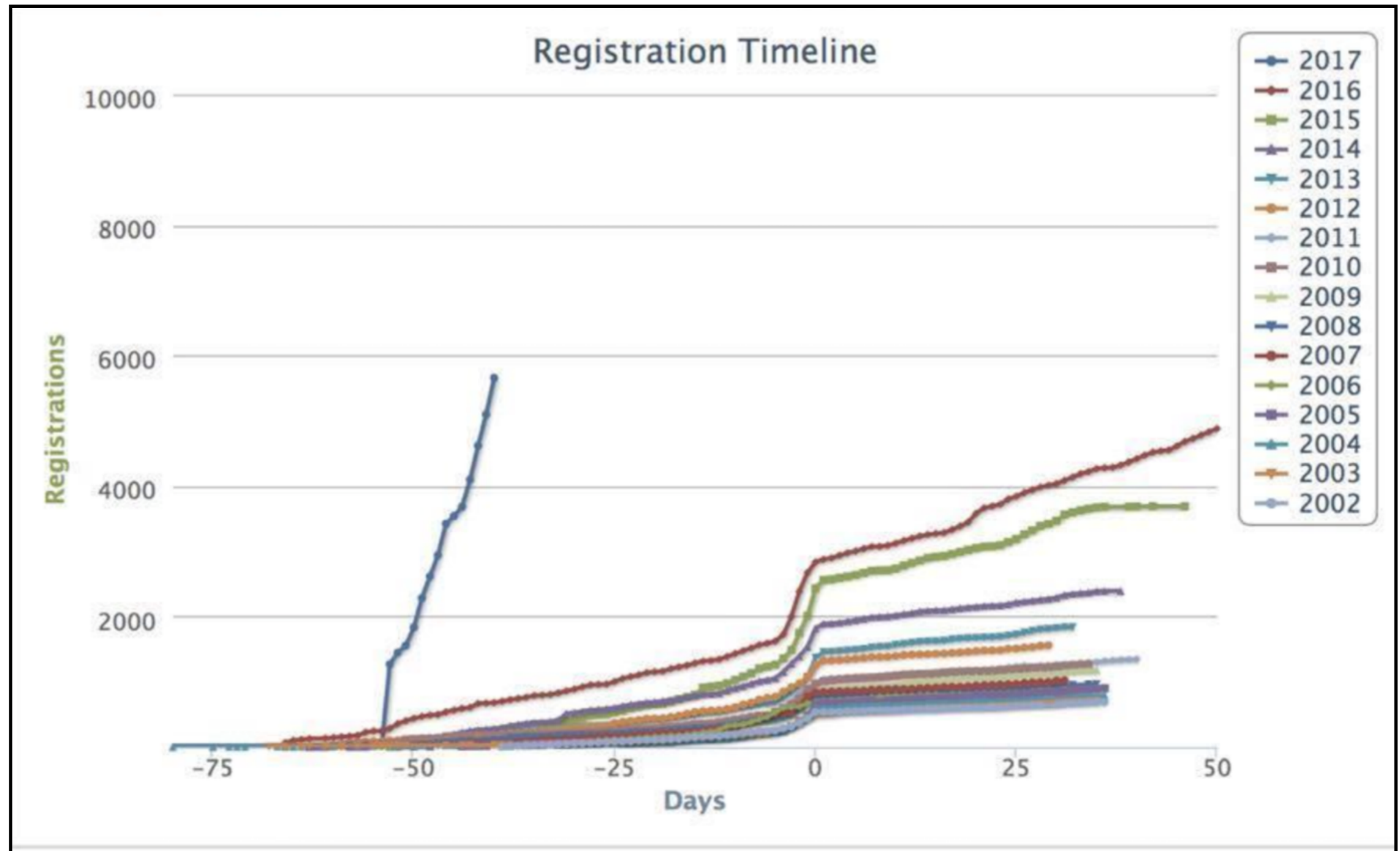|	
Test Cricket	98%
Cricket	98%
Baseball Player	98%
Cricketer	97%
Bat And Ball Games	96%
Team Sport	91%
Ball Game	88%
Games	86%
Sports	85%

19

Machine Learning Applications

Visual Q and A

NeurIPS registration

x=0 -> early registration deadline

Machine Learning Gone Wrong

THE VERGE — TECH ▾ SCIENCE ▾ CULTURE ▾ CARS ▾ REVIEWS ▾ LONGFORM VIDEO MORE

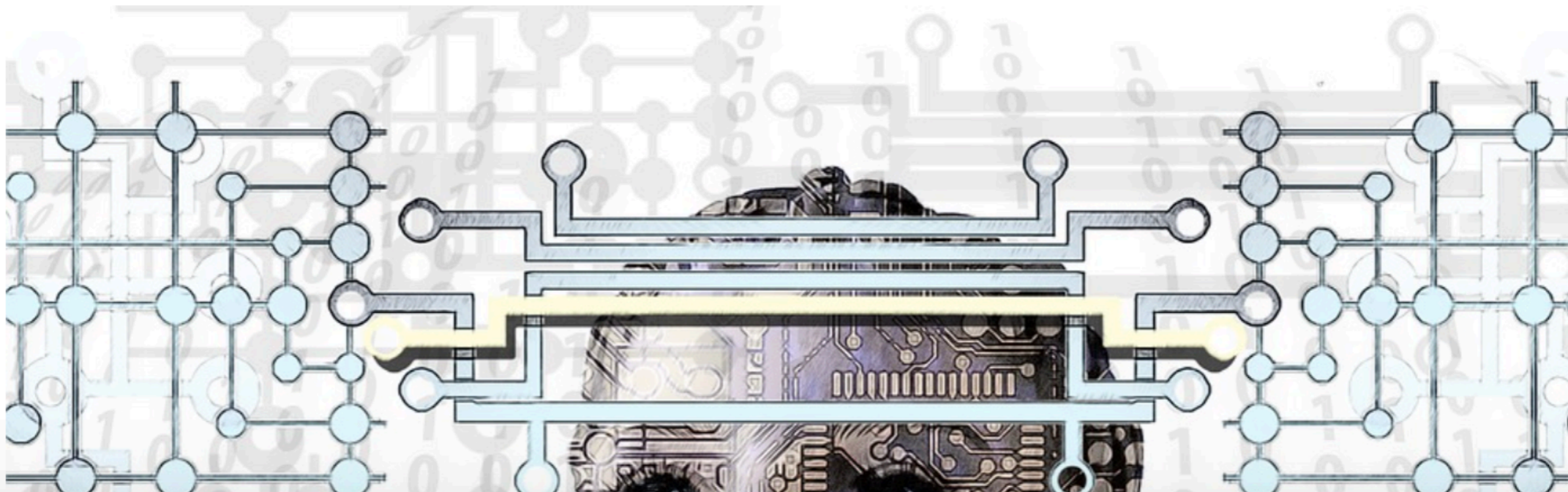🕐 STORYSTREAM TRANSPORTATION \ UBER \ RIDE-SHARING

Uber's fatal self-driving crash: all the news and updates

Machine Learning Gone Wrong

Home › Cool Science › After Uber, Tesla Incidents, Can Artificial Intelligence Be Trusted?

After Uber, Tesla Incidents, Can Artificial Intelligence Be Trusted?

April 13, 2018

"Bias" in Machine Learning

"Bias" addressed

"Racist" Machine Learning?

Where is the bride?

"Bias" addressed

"Bias" addressed

A "reality" check

A "reality" check

Adversaries!

$+.007 \times$

$=$

x

"panda"

57.7% confidence
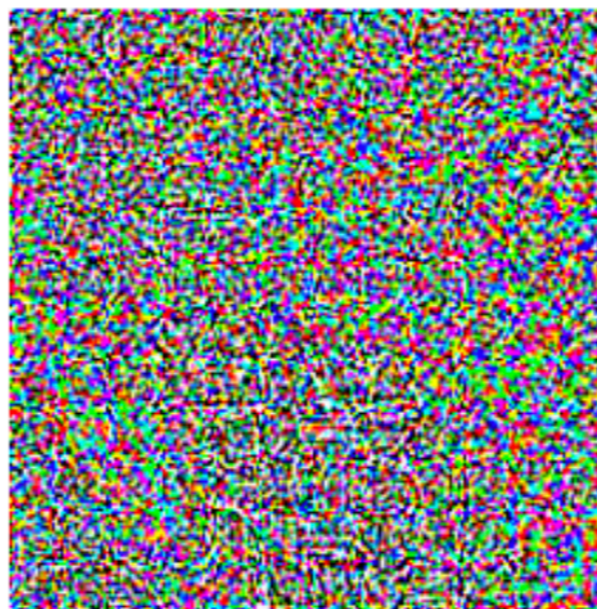
$\text{sign}(\nabla_x J(\boldsymbol{\theta}, \boldsymbol{x}, y))$

"nematode"

8.2% confidence

$x +$
$\epsilon \text{sign}(\nabla_x J(\boldsymbol{\theta}, \boldsymbol{x}, y))$

"gibbon"

99.3 % confidence

Causality v.s. Correlation
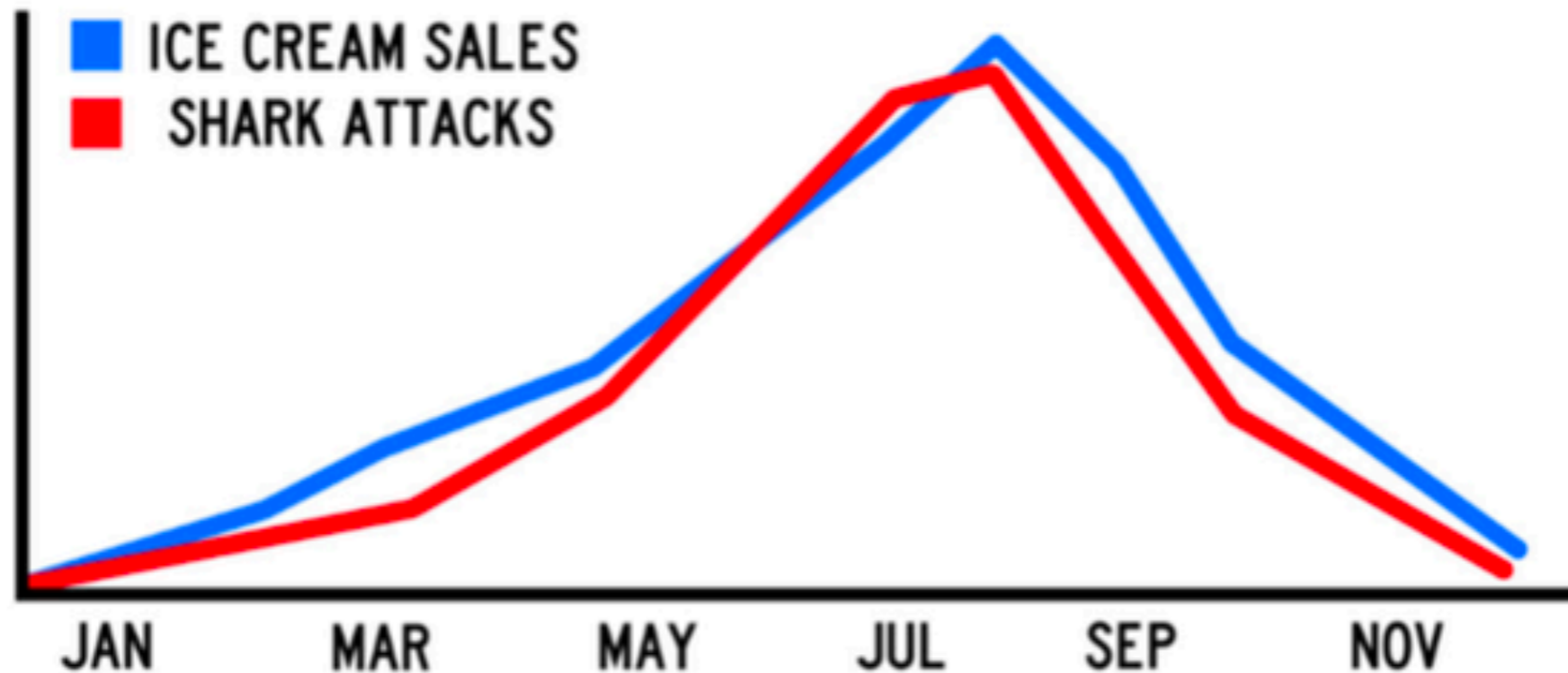
What is Machine Learning?

What is Machine Learning?

- "Field of study that give computers the ability to learn without being explicitly programmed" - Arthur Samuel [1959]

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What is Machine Learning?

- "Field of study that give computers the ability to learn without being explicitly programmed" - Arthur Samuel [1959]

- "A computer program is said to **learn** from **experience E** with respect to some class of **tasks T** and **performance measure P** if its performance at tasks in T, as measured by P, improves with experience E." - Tom Mitchell

What is Machine Learning?

Input
Chest X-Ray Image

CheXNet
121-layer CNN

Output
Pneumonia Positive (85%)

Q: Identify task, performance measure, and experience
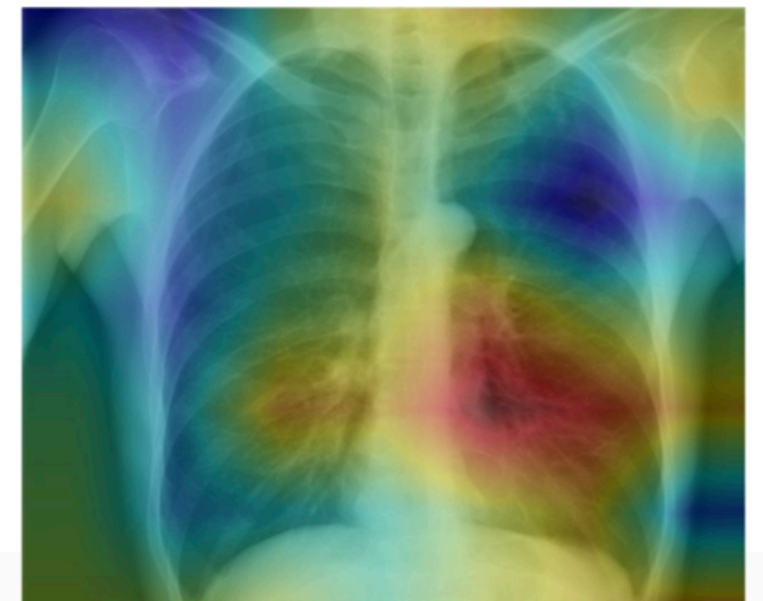
What is Machine Learning?

Input
Chest X-Ray Image

Task

CheXNet
121-layer CNN

Output
Pneumonia Positive (85%)

Q: Identify task, performance measure, and experience
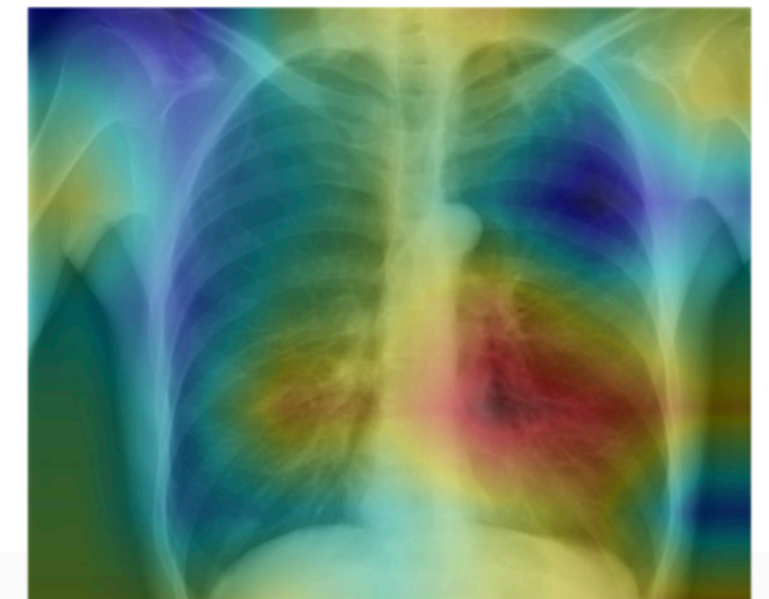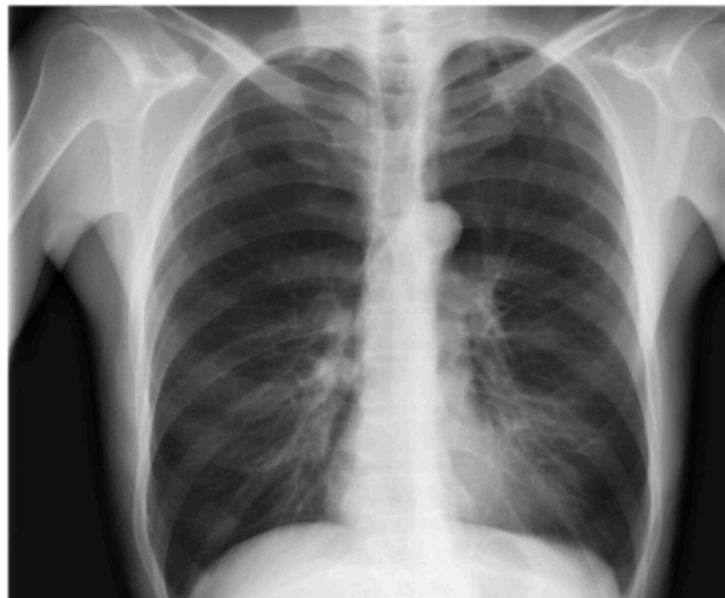
What is Machine Learning?

Performance measure

Output
Pneumonia Positive (85%)

Task

CheXNet
121-layer CNN

Input
Chest X-Ray Image

Q: Identify task, performance measure, and experience

What is Machine Learning?

Experience
1000s of <image, disease> pairs

Performance measure

Output
Pneumonia Positive (85%)

Task

CheXNet
121-layer CNN

Input
Chest X-Ray Image

Q: Identify task, performance measure, and experience

33

What is Machine Learning?

Experience
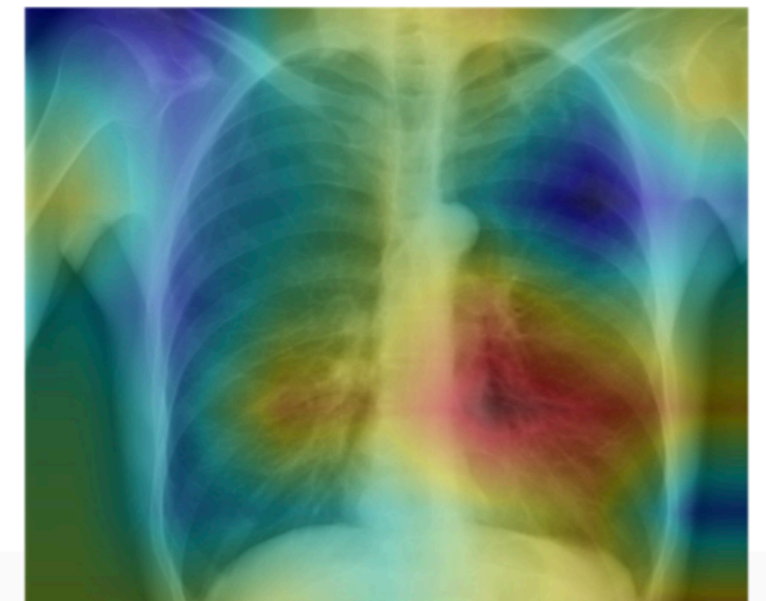1000s of <image, disease> pairs
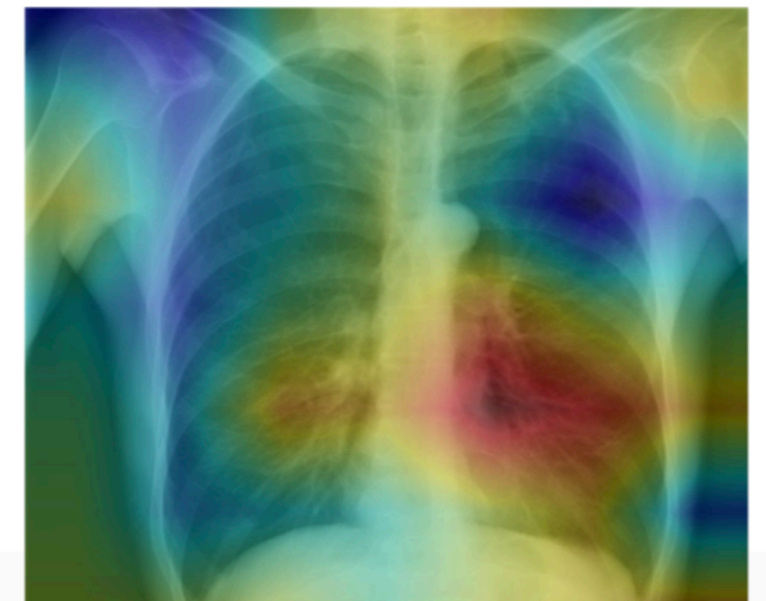
Performance measure

Output
Pneumonia Positive (85%)

Task

CheXNet
121-layer CNN

Input
Chest X-Ray Image

What is Machine Learning?

Experience
1000s of <image, disease> pairs

Input
Chest X-Ray Image

Task

CheXNet
121-layer CNN

Output
Pneumonia Positive (85%)

What is Machine Learning?

Experience
1000s of <image, disease> pairs

Output
Pneumonia Positive (85%)

CheXNet
121-layer CNN

Input
Chest X-Ray Image

What is Machine Learning?
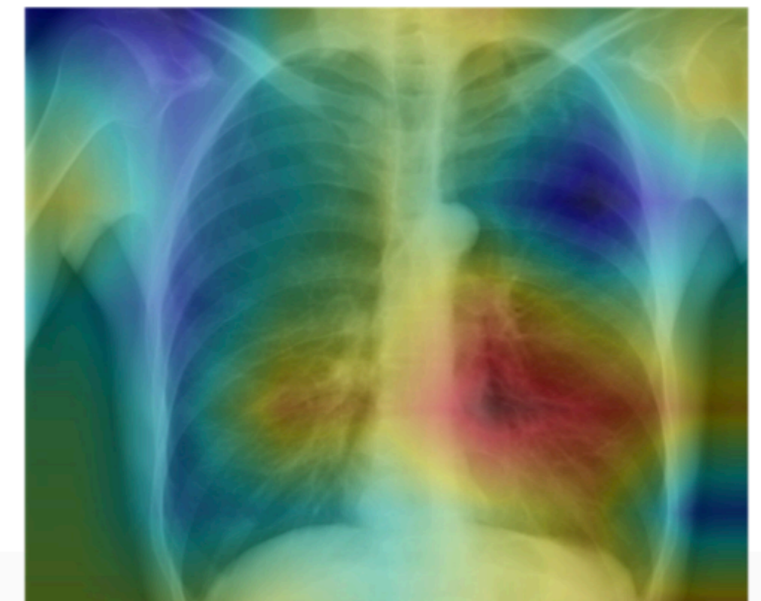
Experience
1000s of <image, disease> pairs

Input
Chest X-Ray Image

CheXNet
121-layer CNN

Output
Pneumonia Positive (85%)

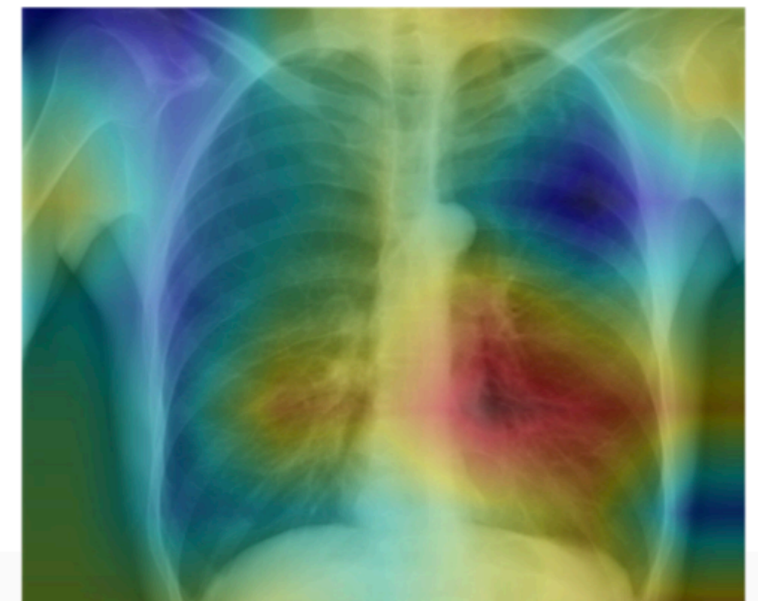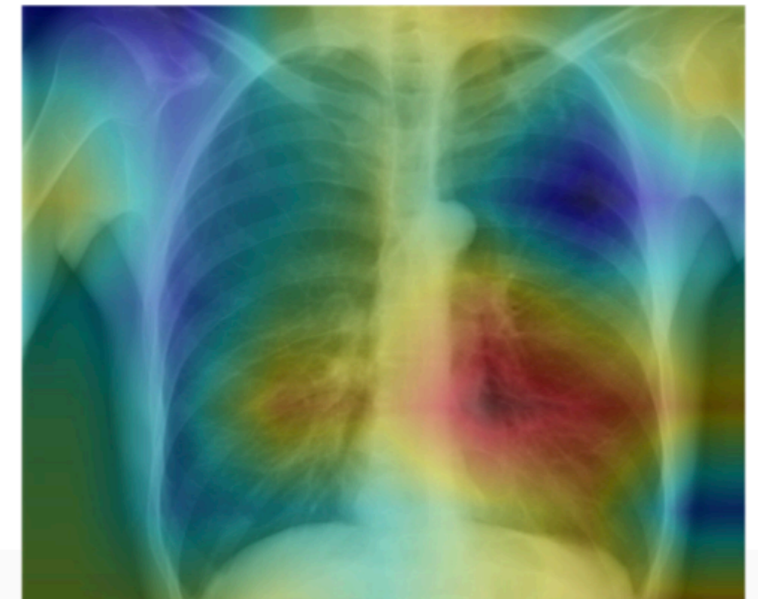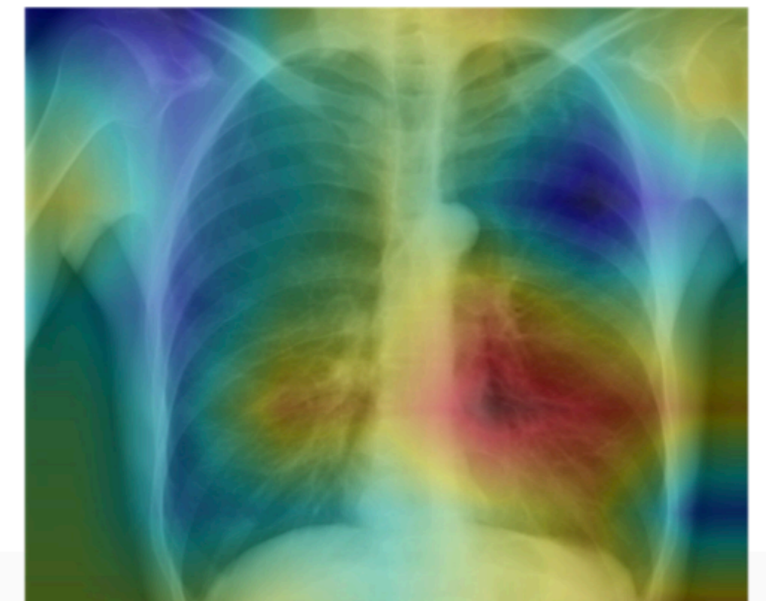# What is Machine Learning?

Experience
1000s of <image, disease> pairs

Supervised Learning

Output
Pneumonia Positive (85%)

CheXNet
121-layer CNN

Input
Chest X-Ray Image

Google Classroom and Website

Google Classroom code: cgt6rwd

Website: https://sites.google.com/view/es654-2020/

Announcement

Announcement

- Saturday, 11th Jan: Extra lecture(s) at 10 AM in 1/101 in lieu of 15th Jan (institute holiday)