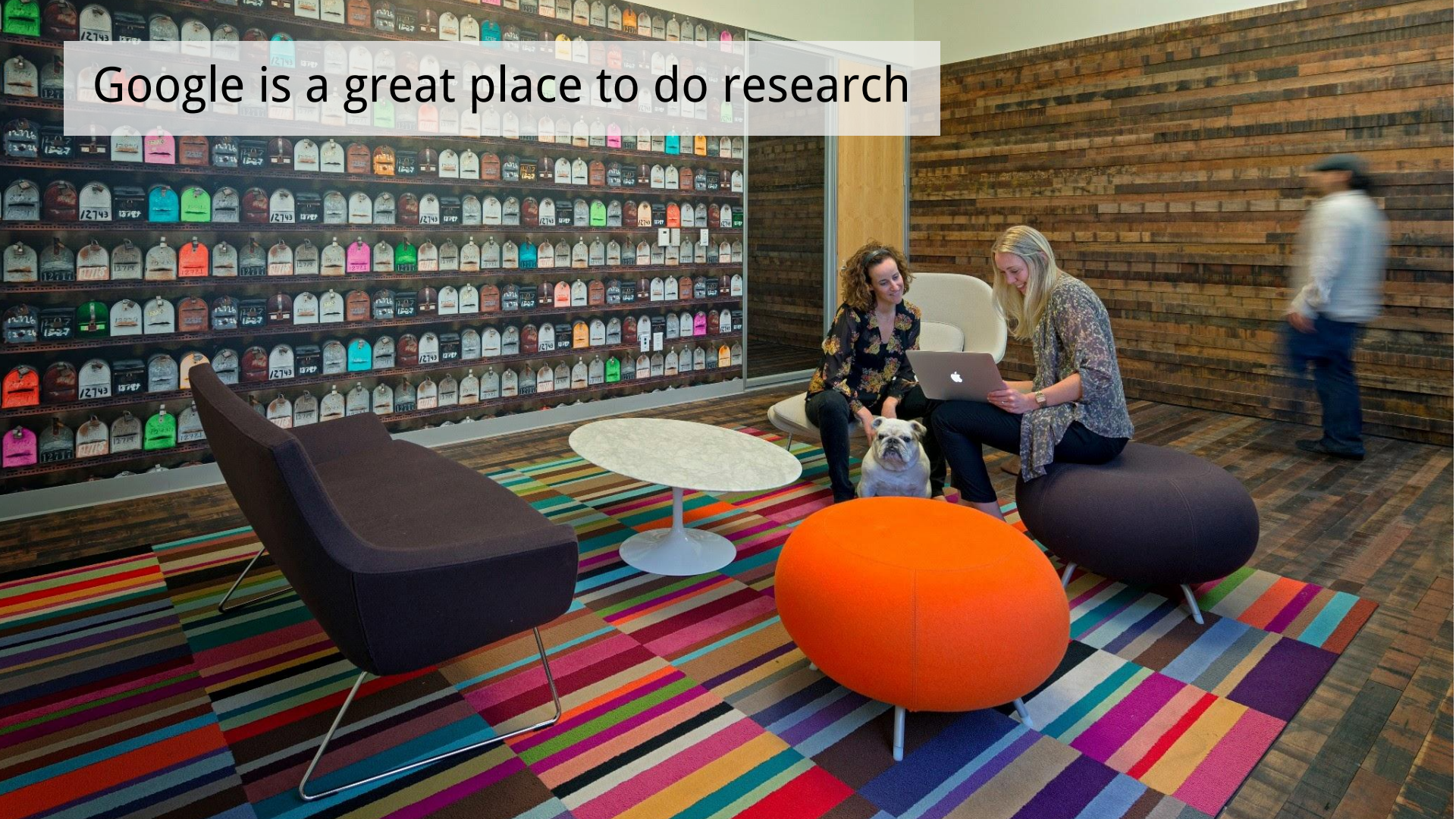


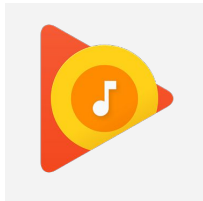
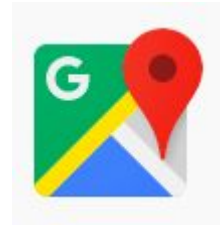
# **MACHINE INTELLIGENCE AT GOOGLE**



Google is a great place to do research



# Research for global products







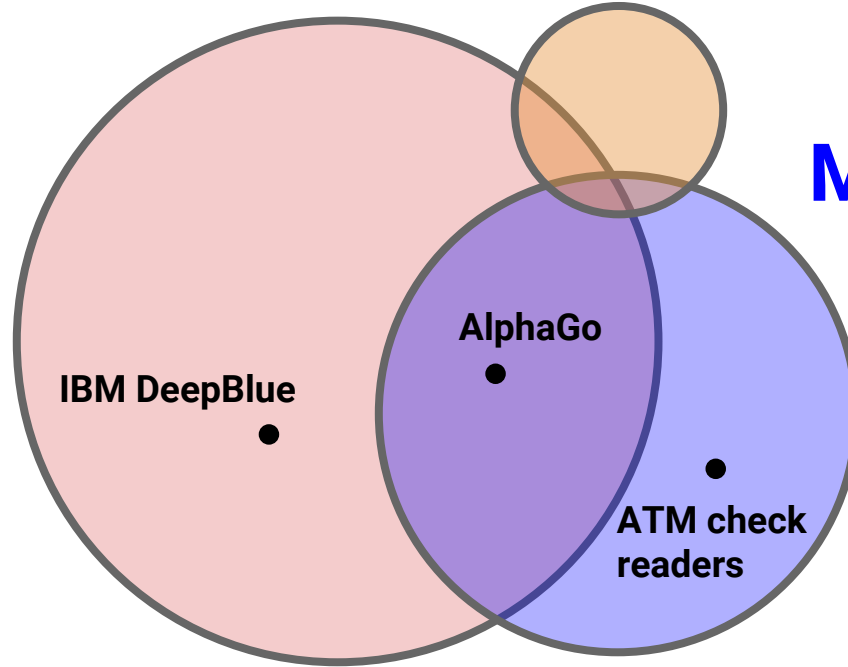
Google Research Europe



Google's mission is to organize the world's information and make it universally accessible and useful.

# Artificial Intelligence

Making machines intelligent



# Robotics

# Machine Learning

Making machines that learn

- Traditional AI systems are *programmed* to be clever.
- Modern ML-based AI systems *learn* to be clever.

# A different way of doing things

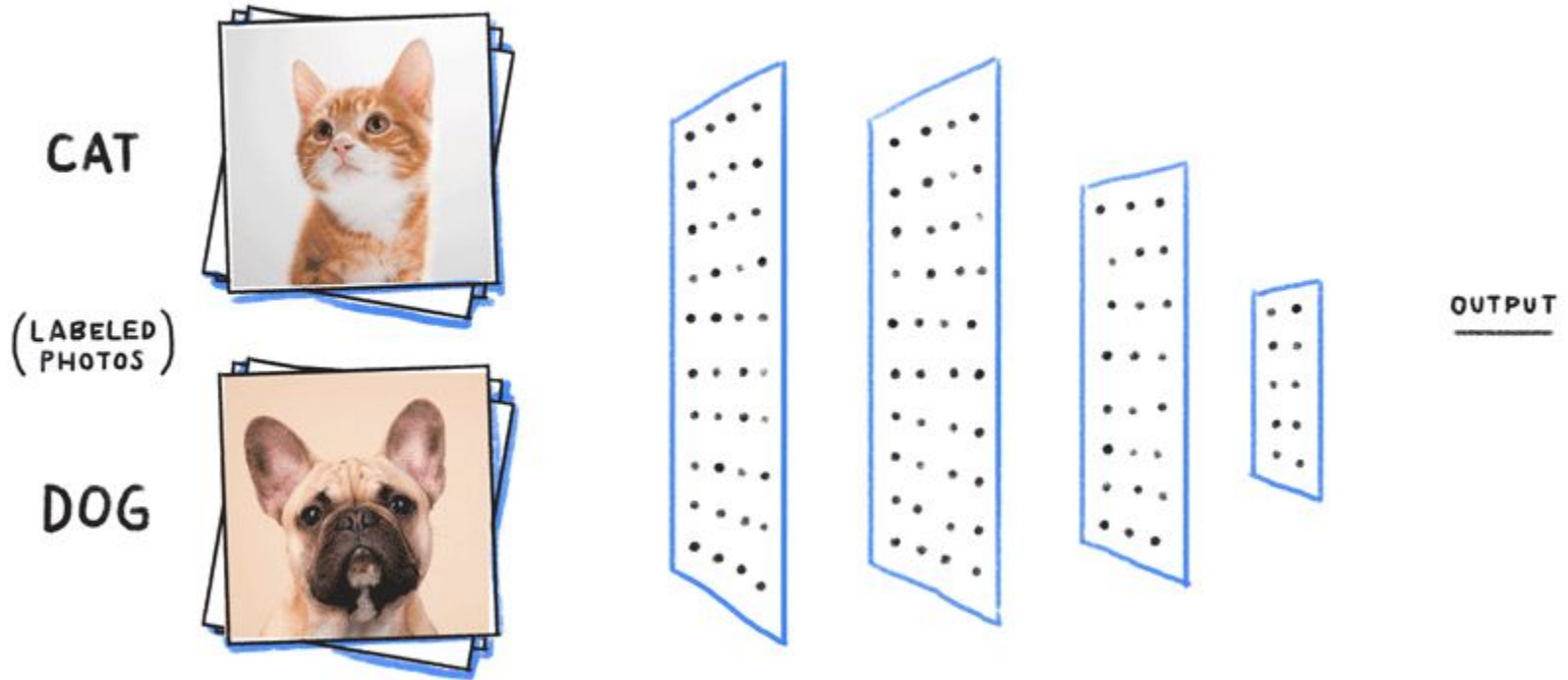
Write a computer program with **explicit rules** to follow

```
if email contains V!agrå  
    then mark is-spam;  
if email contains ...  
if email contains ...
```

Write a computer program to **learn from examples**

```
try to classify some emails;  
change self to reduce  
errors;  
repeat;
```

# Deep Neural Networks







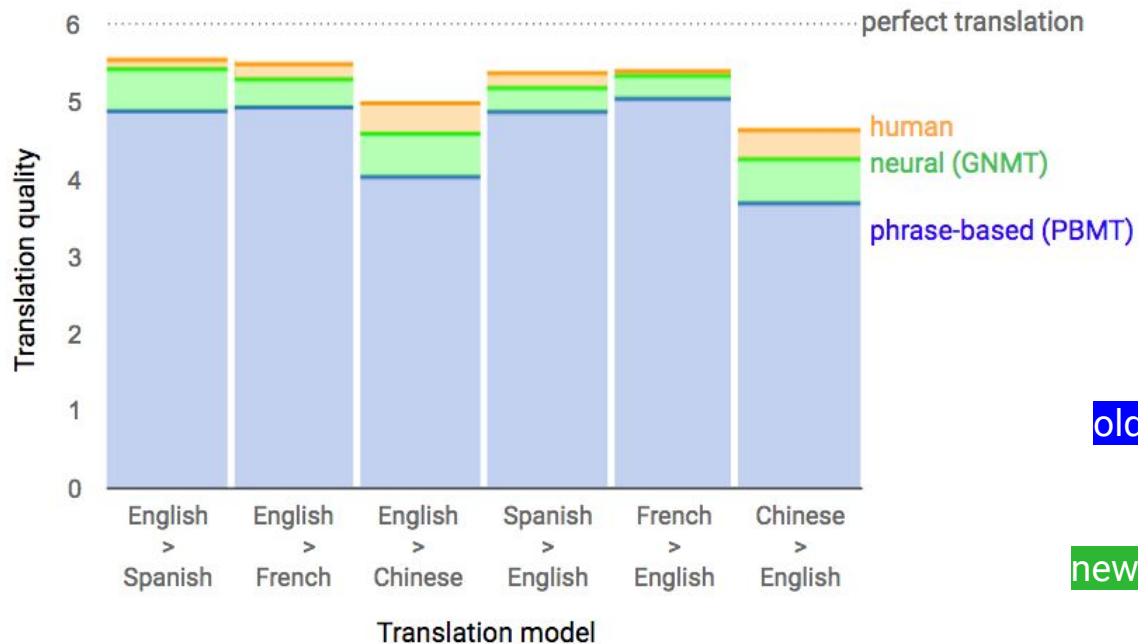
# **MACHINE INTELLIGENCE IN GOOGLE PRODUCTS**



Google Translate



# recent Translate improvements



old: PBMT

new: GNMT

Google Translate

Chinese ↔ English

CHINESE

请问, 洗手间在哪里?  
Qǐngwèn, xǐshǒujiān zài nǎlǐ?

ENGLISH

Where Will the restroom?

ENGLISH

Excuse me, where is the toilet?





[glacier]



Google app

20%

of mobile searches  
are via voice



Listening...

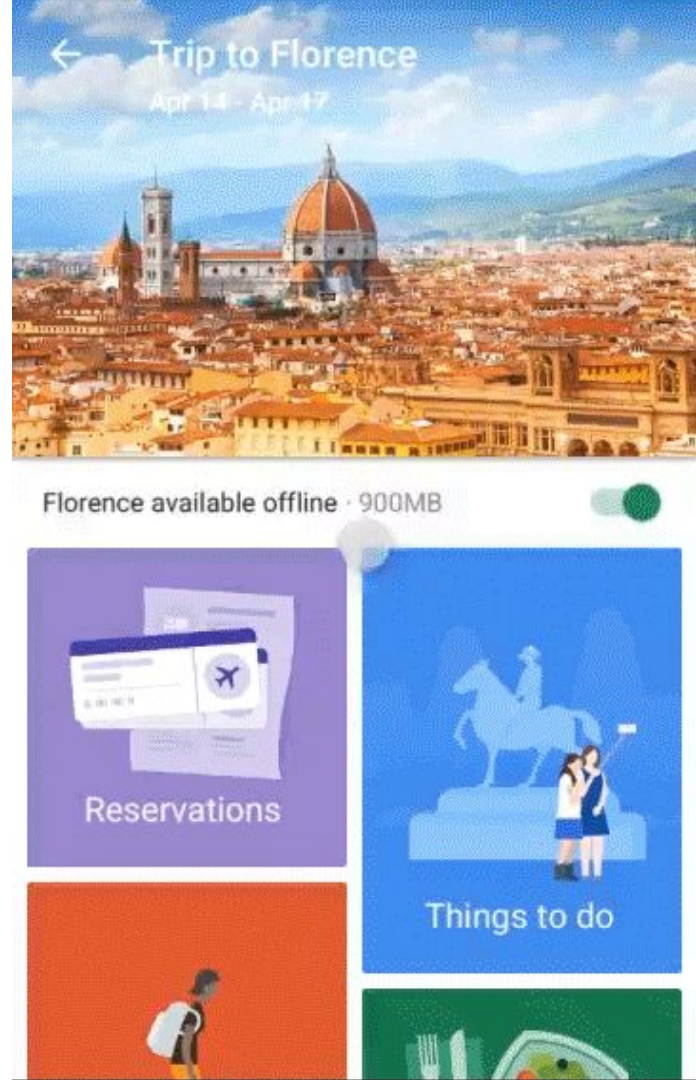


Google





Google Trips







## vacation plans



Peter Harbison  
to me

5:00 PM



I think I'll be able to take a week of vacation next month. Leaning towards Kauai.

Do you have your vacation plans set yet? When you do, can you send them along?



Reply



No plans yet.

I just sent them to you.

I'm working on them.



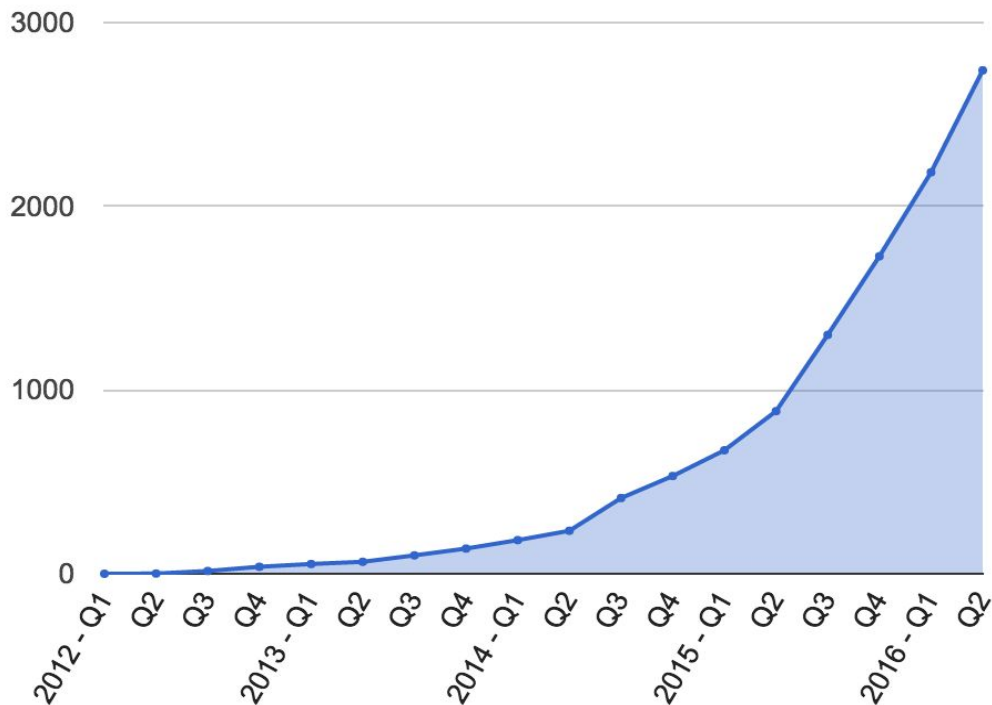
# Smart reply in Inbox

# 12%

of all responses  
sent on mobile

# Machine Learning in Google Projects

## Project directories with deep model files



## Used in many areas:

---

- Android
- Apps
- Gmail
- Maps
- Photos
- Speech
- Search
- Translation
- YouTube
- and many others ...

machine learning... for everyone



sharing our tools with people around the world



**TensorFlow** released  
in Nov. 2015

**#1**  
repository  
for machine learning  
on GitHub

# Google Cloud Machine Learning



"running", "score": 0.99803412,  
"marathon", "score": 0.99482006



"joyLikelihood": "VERY\_LIKELY"

,"description": "ABIERTO\n",  
"local": "es"



sorting cucumbers from a Japanese farm



detecting sea cows for conservation efforts



and many more....



- Establish best practices
- Advance public understanding
- Open discussion of AI and its influences on people and society

# Partnership on AI

to benefit people and society

<http://www.partnershiponai.org/>

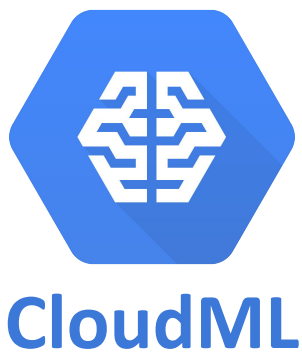
est. September 2016





# Distributing ML Tech Globally

## Shared Tools



## Shared Knowledge

- Open research publication at international conferences
- Global direct community education
- Funding academic research & education (e.g. international PhD fellowship)



Machine learning is already making a big positive difference but there are countless more opportunities...