Google Cloud

Stepping Stone for AI and Machine Learning

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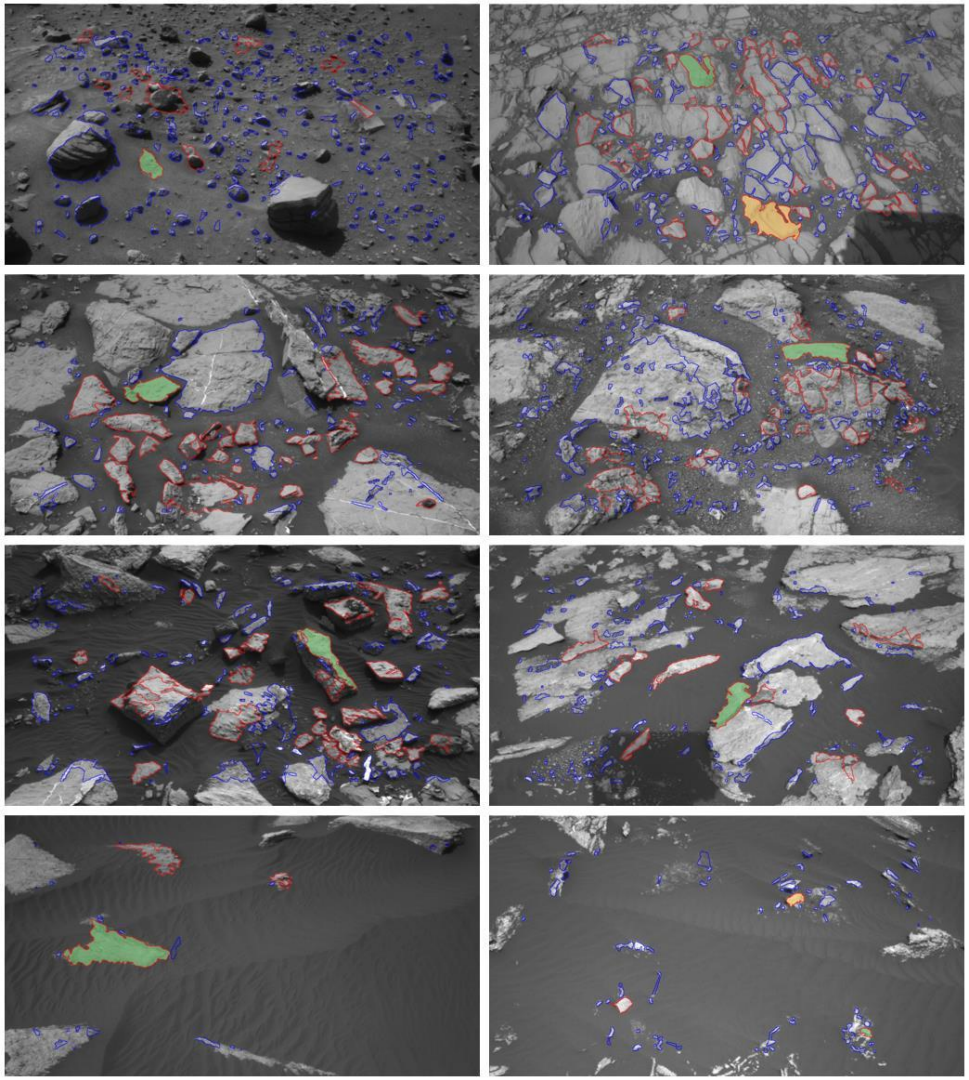
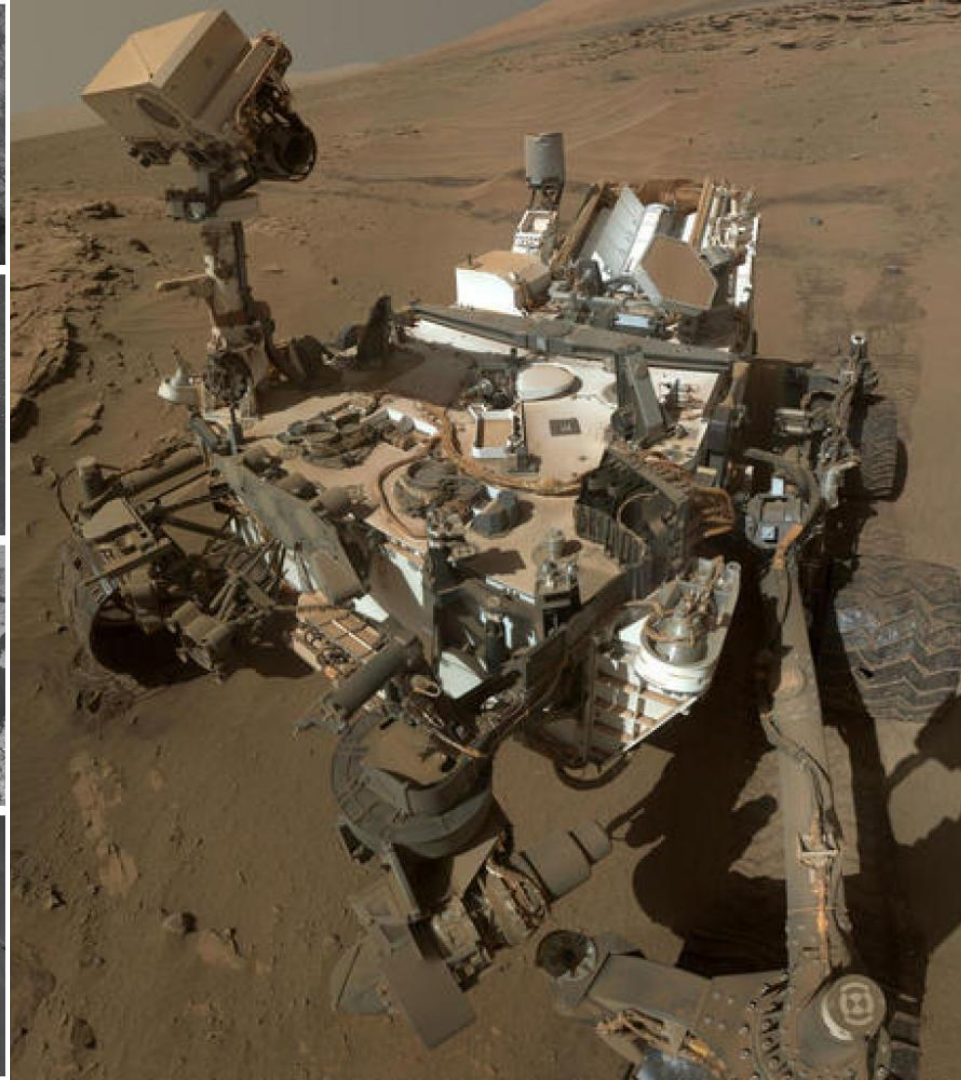
Customer Engineer
sroz@google.com

A connected worker

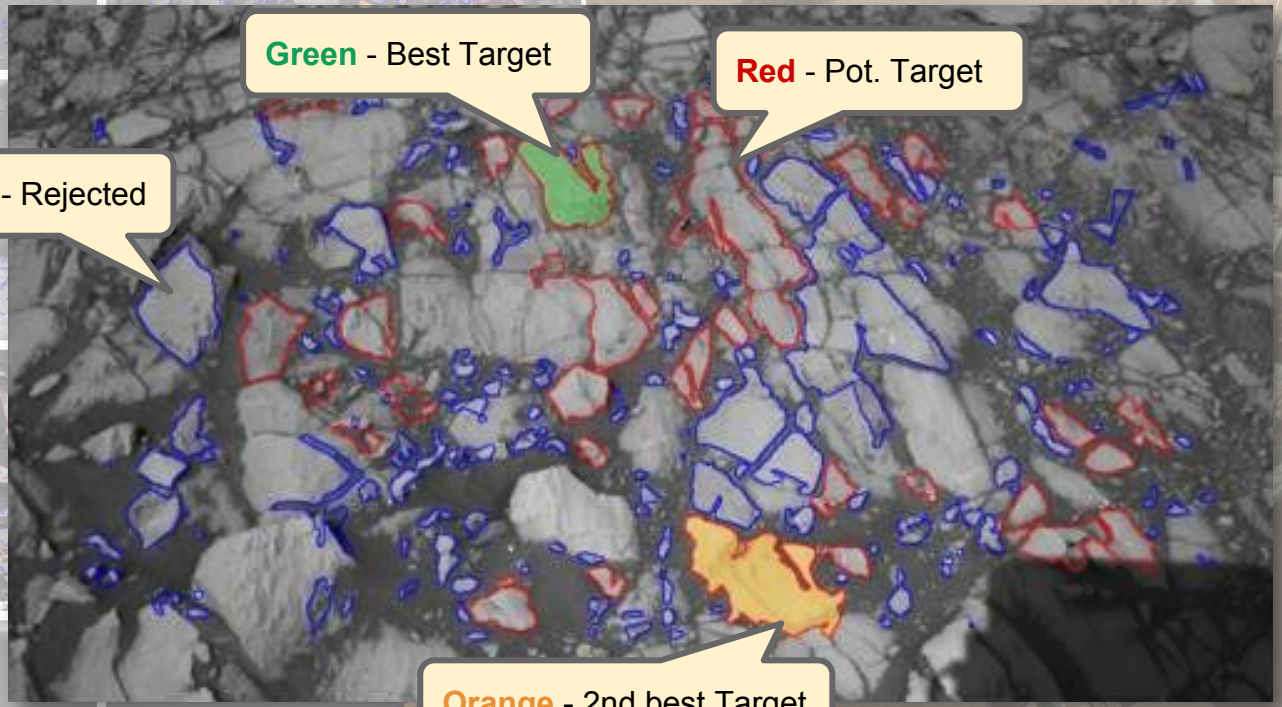
An AI powered connected and very far away remote worker

Curiosity





Which rock to zap?

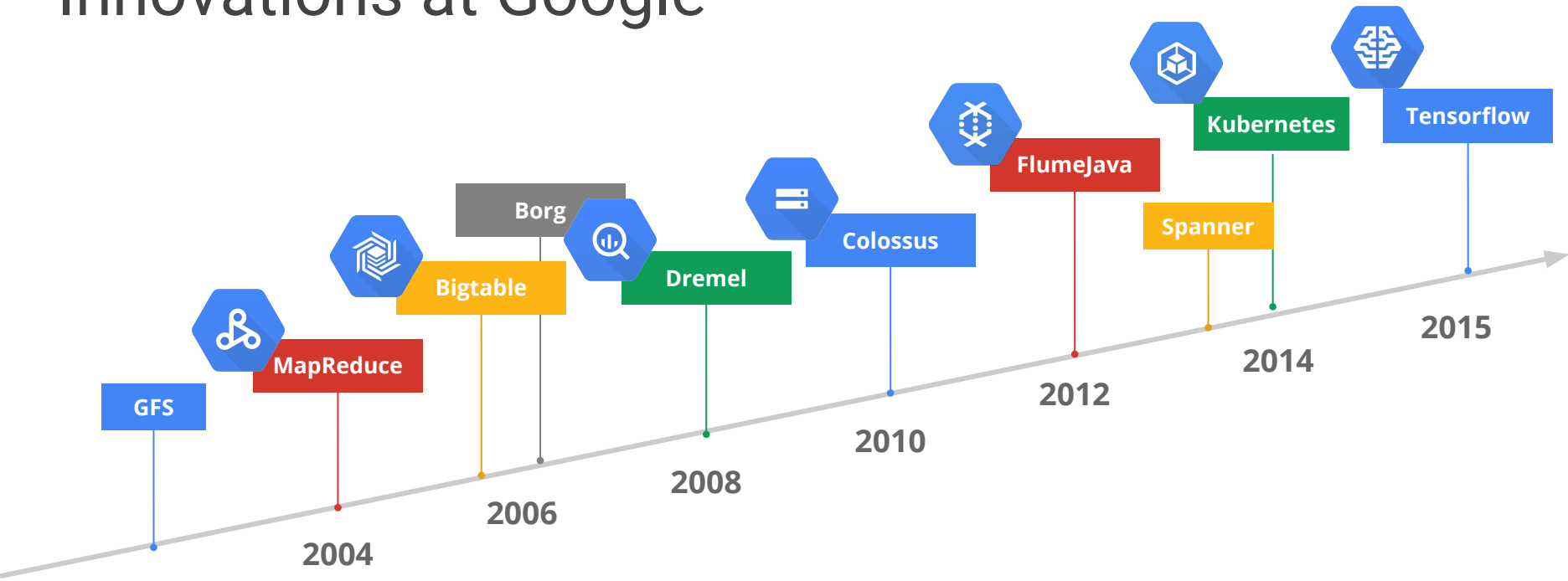


Google’s mission...

… to organize the world’s information and make it universally accessible and useful


Project Loon

Innovations at Google



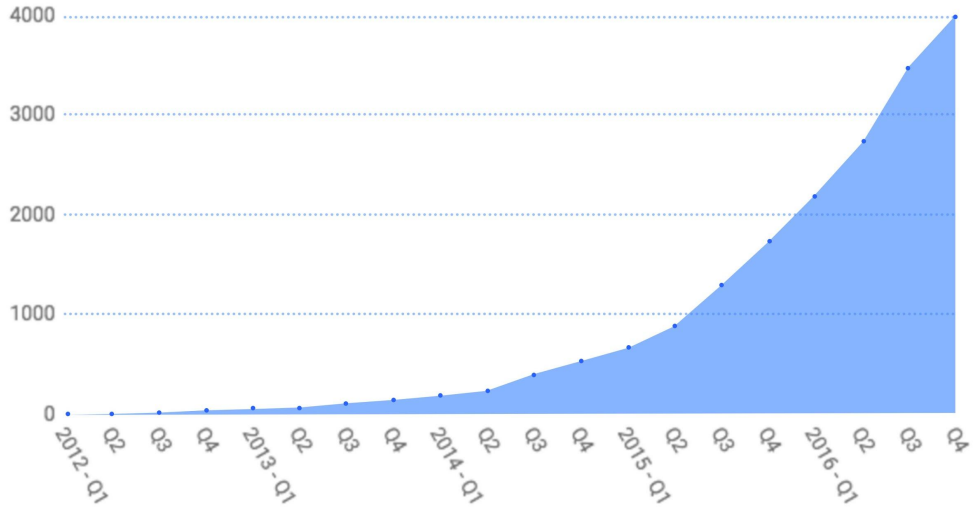
HDFS hadoop SQL APACHE DRILL

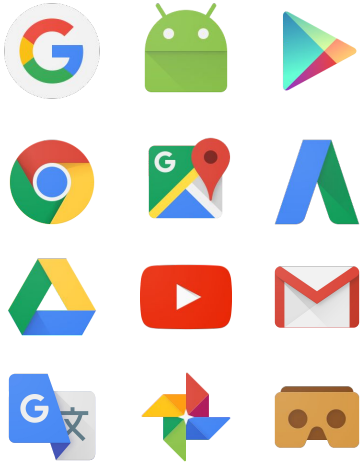
TensorFlow

Google Cloud

*)

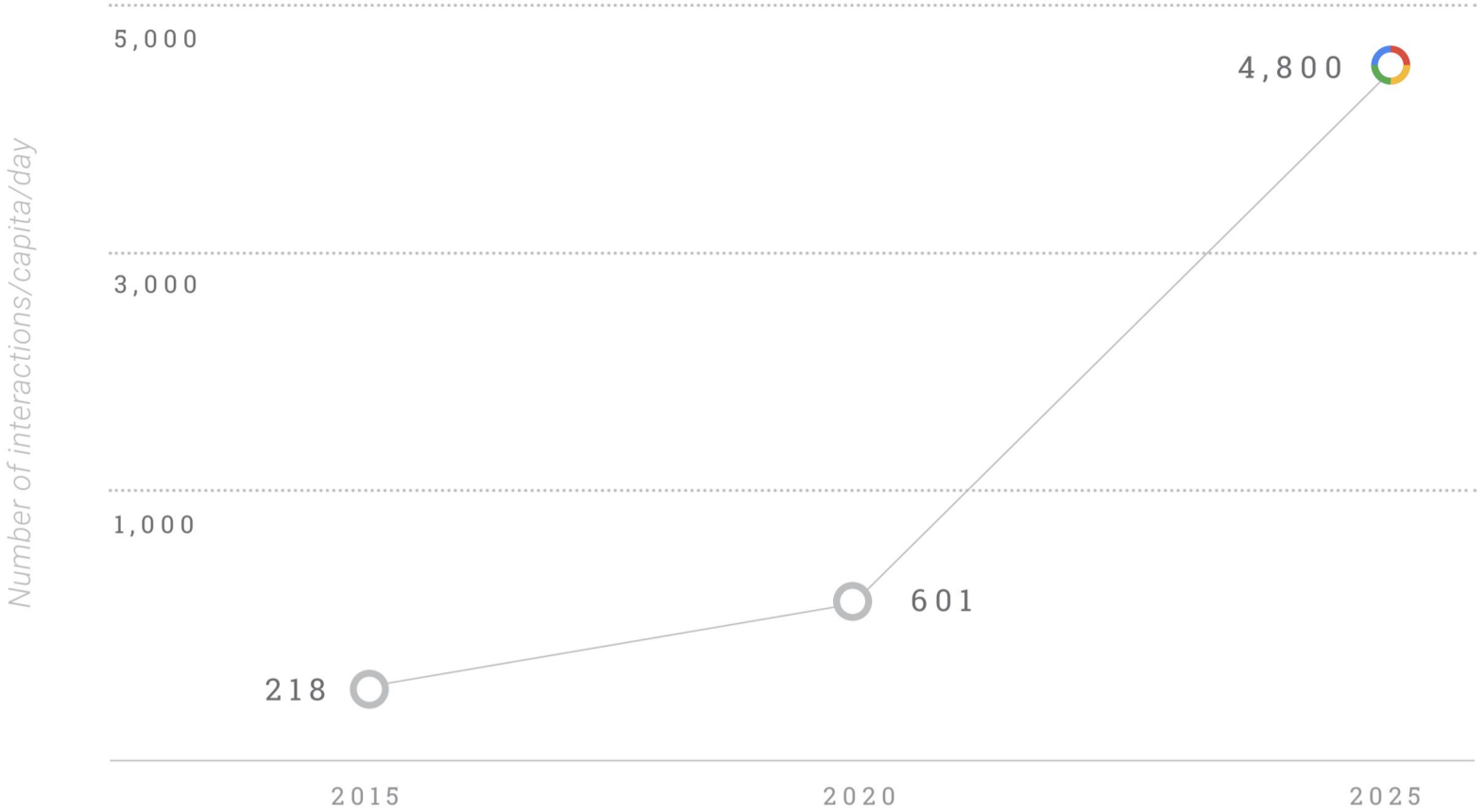
Rapid accelerated infusion of ML at Google





Used across products

INTERACTIONS PER CONNECTED PERSON PER DAY



Artificial Intelligence

The science to make things smart

Machine Learning

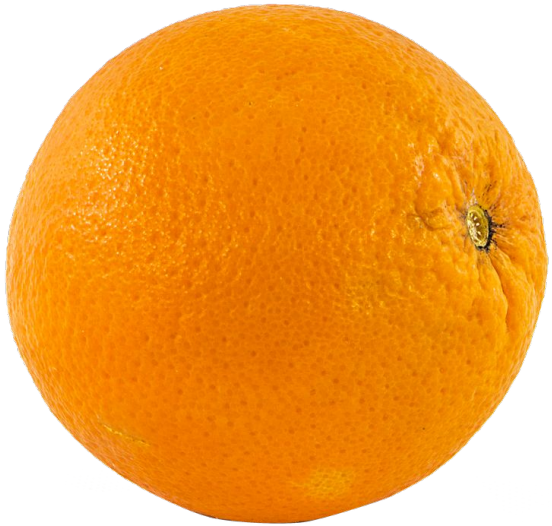
Building machines that can learn

Neural Network

A type of algorithms in machine learning

*)

How do we do this without ML?



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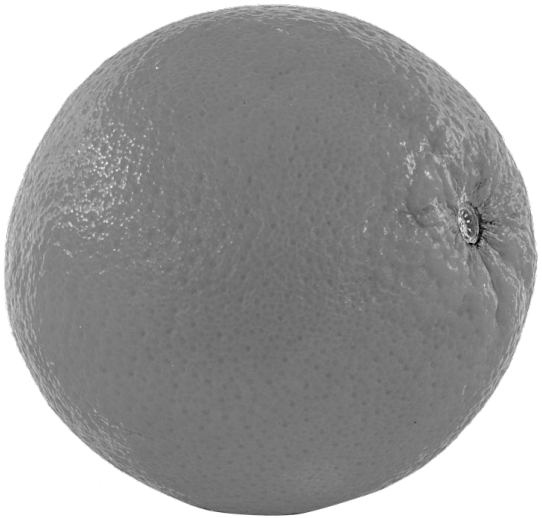

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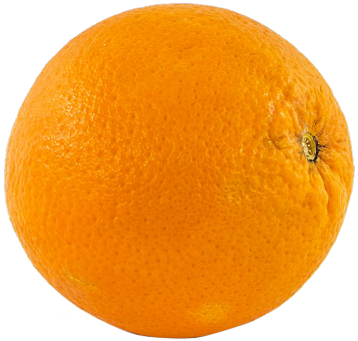


Even Worse...








Sources: ComScore

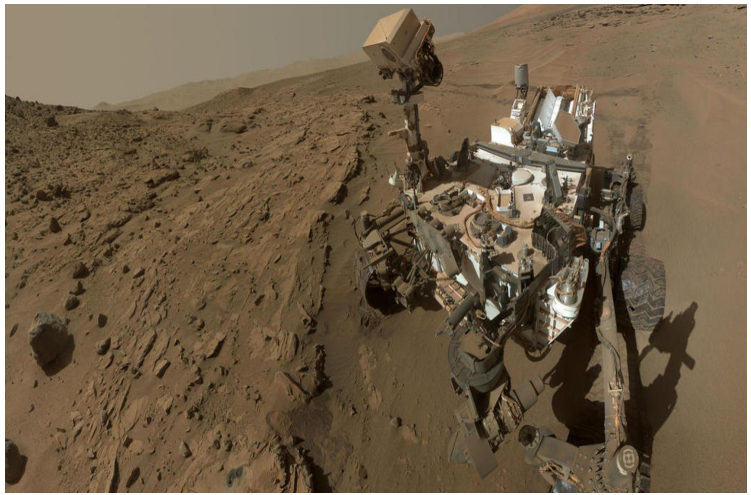
Machine learning is a field of computer science that gives computers the ability to learn without being explicitly programmed*)

*)

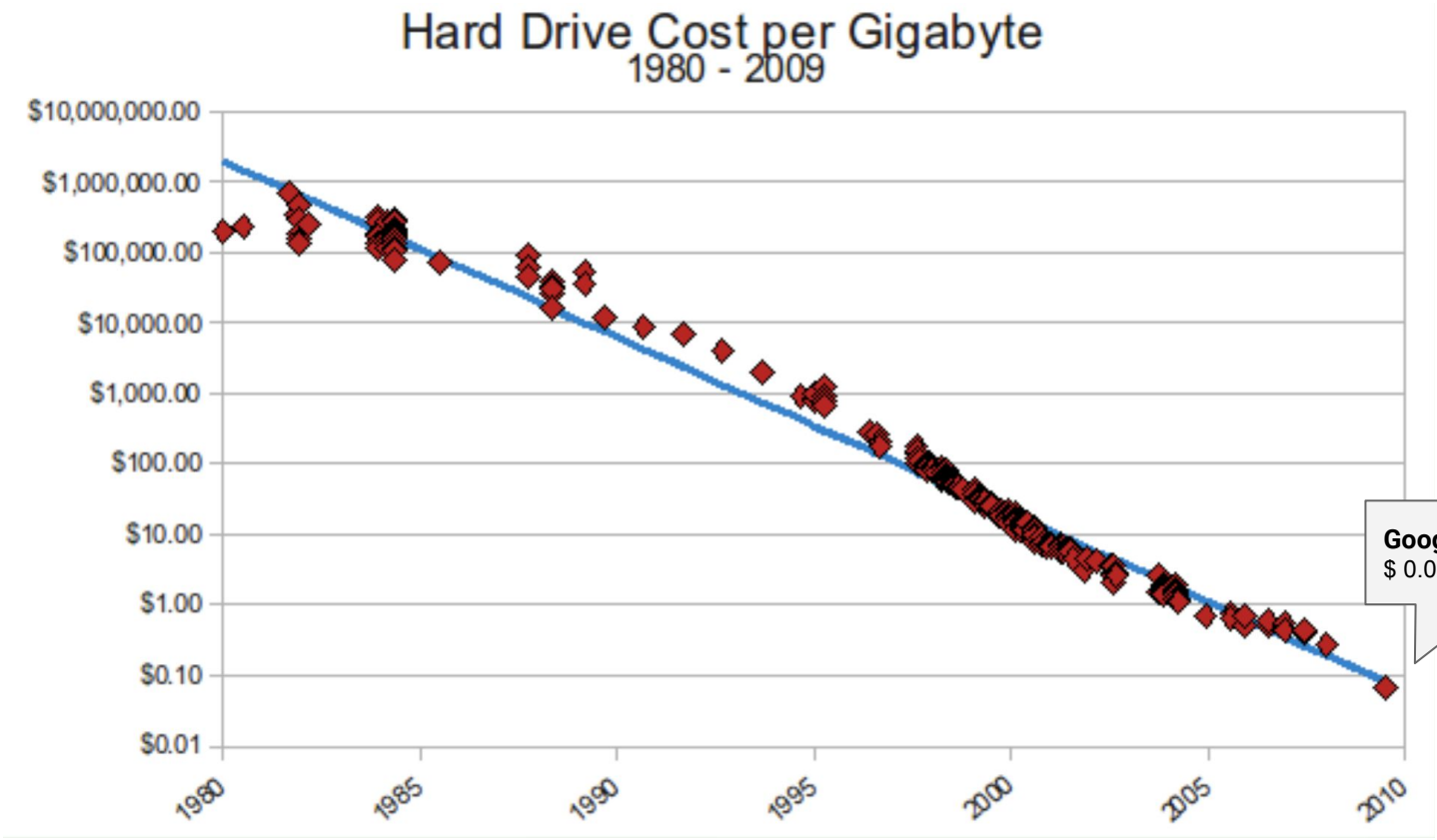
Why so popular now?

1956

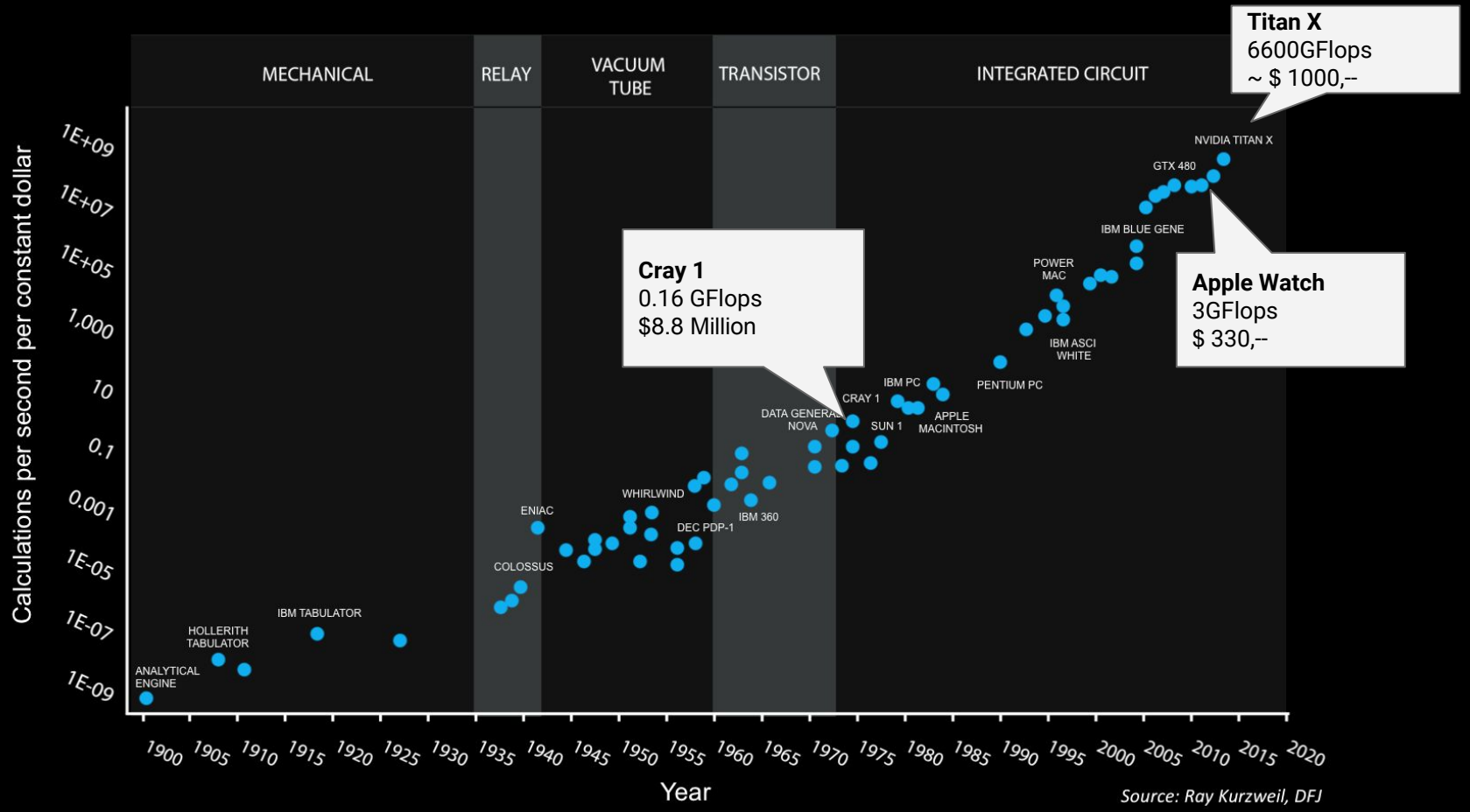
2017



On February 24, 1956, Arthur Samuel's Checkers program, which was developed for play on the IBM 701, was demonstrated to the public on television
http://www.andreykurenkov.com/writing/a-brief-history-of-game-ai/



120 Years of Moore's Law



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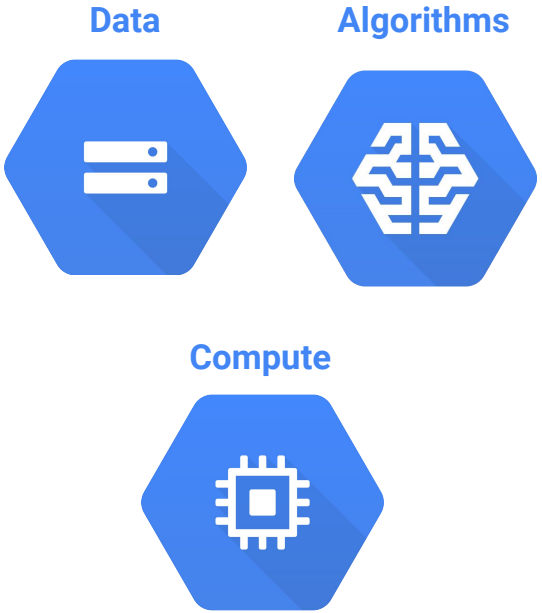


Common believe...

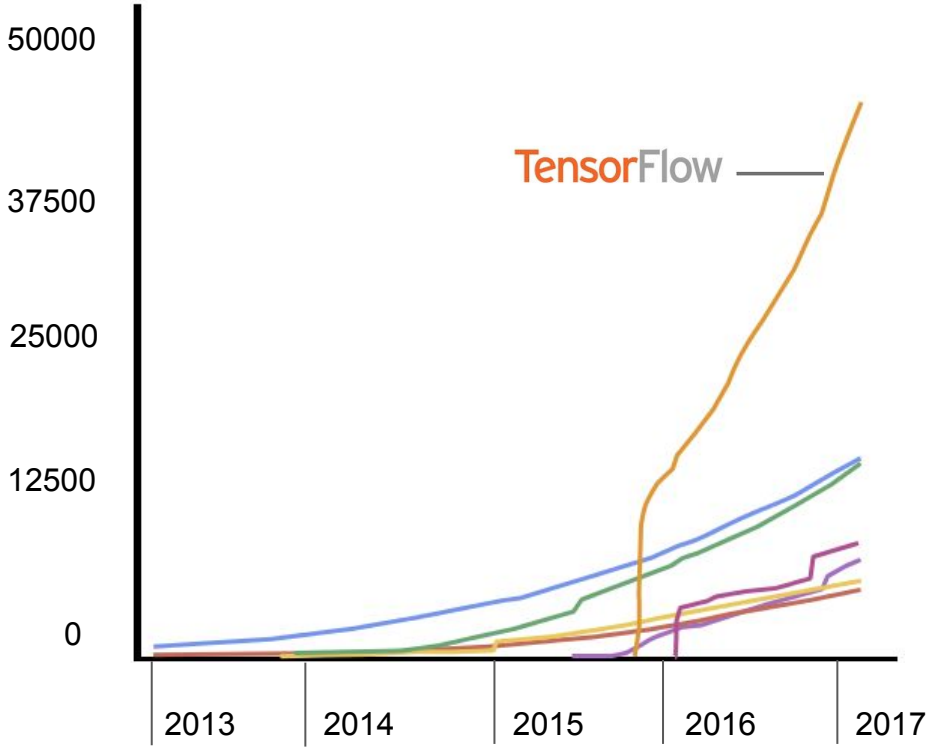
Sharing our tools with
people around the world

TensorFlow
released in Nov. 2015

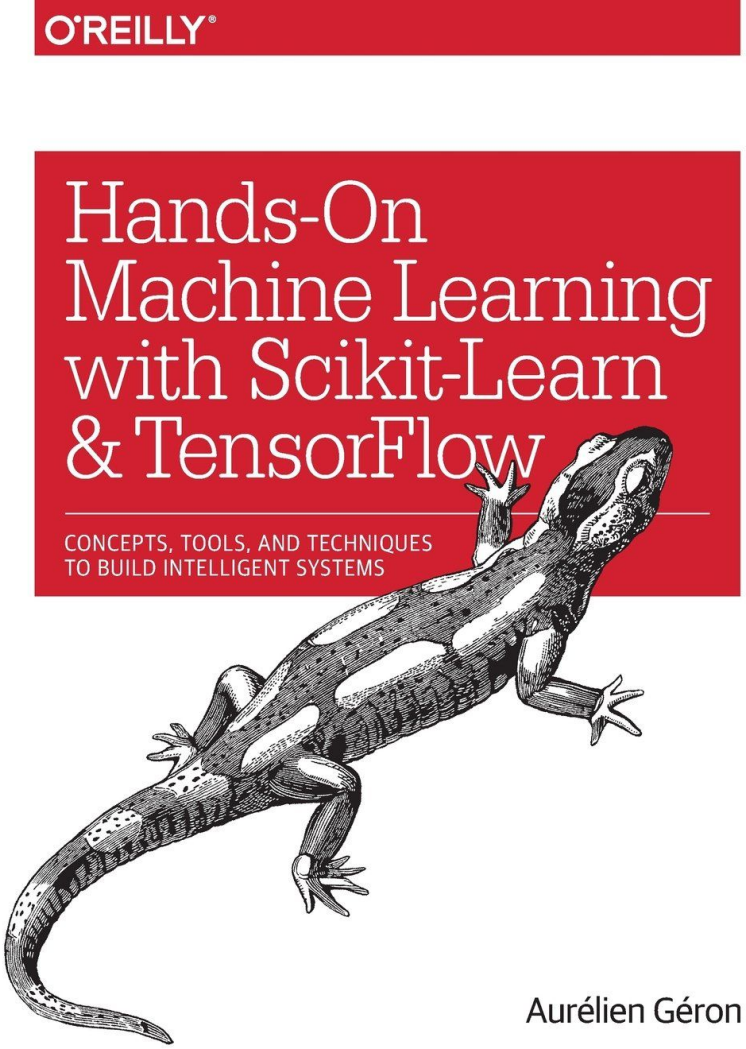
#1 Repository

for machine learning
on GitHub

TensorFlow



Google Cloud



Two ways Google Cloud can help you Benefit from Machine Learning

Use your own data to train models

TensorFlow

Cloud Machine Learning Engine

Ready to use Machine Learning models

Cloud Vision API

Cloud Speech API

Cloud Jobs API

Cloud Translation API

Cloud Natural Language API

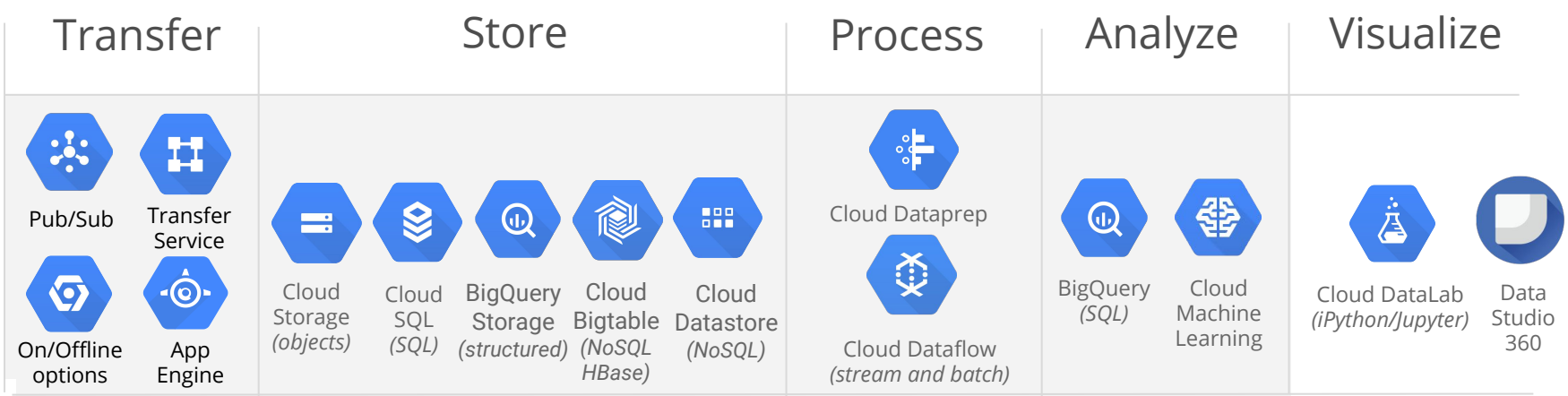
Cloud Video Intelligence

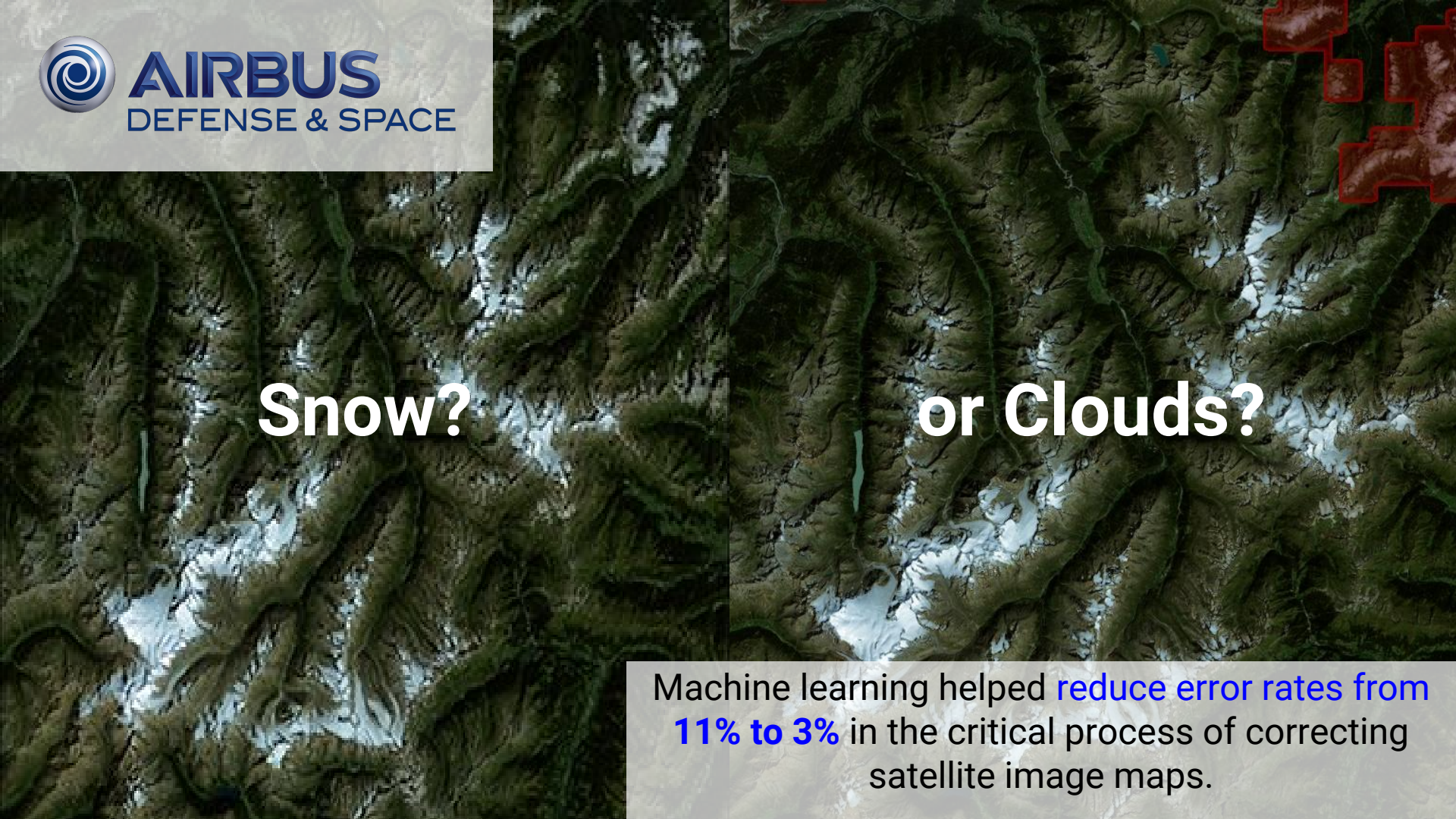
Use/extend OSS SDK — Build custom models — Use pre-built models

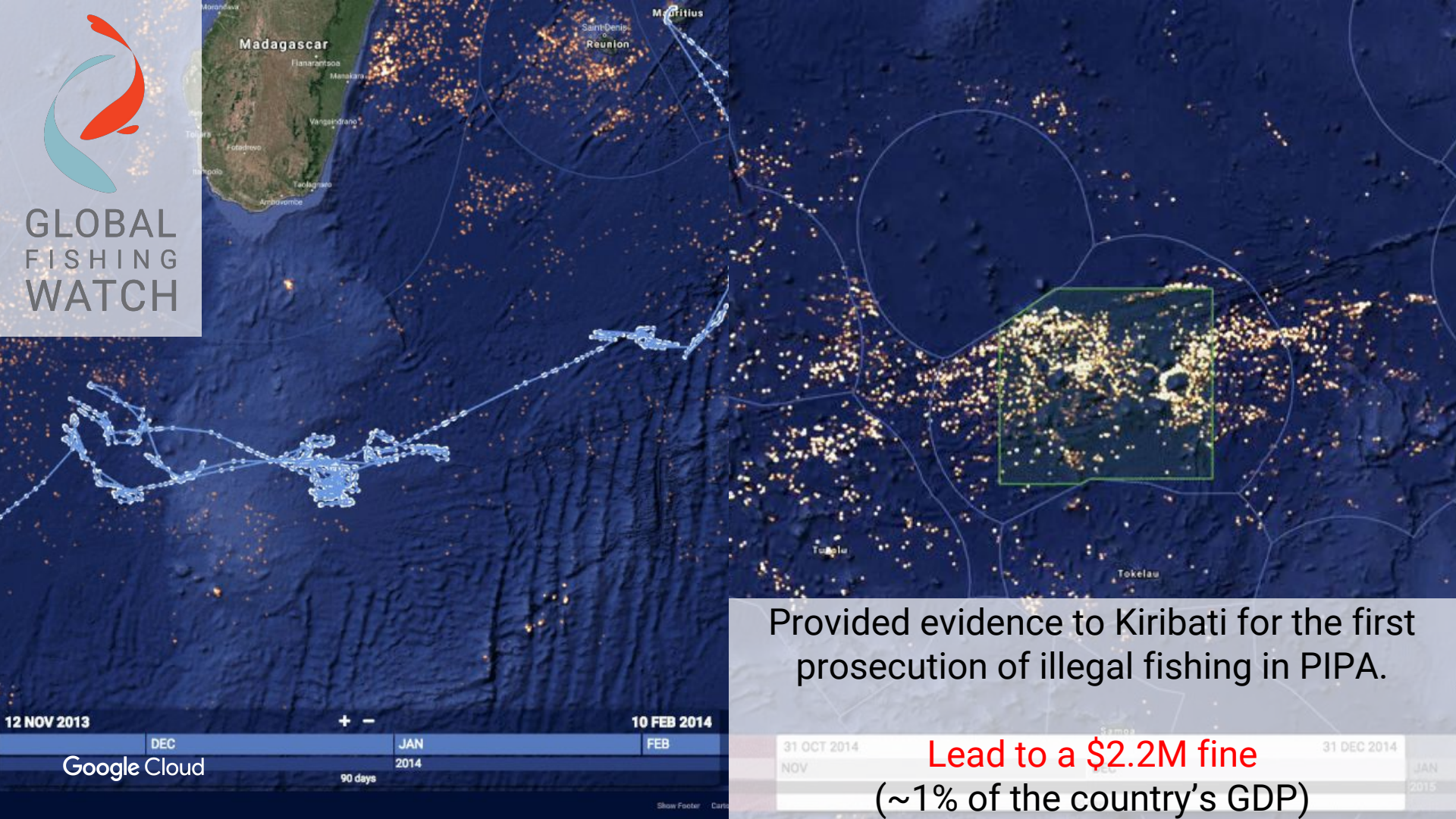
ML researcher — Data Scientist — App Developer

Google Cloud

Array of tools and solutions to enable ML



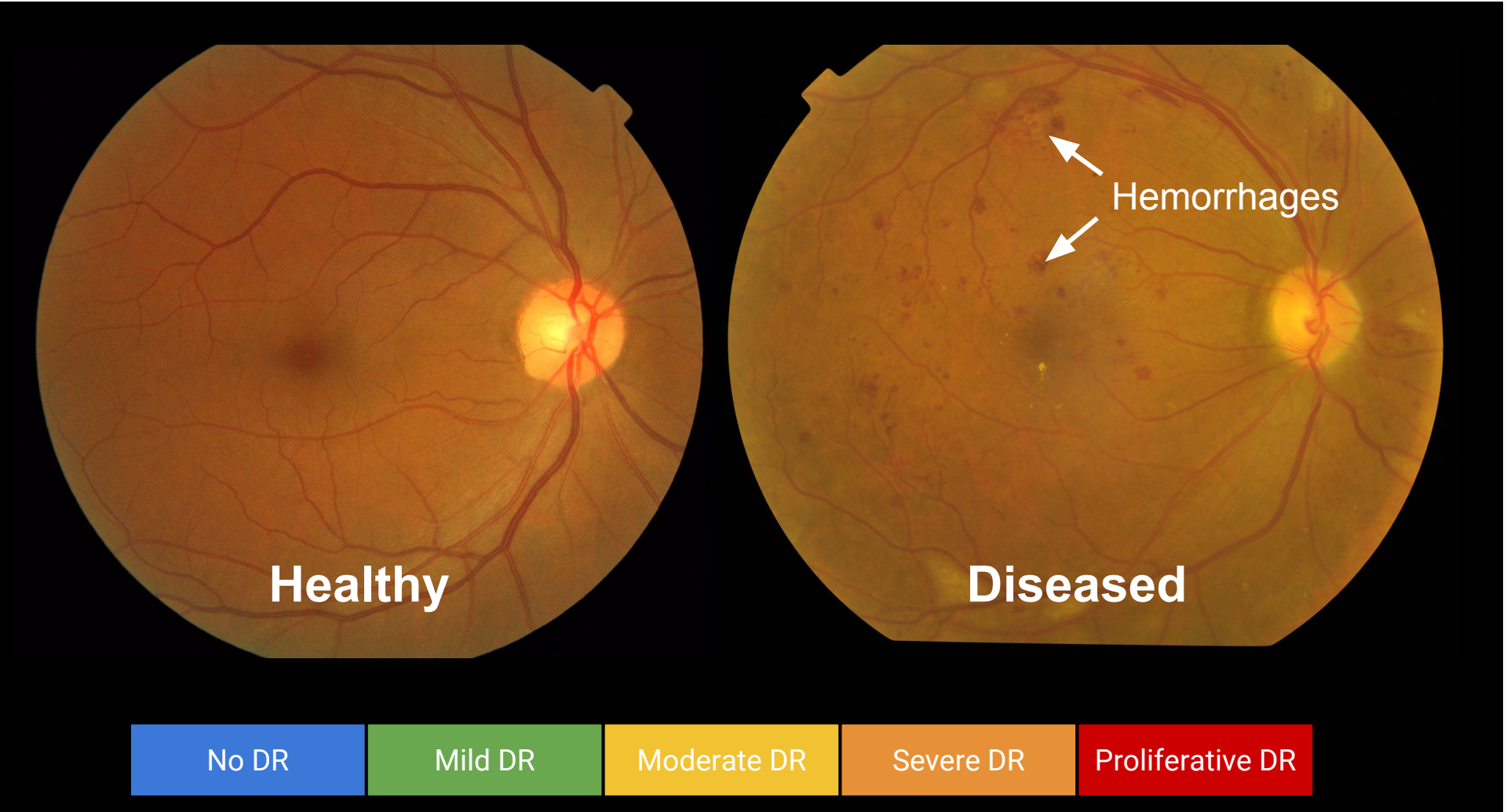

AIRBUS
DEFENSE & SPACE
Snow?
or Clouds?
Machine learning helped reduce error rates from 11% to 3% in the critical process of correcting satellite image maps.



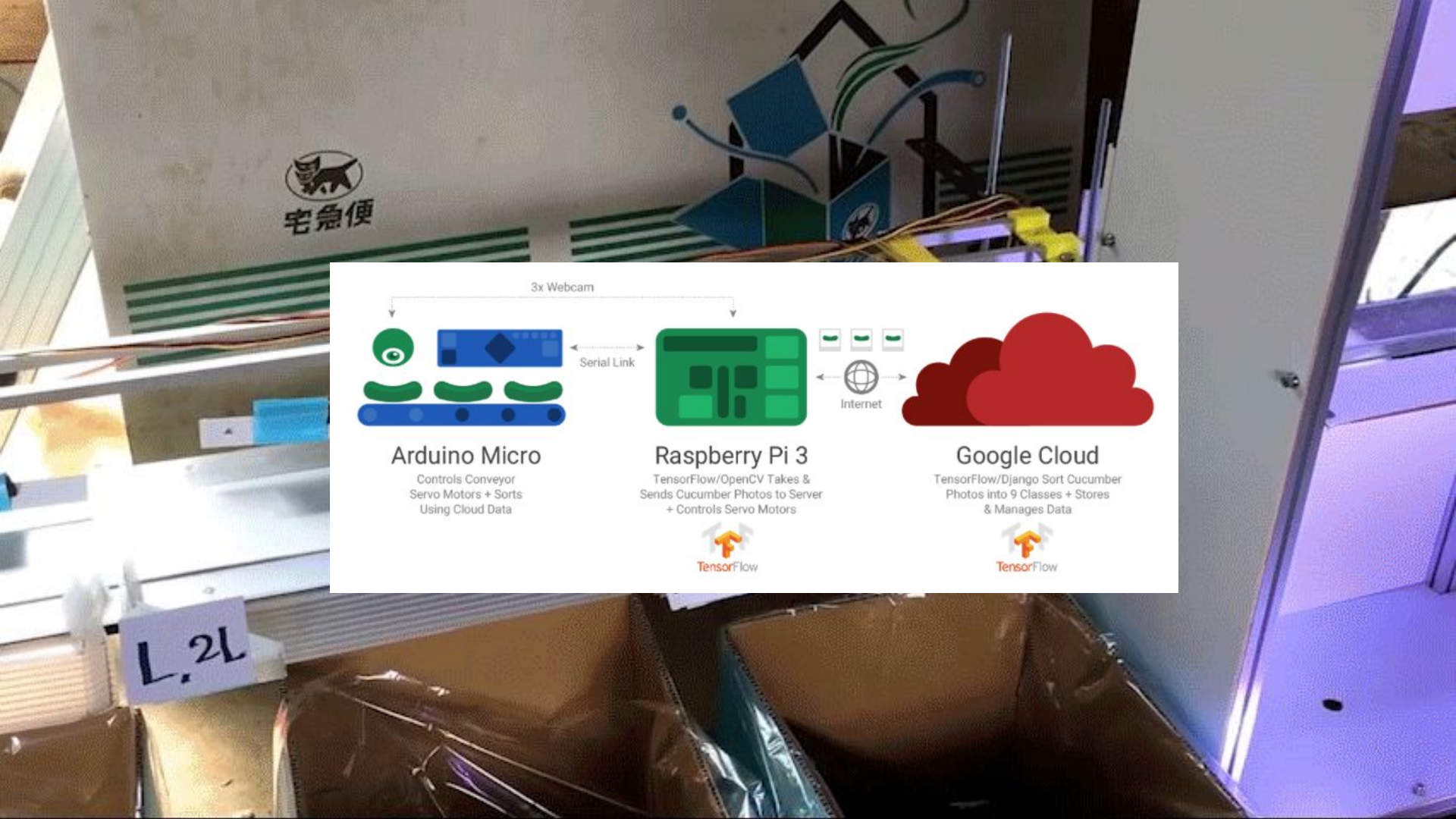
Provided evidence to Kiribati for the first prosecution of illegal fishing in PIPA.

Lead to a $2.2M fine

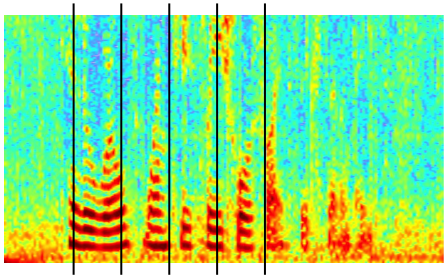
(~1% of the country's GDP)


Hemorrhages
Healthy
Diseased
No DR
Mild DR
Moderate DR
Severe DR
Proliferative DR

Makomoto (Cucumber Farmer):
"Farmers want to focus and spend their time on growing delicious vegetables."


宅急便
L.2L
3x Webcam
Serial Link
Internet
Arduino Micro
Controls Conveyor
Servo Motors + Sorts
Using Cloud Data
Raspberry Pi 3
TensorFlow/OpenCV Takes &
Sends Cucumber Photos to Server
+ Controls Servo Motors
TensorFlow
Google Cloud
TensorFlow/Django Sort Cucumber
Photos into 9 Classes + Stores
& Manages Data
TensorFlow

Understanding Speech



Powered by **deep learning neural networking** to power your applications.

old: PBMT

new: GNMT

Google Cloud

From Data to Deployment

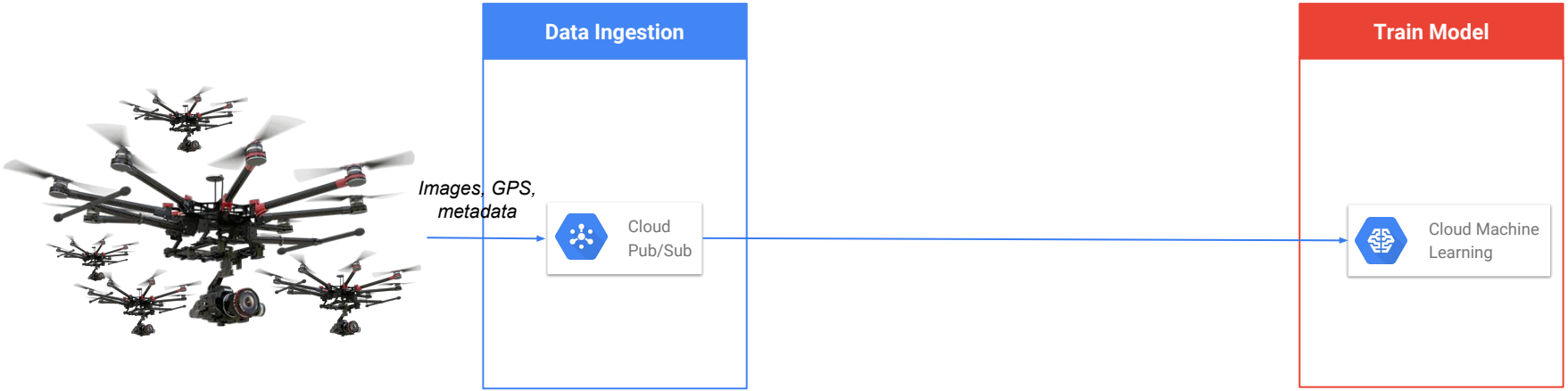
Ingest data

Images, GPS, metadata

Train Model

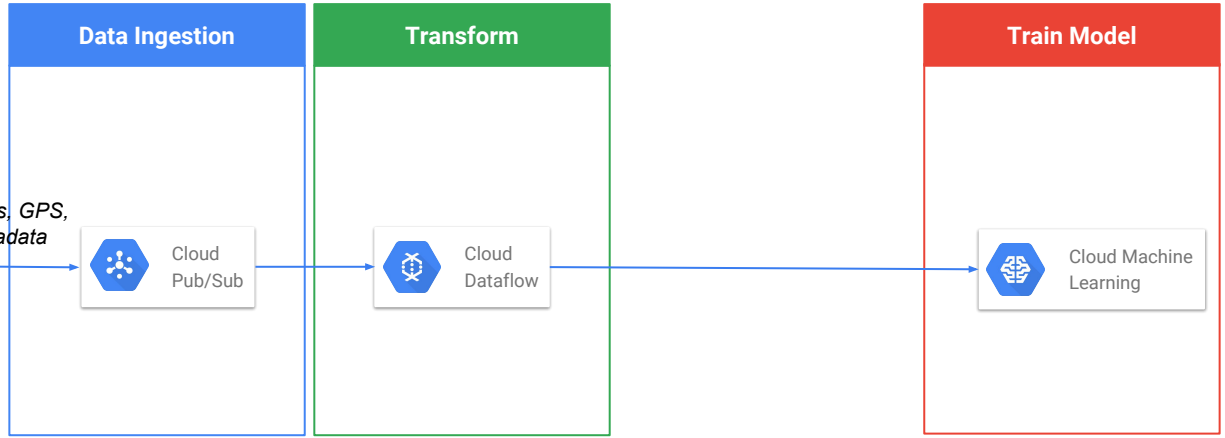
Cloud Machine Learning

Ingest data (serverless, at-scale)



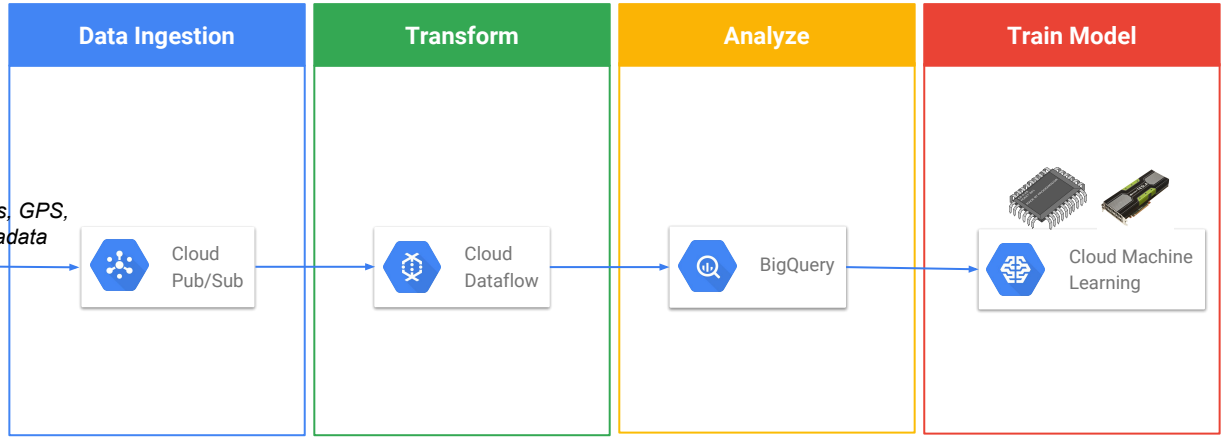
Transform data (stream or batch)

Images, GPS, metadata



Analyze Data (Petabyte)

Images, GPS, metadata



Tensor Processing Units

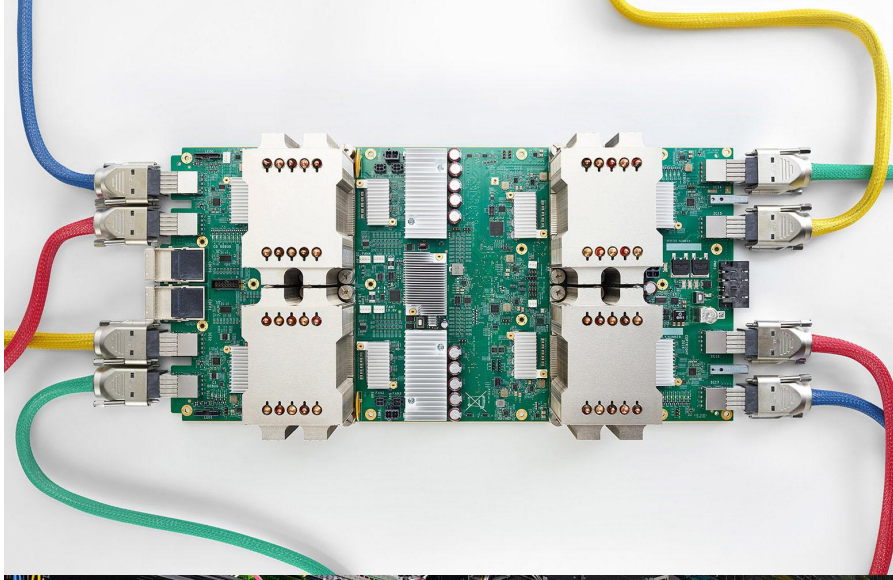
Google-designed custom ASIC built and optimized for TensorFlow

1st generation used in production for over 16 months

Now on 2nd generation—180 Teraflops per TPU

24 hours on 32 GPUs

6 hours on ⅛ of a TPU Pod



Google Cloud

Deploy Model

Images, GPS, metadata

Data Ingestion

Cloud Pub/Sub

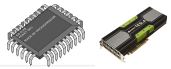
Transform

Cloud Dataflow

Analyze

BigQuery

Train Model



Cloud Machine Learning

Detect failures in real-time

Manage & Deploy at Scale

Cloud Machine Learning

Google Cloud

Build quickly … but not use enough data

Questions?

sroz@google.com

Google Cloud