AI trends in Automotive

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AWS for automotive

AWS enables our customers and partners to deliver intelligent, personalized brand experiences across the value chain

Cloud IT infrastructure

Compute

Storage

Database

Technology building blocks

Serverless Computing

Data Lakes

HPC

Alexa

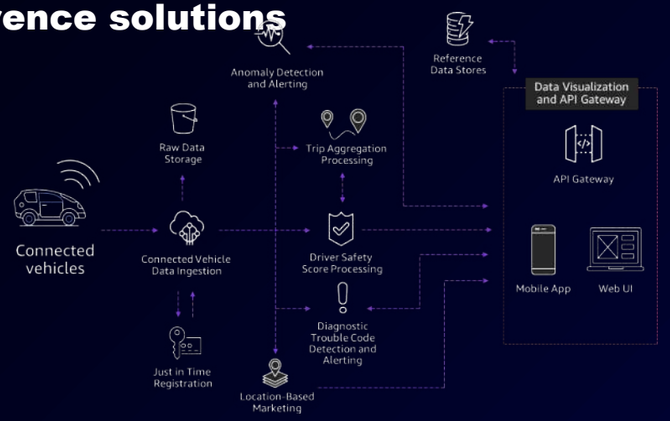
IoT

Machine Learning

Edge Computing

Image Analysis

Reference solutions



Amazon companies

amazon music

audible an amazon company

amazon instant video

amazon Prime

amazon fireTV

amazon key

amazon logistics

AWS Partner Network (APN)

Automotive transformation

Every automotive company needs to also be a software company

Vehicle manufacturer

Product attributes

Hardware

Independent physical interfaces

Mobility provider

Customer experiences

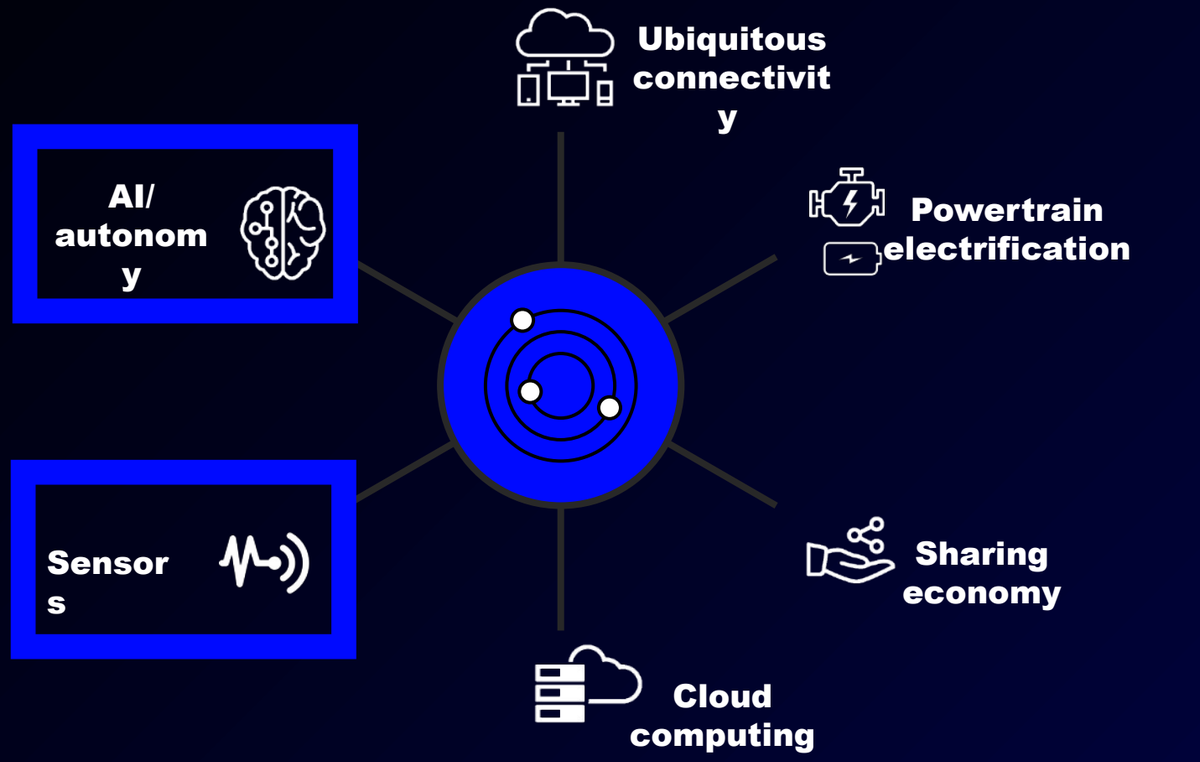
Software

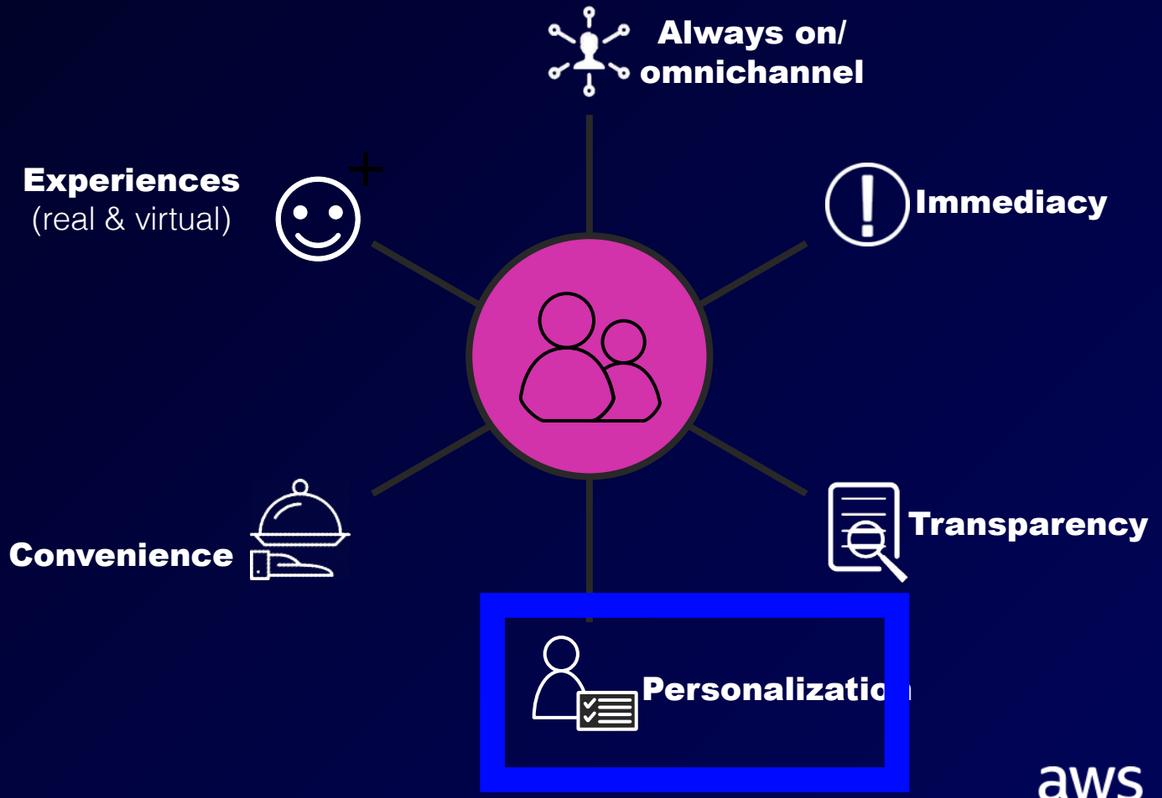
Integrated software interfaces

Automotive transformation

Unprecedented convergence of technology and consumer trends

Transformational technology ⟷ Consumer trends





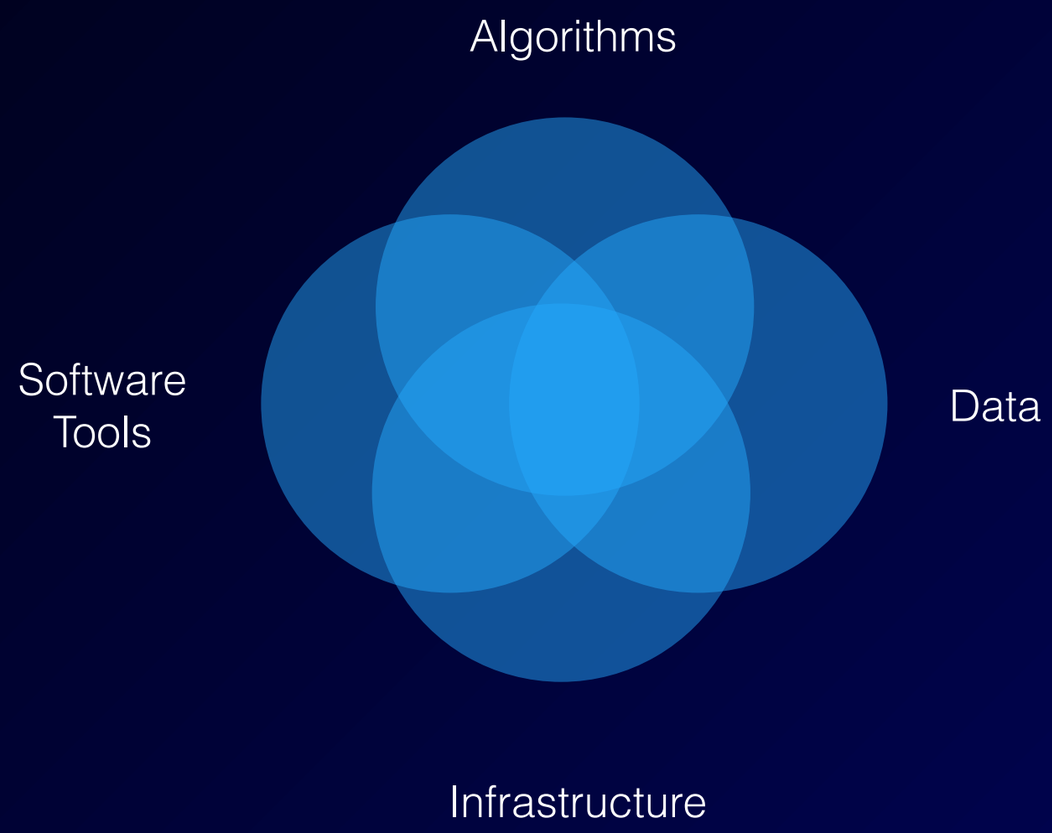
AI, Machine Learning, Deep Learning

Artificial Intelligence: design software applications which exhibit human-like behavior, e.g. speech, natural language processing, reasoning or intuition

Machine Learning: using statistical algorithms, teach machines to learn from featurized data (columns) without being explicitly programmed

Deep Learning: using neural networks, teach machines to learn from complex data where features cannot be explicitly expressed

The Advent of Machine Learning



Machine Learning

Optimizing logistics

https://aws.amazon.com/machine-learning/customers/innovators/convoy/

CONVOY

40 percent of the miles truck drivers log each year are done with an empty truck!

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Formula 1

https://aws.amazon.com/f1insights/

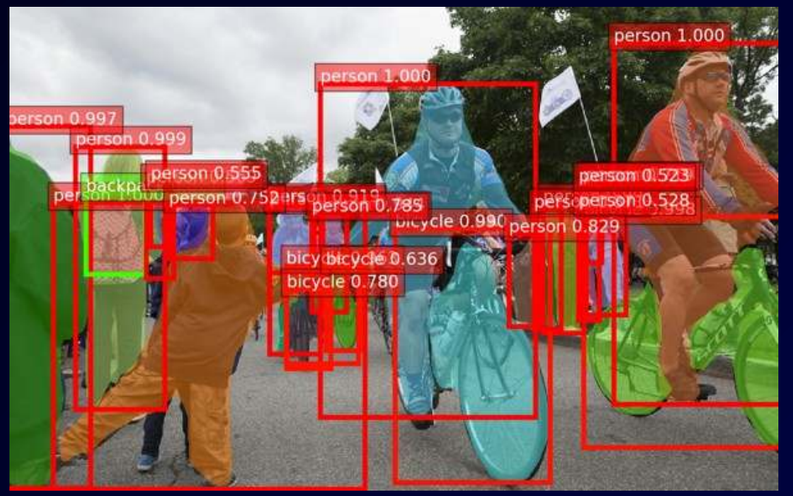
- 120 sensors per car
- 3GB and 1,500 data points per second
- 65 years of historical data

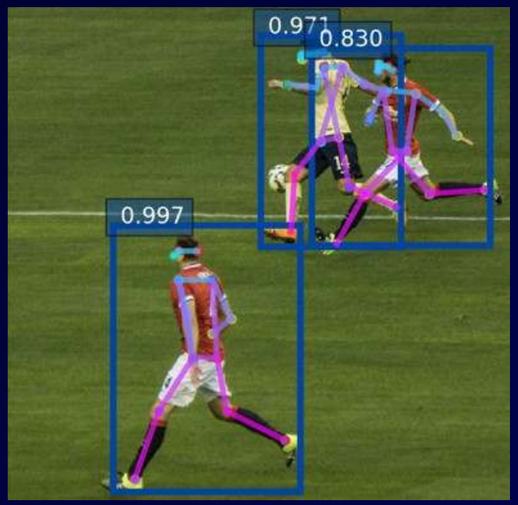
- Overtake probability
- Car performance
- Pitstop advantage

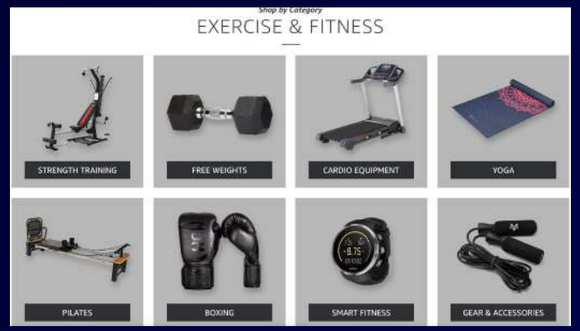
Deep Learning

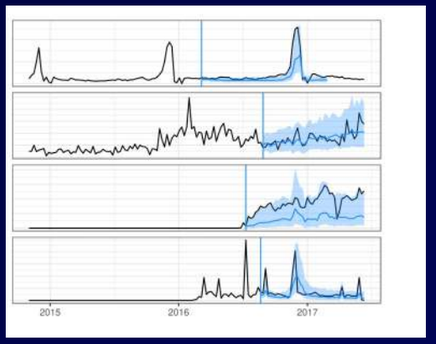
Deep Learning is changing the IT landscape

- Image and video analysis
- Natural language understanding
- Machine translation
- Speech processing
- Enterprise data too!









Alexa in the car: BMW Connected Drive

https://www.youtube.com/watch?v=I-uHGOUpLIg

Autonomous driving & ADAS

https://www.mobileye.com

Autonomous trucks

https://www.tusimple.com
https://www.youtube.com/watch?v=VXSIq33WZoo

Level 4 autonomy

Billions of miles simulated on AWS

3 to 5 trips per day along three fixed routes in Arizona, with an average run of 200 miles

Driving data: The trillion-mile challenge

Data gathering from ordinary drivers

millions of miles

environment behavior

low-res maps

Cloud simulator

billions of miles

validation

high-res maps

Test cars with professional drivers

millions of miles

aws

Reinforcement Learning

Types of Machine Learning

Supervised learning

- Run an algorithm on a labeled data set
- The model learns how to correctly predict the right answer
- Regression and classification are examples of supervised learning

Unsupervised learning

- Run an algorithm on an unlabeled data set
- The model learns patterns and organizes samples accordingly
- Clustering and anomaly detection are examples of unsupervised learning

Building a dataset is not always an option

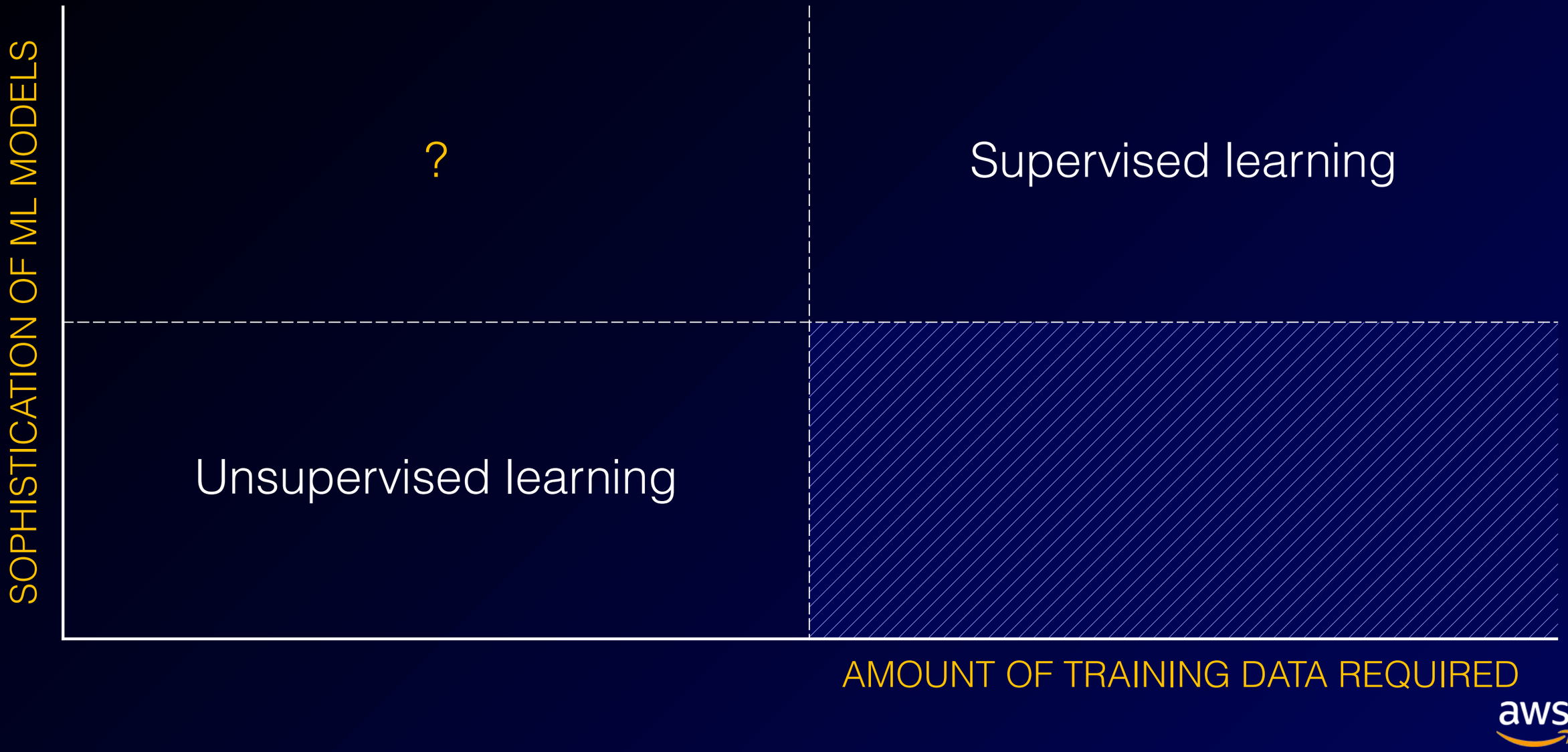
Large, complex problems

Uncertain, chaotic environments

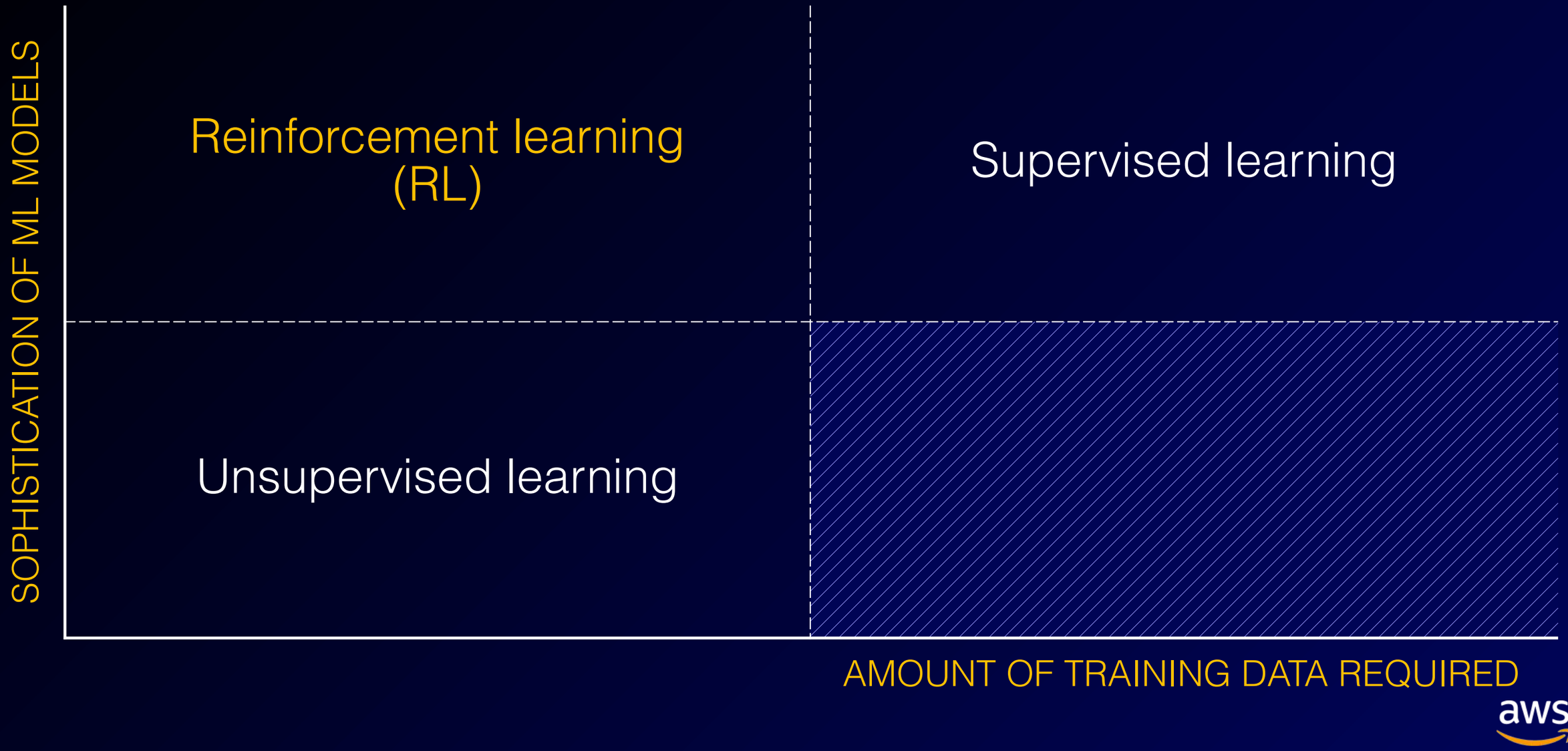
Continuous learning

Supply chain management, HVAC systems, industrial robotics, autonomous vehicles, portfolio management, oil exploration, etc.

Types of Machine Learning

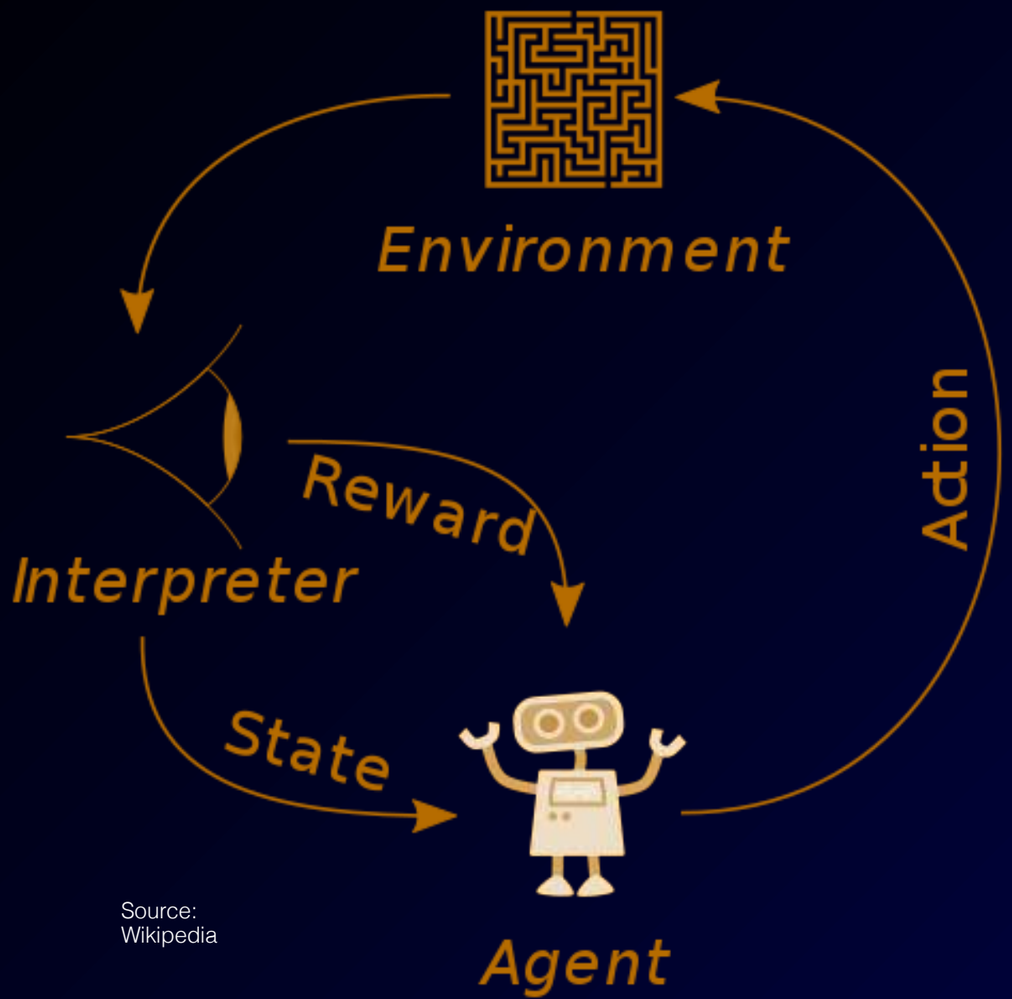


Types of Machine Learning



Learning without any data: we've all done it!

Reinforcement Learning



Source:
Wikipedia

An agent interacts with its environment.

The agent receives positive or negative rewards for its actions: rewards are computed by a user-defined function which outputs a numeric representation of the actions that should be incentivized.

By trying to maximize the accumulation of rewards, the agent learns an optimal strategy (aka policy) for decision making.

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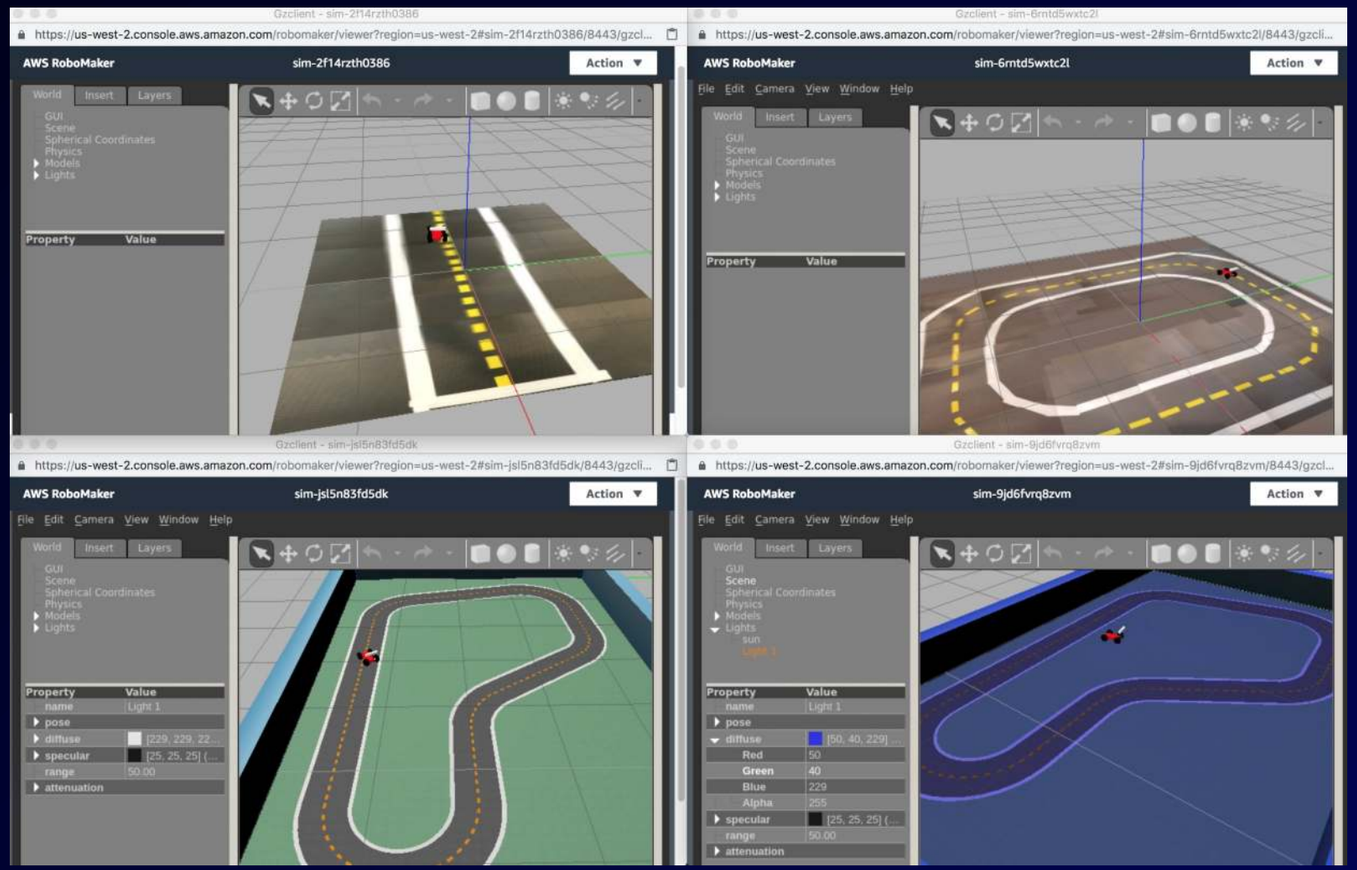
Robotics

Autonomous driving

AWS DeepRacer

1/18th scale autonomous vehicle



Amazon RoboMaker

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Machine Learning at the edge

Computing is increasingly available at the edge

Machine Learning predictions at the edge make devices smarter

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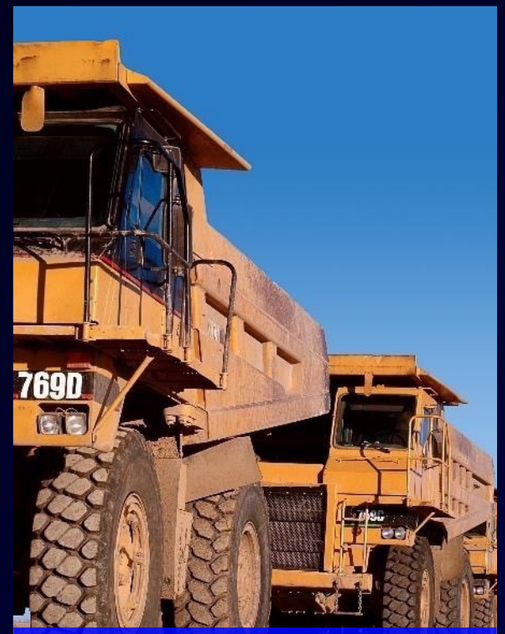
Most machine data never reaches the cloud

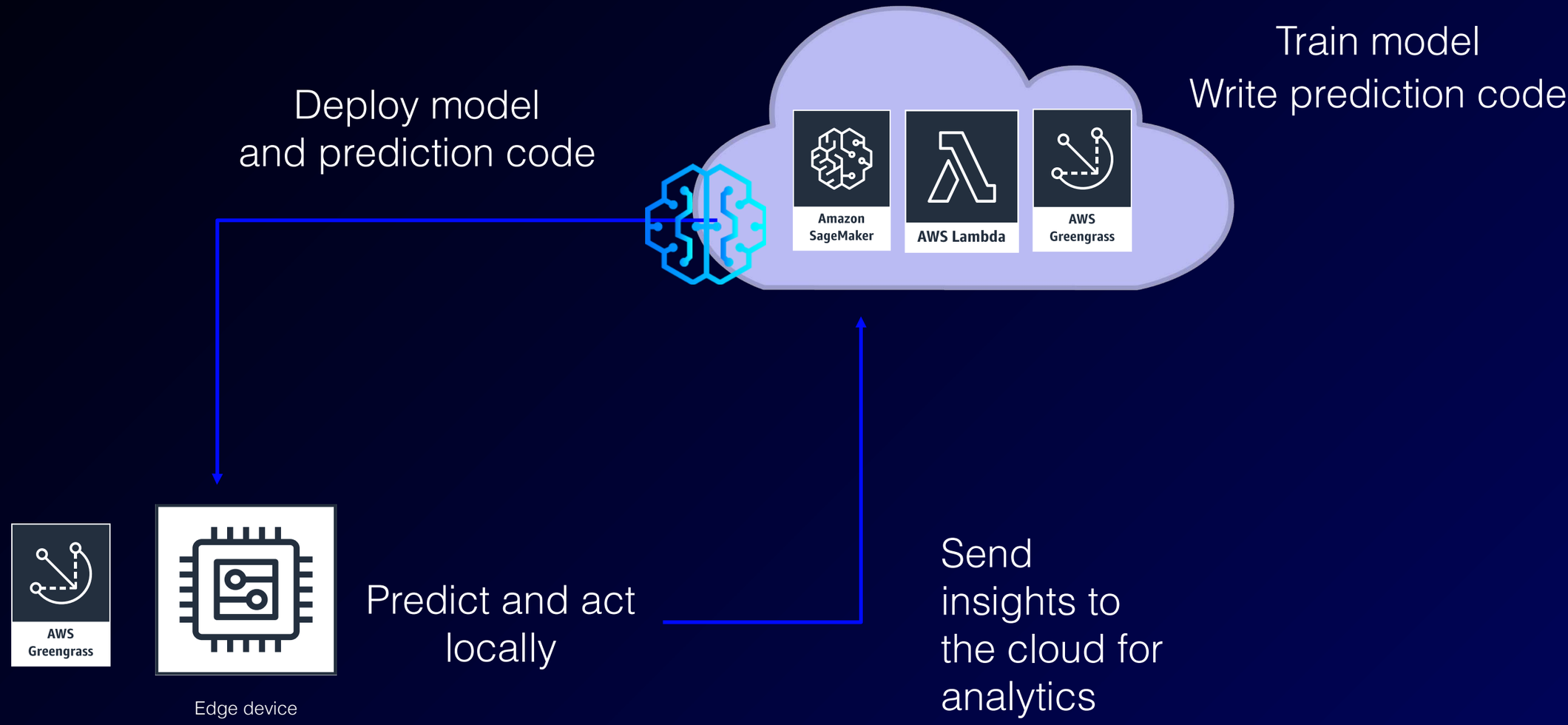
Medical equipment



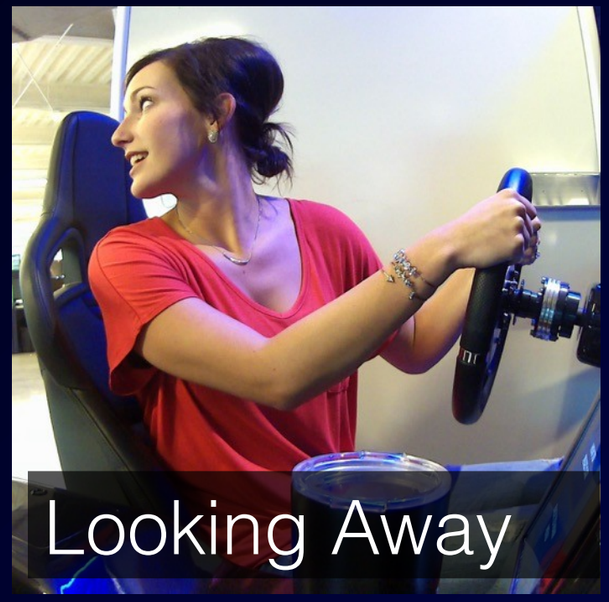
Industrial machinery

Extreme environments

Train in the cloud, deploy and predict at the edge



Predicting distracted driving



Getting started

https://ml.aws

https://aws.amazon.com/deepracer/

https://aws.amazon.com/automotive/

Thank you!

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