



INNOVATE
ONLINE CONFERENCE

MACHINE LEARNING
AND AI EDITORIAL



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AND AI EDITORIAL

|

Opening keynote

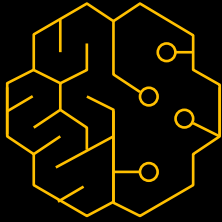
Julien Simon

Global Evangelist, AI & Machine Learning
Amazon Web Services

@julsimon

<https://medium.com/@julsimon>

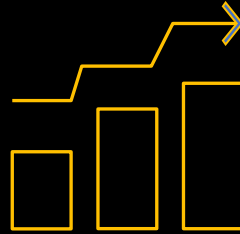
Why AWS for ML?



Broadest and deepest set of AI and ML services

200 new features and services launched this last year alone

Unmatched flexibility



Accelerate your adoption of ML with Amazon SageMaker

70% cost reduction in data labeling

10x faster performance

90% lower training cost

75% lower inference cost



Built on the most comprehensive cloud platform

AWS named as a leader in Gartner's Magic Quadrant for Cloud Infrastructure as a Service (IaaS) for the 9th consecutive year

More machine learning happens on AWS than anywhere else

10,000+ customers | 2x the customer references



Our mission at AWS

Put machine learning in the
hands of every developer

The AWS ML Stack

Broadest and deepest set of capabilities















AI Services

VISION			SPEECH		LANGUAGE		CHATBOTS	FORECASTING	RECOMMENDATIONS
									
AMAZON REKOGNITION IMAGE	AMAZON REKOGNITION VIDEO	AMAZON TECTRACT	AMAZON POLLY	AMAZON TRANSCRIBE	AMAZON TRANSLATE	AMAZON COMPREHEND & AMAZON COMPREHEND MEDICAL	AMAZON LEX	AMAZON FORECAST	AMAZON PERSONALIZE

ML Services

 Amazon SageMaker							
	Ground Truth	Notebooks	Algorithms + Marketplace	Reinforcement Learning	Training	Optimization	Deployment

ML Frameworks +

Infrastructure FRAMEWORKS	INTERFACES	INFRASTRUCTURE									
<div> TensorFlow</div> <div></div> <div> PYTORCH</div>	<div> GLUON</div> <div> Keras</div>	<div> EC2 P3 & P3DN</div> <div> EC2 G4 EC2 C5</div> <div> FPGAs</div> <div> AWS DL CONTAINERS & AMIs</div> <div> AMAZON ELASTIC CONTAINER SERVICE</div> <div> AMAZON ELASTIC KUBERNETES SERVICE</div> <div> AWS IoT GREENGRASS</div> <div> AMAZON ELASTIC INFERENCE</div> <div> AWS INFERENTIA</div>									

We're focused on solving the
toughest challenges
that hold back success

Three challenges facing ML today

1

Flexibility & cost

- Optimized TensorFlow
- Managed Spot Training
- Amazon Elastic Inference

2

Data

- Amazon SageMaker Ground Truth
- Amazon SageMaker RL

3

Ease of

Use

- AWS Marketplace for Machine Learning
- AWS Solutions for Machine Learning
- Amazon Polly NTTS
- Amazon Textract
- Amazon Forecast
- Amazon Personalize

Let's look under the hood into some of the new features in each layer of the stack

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AI Services















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ML Frameworks +

Infrastructure

FRAMEWORKS	INTERFACES	INFRASTRUCTURE								
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AWS is framework agnostic

Choose from popular frameworks



PYTORCH



Chainer



ONNX

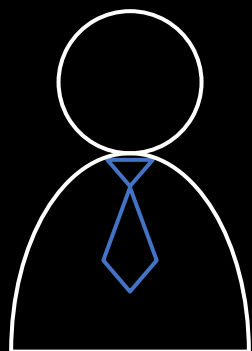


Keras

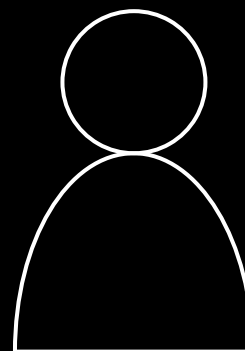


GLUON

Run them fully managed



Or run them yourself



AWS: The platform of choice for TensorFlow



85% of all
TensorFlow
workloads in the
cloud run on AWS

Source: Nucleus Research, November 2018

Scaling TensorFlow to 256 GPUs

<https://aws.amazon.com/tensorflow/>

Stock
TensorFlow

65%

scaling efficiency
with 256 GPUs



AWS-optimized
TensorFlow

90%

scaling efficiency
with 256 GPUs

Available with:
Amazon SageMaker,
AWS Deep Learning Containers,
AWS Deep Learning AMIs



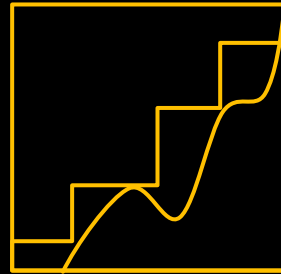
HOROVOD

Amazon Elastic Inference

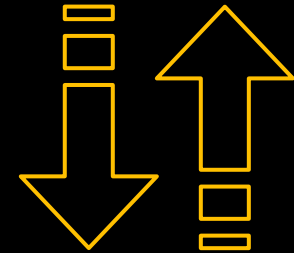
<https://aws.amazon.com/blogs/aws/amazon-elastic-inference-gpu-powered-deep-learning-inference-acceleration/>



Lower inference costs
up to 75%



Match capacity
to demand



Available between
1 and 32 TFLOPs

KEY FEATURES

Integrated with
Amazon EC2,
Amazon SageMaker











Support for TensorFlow,
Apache MXNet, and ONNX

Single and
mixed-precision
operations


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Broadest and deepest set of capabilities













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Managed Spot Training in Amazon SageMaker

<https://aws.amazon.com/blogs/aws/managed-spot-training-save-up-to-90-on-your-amazon-sagemaker-training-jobs>

Save up to **90%** on training costs

All instance types

Built-in algorithms,
built-in frameworks,
custom containers

Training jobs are
restarted, or resumed if
checkpointing is
implemented

Managed spot training

☒ **Enable managed spot training - *optional***
Save compute costs for jobs that have flexibility in start and end times. Amazon SageMaker will use spare capacity only to run this job. [Learn more](#)

Maximum wait time before job terminates *optional stopping condition*
At the end of this duration you will receive the complete or partial results of you managed spot training job.

hours ▼

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- AWS Solutions for Machine Learning
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Labeling data sets is
too time-consuming

Annotating data at scale is time-consuming and expensive



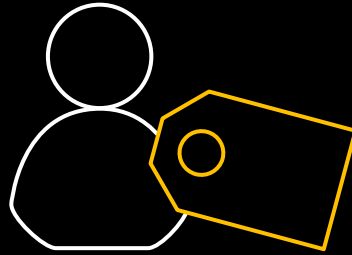
Amazon SageMaker Ground Truth

Label machine learning training data easily and accurately

<https://aws.amazon.com/blogs/aws/amazon-sagemaker-ground-truth-keeps-simplifying-labeling-workflows/>



Quickly label
training data



Easily integrate
human labelers



Get accurate
results

KEY FEATURES

Automatic labeling via
active learning

Ready-made and
custom workflows

Private and public
human workforce

Label
management

How do you teach machine learning models to make decisions when there is no training data?

Reinforcement learning



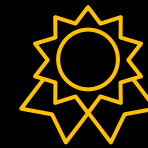
Learn by
interacting with
the real world



Model the real-
world problem
as a simulation
environment



Trial and error
Observe results



Optimize learning
strategy to
maximize long-
term reward

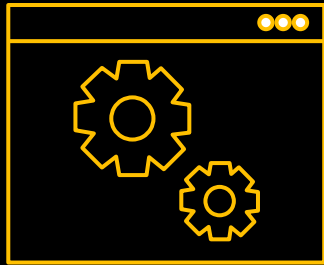


Model learns
how to make
complex
decisions

Amazon SageMaker RL

Reinforcement learning for every developer and data scientist

<https://aws.amazon.com/blogs/aws/amazon-sagemaker-rl-managed-reinforcement-learning-with-amazon-sagemaker/>



Fully
managed



Broad support
for frameworks



Broad support for simulation
environments

KEY FEATURES

2D & 3D physics
environments and
OpenAI Gym support

Supports Amazon Sumerian,
AWS RoboMaker, and the open
source Robotics Operating
System (ROS) project

Example notebooks
and tutorials

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- Amazon Textract
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- Amazon Personalize

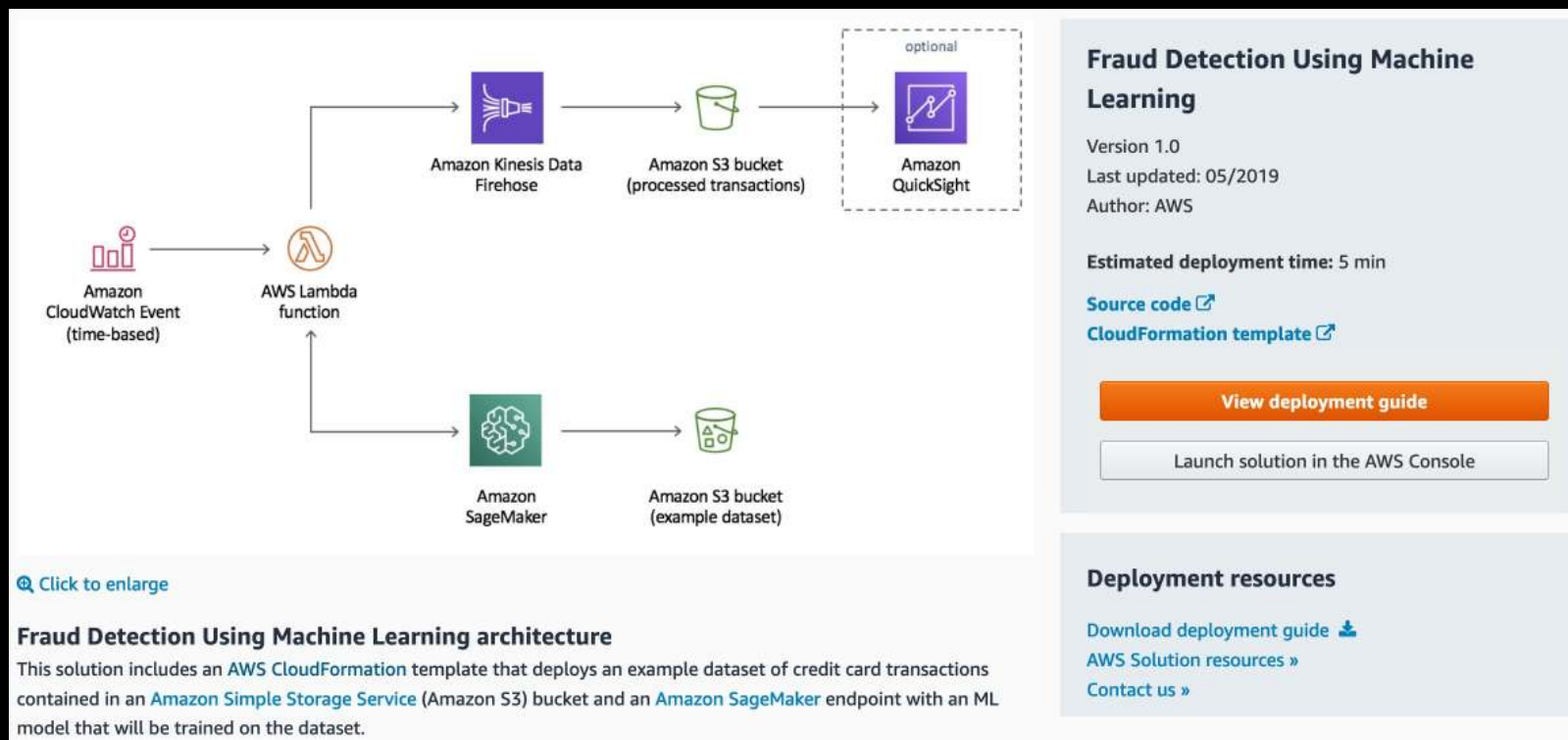
Where can we find reference
implementations applying ML to business
problems?

AWS solutions for machine learning

<https://aws.amazon.com/solutions/>

Vetted, technical **reference implementations** designed to help you solve common problems and build faster

- Detailed architecture
- Deployment guide
- Instructions for both automated and manual deployment



Where can we find off-the-shelf
algorithms and models?

AWS Marketplace for Machine Learning

<https://aws.amazon.com/marketplace/solutions/machinelearning/>

- Algorithms and model packages
- Deploy directly on Amazon SageMaker through a Jupyter Notebook, Amazon SageMaker SDK, or AWS CLI
- Free, free trial, or paid
- Pay as you go

The screenshot displays the AWS Marketplace interface for Machine Learning solutions. On the left, a sidebar contains 'Categories' (All Categories: Infrastructure Software (33), DevOps (33), Business Applications (2), Machine Learning (248), IoT (10), Industries (48)), 'Filters', and 'Vendors' (Perception Health (31), RocketML (23), Sensifai (18), Cloudwick (11), Figure Eight (11), Persistent Systems (10)). The main content area shows 'All Categories (248 results)' with a pagination bar (1-25). Two results are visible: 'Text Similarity Analyzer' by TIBCO Data Science (0 reviews, Version v1, sold by TIBCO Software Inc.) and 'GluonNLP Sentence Generator' by Amazon Web Services (1 review, Version 1.0, sold by Amazon Web Services). Both listings include a description of the algorithm and a status bar indicating fulfillment on Amazon SageMaker.

Categories

All Categories

- Infrastructure Software (33)
- DevOps (33)
- Business Applications (2)
- Machine Learning (248)
- IoT (10)
- Industries (48)

Filters [Clear all filters](#)

Vendors

- ☐ Perception Health (31)
- ☐ RocketML (23)
- ☐ Sensifai (18)
- ☐ Cloudwick (11)
- ☐ Figure Eight (11)
- ☐ Persistent Systems (10)

All Categories (248 results) showing 1 - 10

TIBCO
Data Science

Text Similarity Analyzer

★★★★★ (0) | Version v1 | Sold by [TIBCO Software Inc.](#)

This algorithm produces similarity scores for a document or a line of text compared to documents in a corpus. The algorithm includes a tf-idf text featurizer to create n-gram features describing the text. It then uses the library scipy.spatial.distance to compute the cosine distance between the new...

Algorithm - Fulfilled on Amazon SageMaker

aws

GluonNLP Sentence Generator

★★★★★ (1) | Version 1.0 | Sold by [Amazon Web Services](#)

Given an incomplete sentence, this model predicts sentences that are most likely to occur in the context. For example, given input "I love it", it will generate samples like "I love it and enjoy one of their series, Schafer or Clive ."

Model Package - Fulfilled on Amazon SageMaker

Can we just call APIs
and get the job done?


The AWS ML Stack

Broadest and deepest set of capabilities













AI Services

VISION			SPEECH		LANGUAGE		CHATBOTS	FORECASTING	RECOMMENDATIONS
									
AMAZON REKOGNITION IMAGE	AMAZON REKOGNITION VIDEO	AMAZON TEXTTRACT	AMAZON POLLY	AMAZON TRANSCRIBE	AMAZON TRANSLATE	AMAZON COMPREHEND & AMAZON COMPREHEND MEDICAL	AMAZON LEX	AMAZON FORECAST	AMAZON PERSONALIZE

ML Services

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ML Frameworks +

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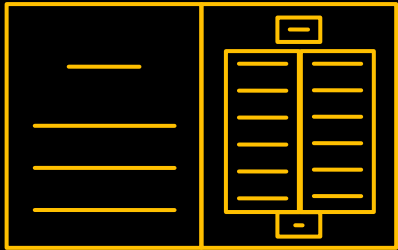
Every organization has tons
of documents to process.

Can we make OCR smarter?

Amazon Textract

Extract text and data from virtually any document

<https://aws.amazon.com/blogs/machine-learning/automatically-extract-text-and-structured-data-from-documents-with-amazon-textract/>



Extract data quickly and accurately



Eliminate manual effort



Lower document processing costs

KEY FEATURES

Optical character recognition (OCR)

Key-value pair detection

Table detection

Adjustable confidence thresholds

Bounding box coordinates

No ML experience required

Voice is the interface of the future.

Can text-to-speech sound
even more lifelike?

Improving text-to-speech

Text

"Sentence to synthesize"

Phonetic transcription

'sɛntəns tə 'sɪnθə saɪz.

**Concatenative
TTS**

**Neural
TTS**

'sɛnt

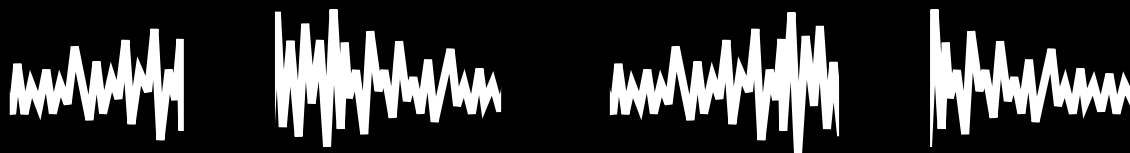
sɛntəns tə

'sɪnθ

ə



DNN



Amazon Polly NTTS and newscaster style

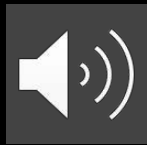
<https://aws.amazon.com/blogs/aws/amazon-polly-introduces-neural-text-to-speech-and-newscaster-style/>

US English Matthew voice

“Sources tell CNN he believes the media and the northeast elite are needlessly hyperventilating and overreacting to his comments.”



Standard



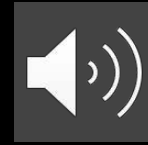
Neural NTTS



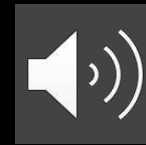
Newscaster
NTTS

US English Joanna voice

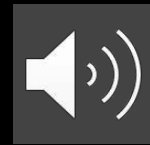
“President Donald Trump said on March 13 his administration was ordering the grounding of all Max 8 and 9 models, hours after Canada said it was grounding the planes after analyzing new satellite tracking data.”



Standard



Neural NTTS



Newscaster
NTTS

Many organizations want to personalize the user experience and to forecast time-based data. Both are way too complicated.

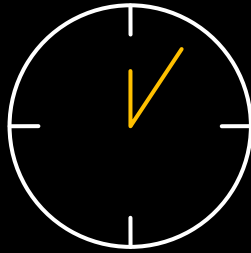
Amazon Personalize

Improve customer experiences with personalization and recommendations

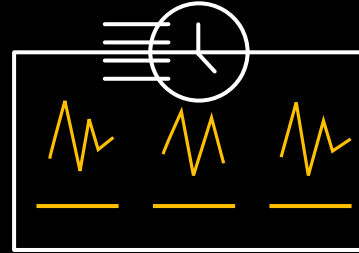
<https://aws.amazon.com/blogs/aws/amazon-personalize-is-now-generally-available/>



Deliver high-quality
recommendations



Real-time



Deliver
personalization in
days, not months



Works with any
product or content

KEY FEATURES

Combine user
interaction data with
contextual data

Automated
machine learning

Continuous learning
to improve performance

Based on the same
technology used at
Amazon.com

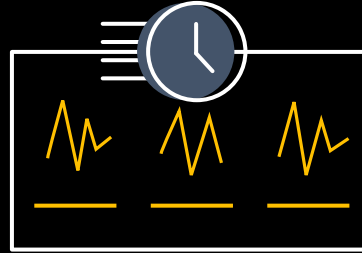
Amazon Forecast

Improve forecasting accuracy by up to 50% at 1/10th the cost

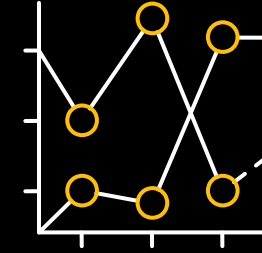
<https://aws.amazon.com/blogs/aws/amazon-forecast-now-generally-available/>



Accurate
forecasts



Provides results
quickly



Works with any historical time
series

KEY FEATURES

Combine time-series
data with contextual data

Automated
machine learning

Probabilistic
forecasts

Based on the same
technology used at
Amazon.com

Getting started


The AWS ML Stack

<https://ml.aws>















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ML Frameworks +

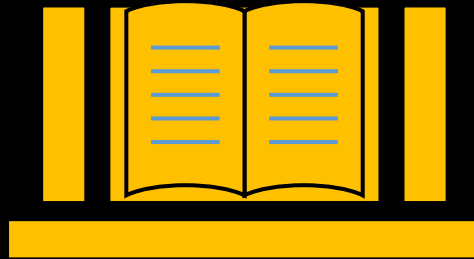
Infrastructure FRAMEWORKS		INTERFACES	INFRASTRUCTURE									
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AWS Machine Learning University

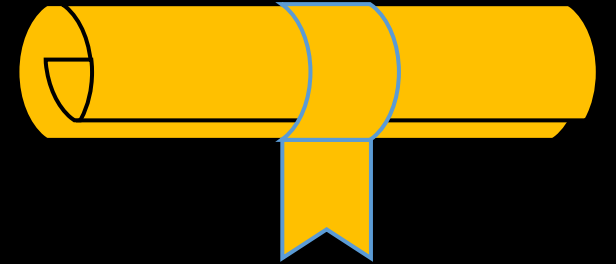
<https://aws.training/machinelearning>



Uses the same
materials used to train
Amazon developers



Foundational knowledge
with
real-world application



Structured
courses and
specialist certification

AWS DeepLens

Getting started with deep learning for computer vision

<https://aws.amazon.com/deeplens/>



- Purpose-built for ML skills development
- Fully programmable & customizable
- Build custom Amazon SageMaker models
- 10 minutes to your first deep learning project
- Now available in **France**, **Germany**, **Italy**, **Spain**, and the **UK**

AWS DeepRacer

Getting started with reinforcement learning

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



- Fully autonomous 1/18th-scale race car
- Train models in Amazon SageMaker
- Test and iterate on the track using the AWS DeepRacer 3D racing simulator
- Compete in the world's first global autonomous racing league, either at AWS Summits or at virtual events
- Race for prizes and a chance to advance to win the coveted AWS DeepRacer Cup

Agenda

10:00 AM London time 40 min.	Opening Keynote by Julien Simon, Principal Technical Evangelist for AI & Machine Learning, AWS				
Track	I'm starting my career in machine learning	I'm a data scientist or researcher	I'm in DevOps working with data scientists & researchers	I'm an application developer	I'm a developer who wants to get hands on (Twitch)
10:45 AM 40 min.	Introduction to machine learning with Python and scikit-learn (Level 200)	Scale machine learning from zero to millions of users (Level 200)	AWS data services for machine learning (Level 200)	AWS AI services for image and video analysis (Level 200)	Getting started with AWS DeepRacer (Level 200)
11:30 AM 40 min.	Getting started with machine learning using Amazon SageMaker (Level 200)	Build, train, and deploy machine learning models with Amazon SageMaker (Level 300)	Automating Amazon SageMaker workflows (Level 200)	Breaking language barriers with AI (Level 300)	Advanced topics with AWS DeepRacer (Level 300)
12:20 PM 40 min.	Introduction to deep learning (Level 200)	Deep dive on Amazon SageMaker (Level 400)	Building a secure data science environment (Level 200)	Build conversational interfaces for your customers (Level 200)	AWS DeepLens (Level 300)
1:05 PM 40 min.	Getting started with deep learning using Amazon SageMaker (Level 200)	Migrating your machine learning workloads to Amazon SageMaker (Level 300)	Combining Apache Spark and Amazon SageMaker (Level 300)	Simplifying time-series forecasting and real-time personalization (Level 300)	
1:50 PM 40 min.	Closing Remarks by Julien Simon and Pavlos Mitsoulis-Ntompos, AWS ML Hero				

Thank you!

Julien Simon
Global Evangelist, AI & Machine Learning
Amazon Web Services

[@julsimon](#)

<https://medium.com/@julsimon>