AWS re:Invent

AIM223-R

AWS DeepComposer: Get started with generative AI

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Amazon Web Services

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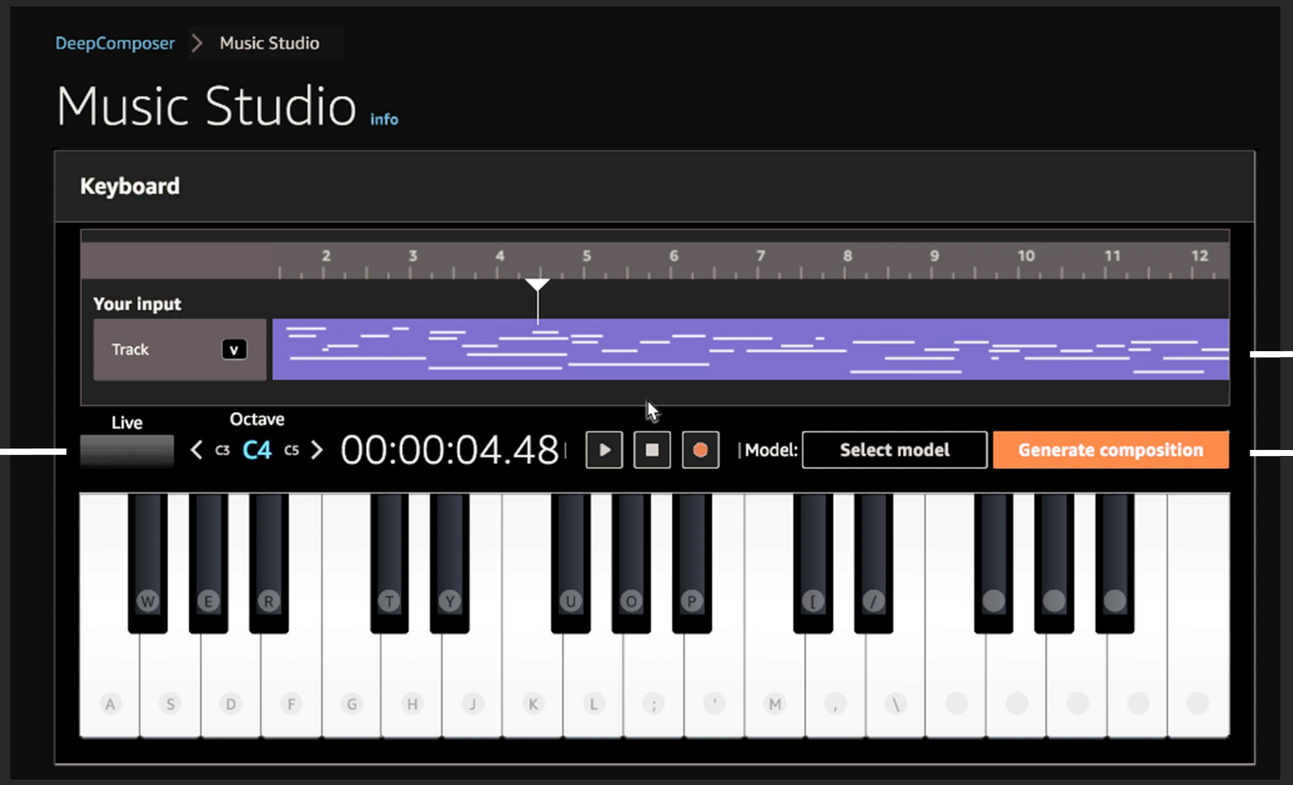
Amazon Web Services

AWS

DeepComposer

The world's first machine learning-enabled musical keyboard for developers


Arpeggiator
Tap tempo
Playback
Octave adjust
Auto-Chord
Record
Volume
0
1
2
3
Volume
PITCH
MODULATION
OCTAVE
OCTAVE
TAP
ARP
VEL
CHORD
RESET
SET
aws
32-key, 2-octave keyboard



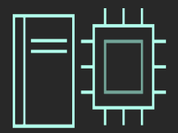
Playback info & transport controls

Virtual keyboard

Input melody

Model selector

Agenda

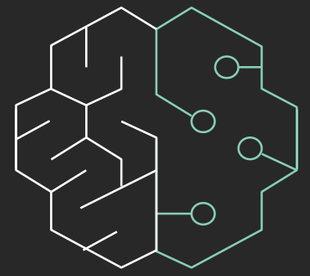


1. ML on AWS (10 minutes)
2. Introduction to ML and Generative AI (20 minutes)
3. Lab 1- Music composition with AWS DeepComposer models (35 minutes)
4. Lab 2- Training models with AWS DeepComposer (55 minutes)

Our mission at AWS

Put machine learning in the
hands of every developer

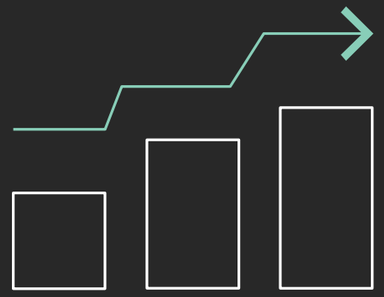
Why AWS for ML



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 SageMaker

70% cost reduction in data-labeling

10x faster performance

75% lower inference cost

Built on the most comprehensive cloud platform

AWS Named as a Leader in Gartner's Infrastructure as a Service (IaaS) Magic Quadrant for the 9th Consecutive Year

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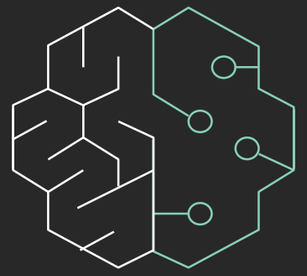

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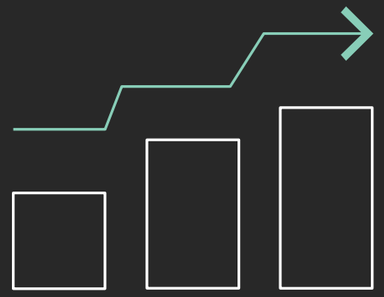

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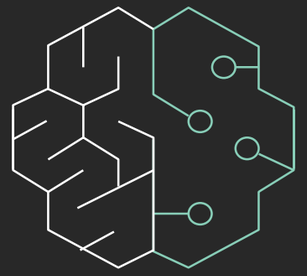

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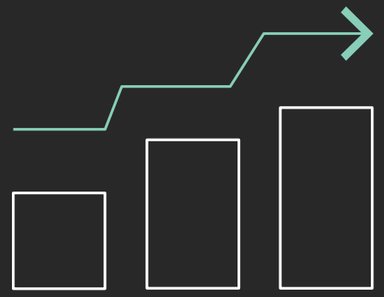

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More machine learning happens on AWS than anywhere else

More than ten thousand customers | 2x the customer references | 85% of TensorFlow projects in the cloud happen on AWS

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 TEXTRACT	AMAZON POLLY AMAZON TRANSCRIBE	AMAZON TRANSLATE AMAZON COMPREHEND & COMPREHEND MEDICAL	AMAZON LEX	AMAZON FORECAST	AMAZON PERSONALIZE

ML Services

Amazon SageMaker

Ground Truth	Notebooks	Algorithms + Marketplace	Reinforcement Learning	Training	Optimization	Deployment	Hosting

ML Frameworks + Infrastructure

FRAMEWORKS	INTERFACES
TensorFlow, mxnet, PYTORCH	GLUON, Keras

INFRASTRUCTURE

EC2 P3 & P3DN | EC2 G4 EC2 C5 | FPGAS | DL CONTAINERS & AMIs | ELASTIC CONTAINER SERVICE | ELASTIC KUBERNETES SERVICE | AWS IOT GREENGRASS | ELASTIC INFERENCE | INFERENTIA

Enabling the next ML developers

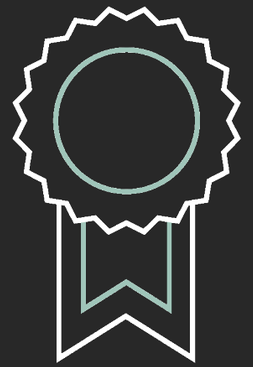
ML Educational Devices

AWS DeepLens
Deep Learning

AWS DeepRacer
Reinforcement Learning

AWS DeepComposer
Generative AI

Training & Certification



AWS ML Training and
Certification

UDACITY

coursera

edX

Partnerships with
MOOCs

Enabling the next ML developers

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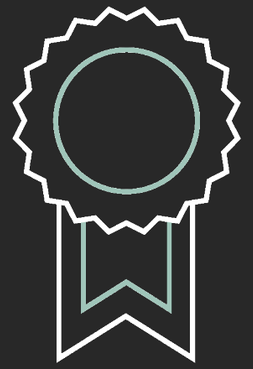

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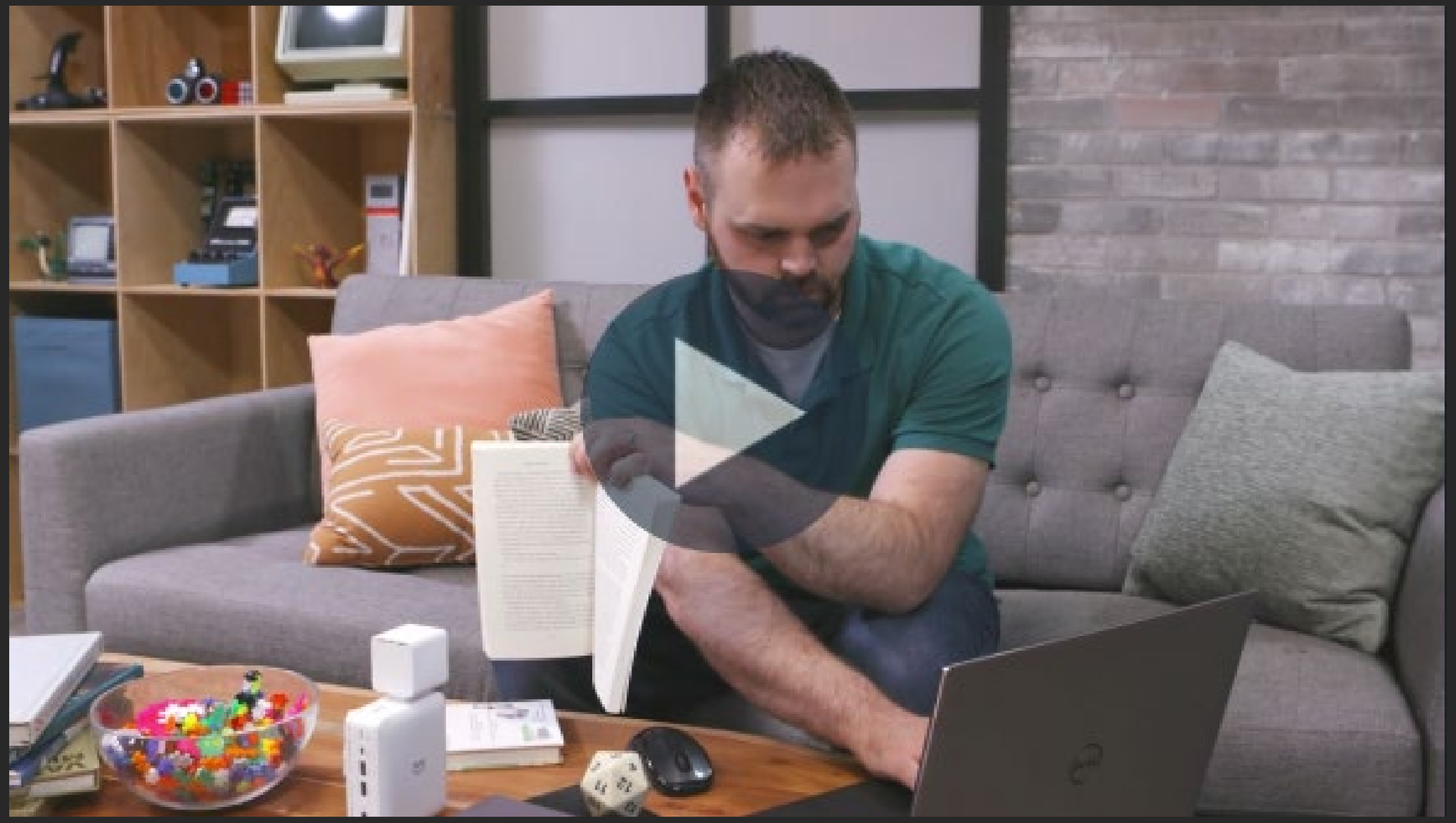
Let’s hear from one of the developers



Build your AI with AWS and Intel

AWS and Intel deliver the most comprehensive set of resources, tools, training, and services together

OpenVINO™ intel inside™

Introduction to ML and Generative AI

AWS re:Invent

aws

Types of ML techniques

Supervised learning

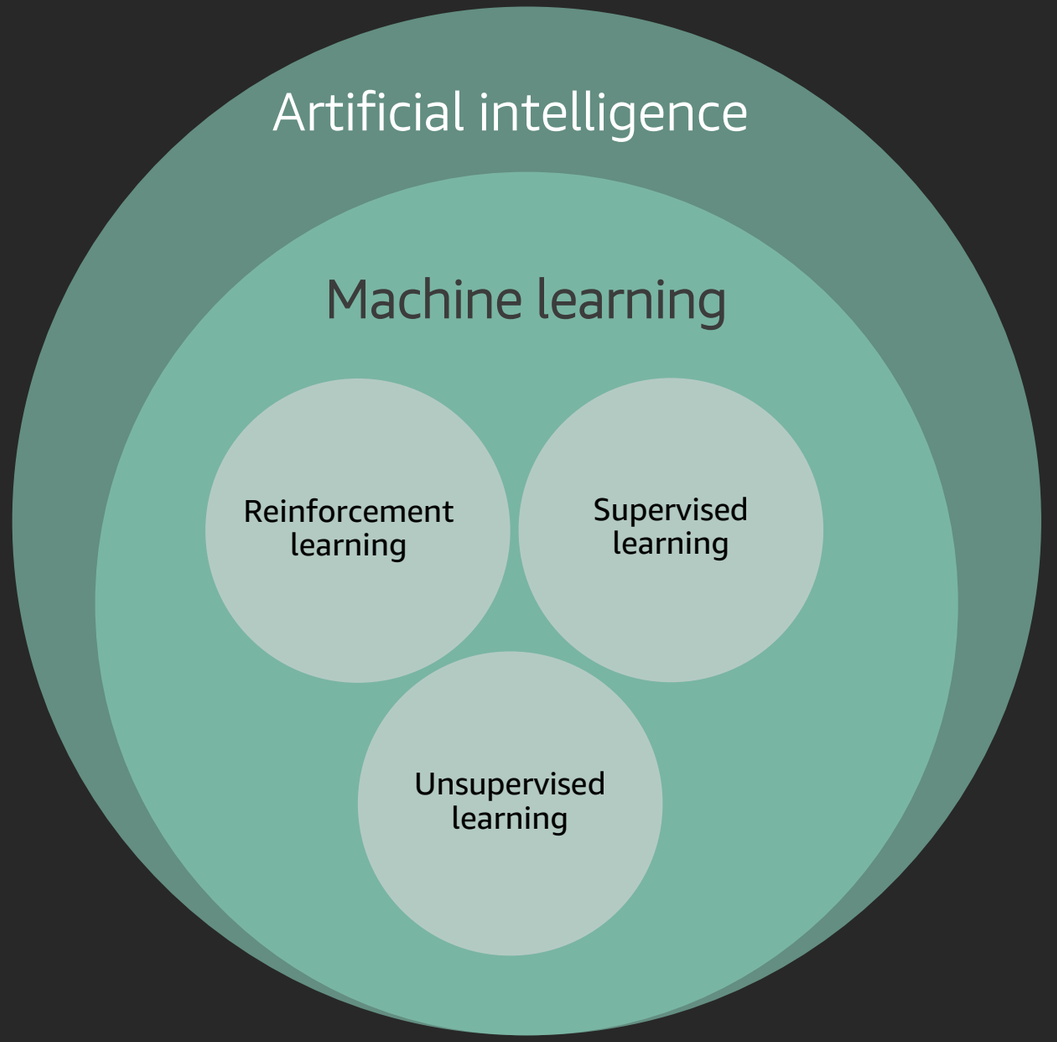
- Every training example has a corresponding label

Unsupervised learning

- No labels for training data
- Most Generative AI is unsupervised learning

Reinforcement learning

- Learns through consequences of action in specific environment



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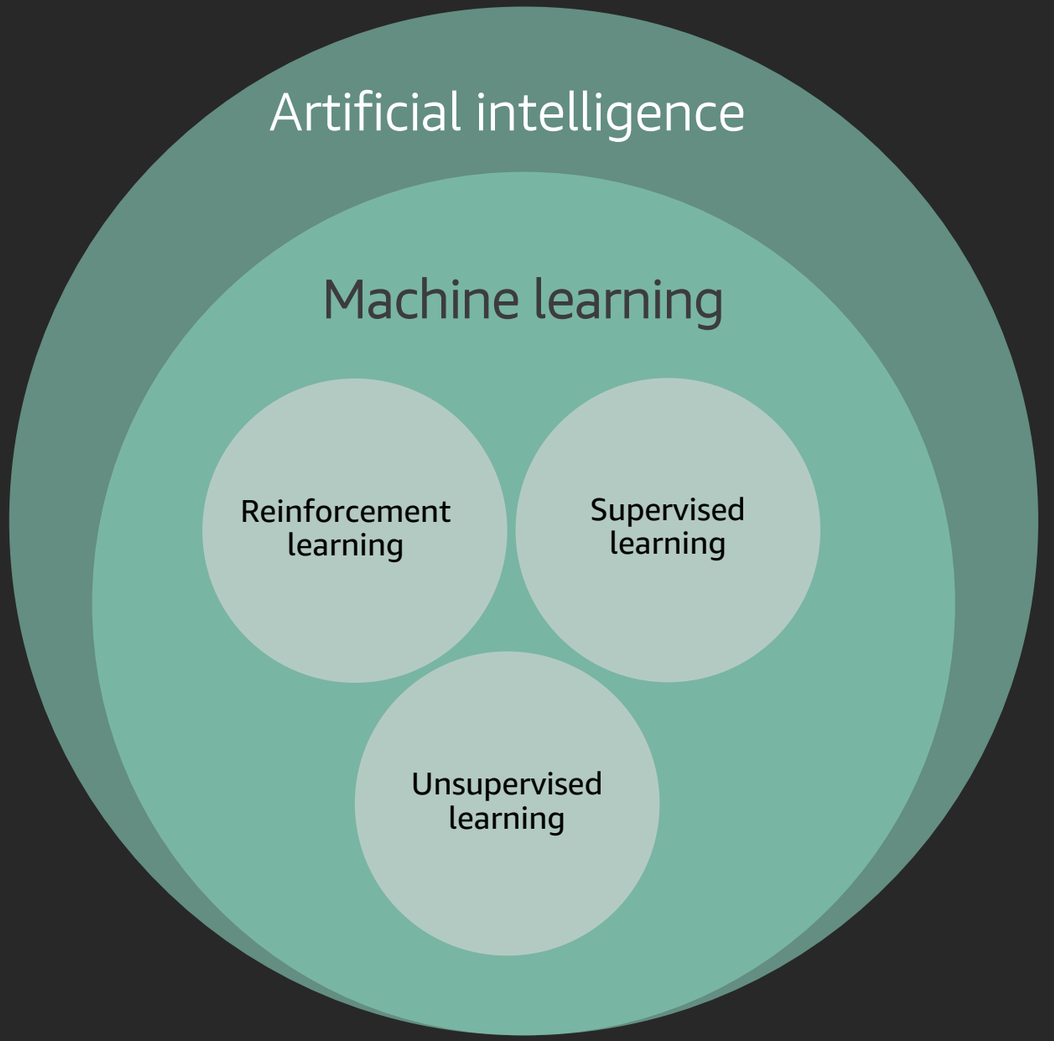

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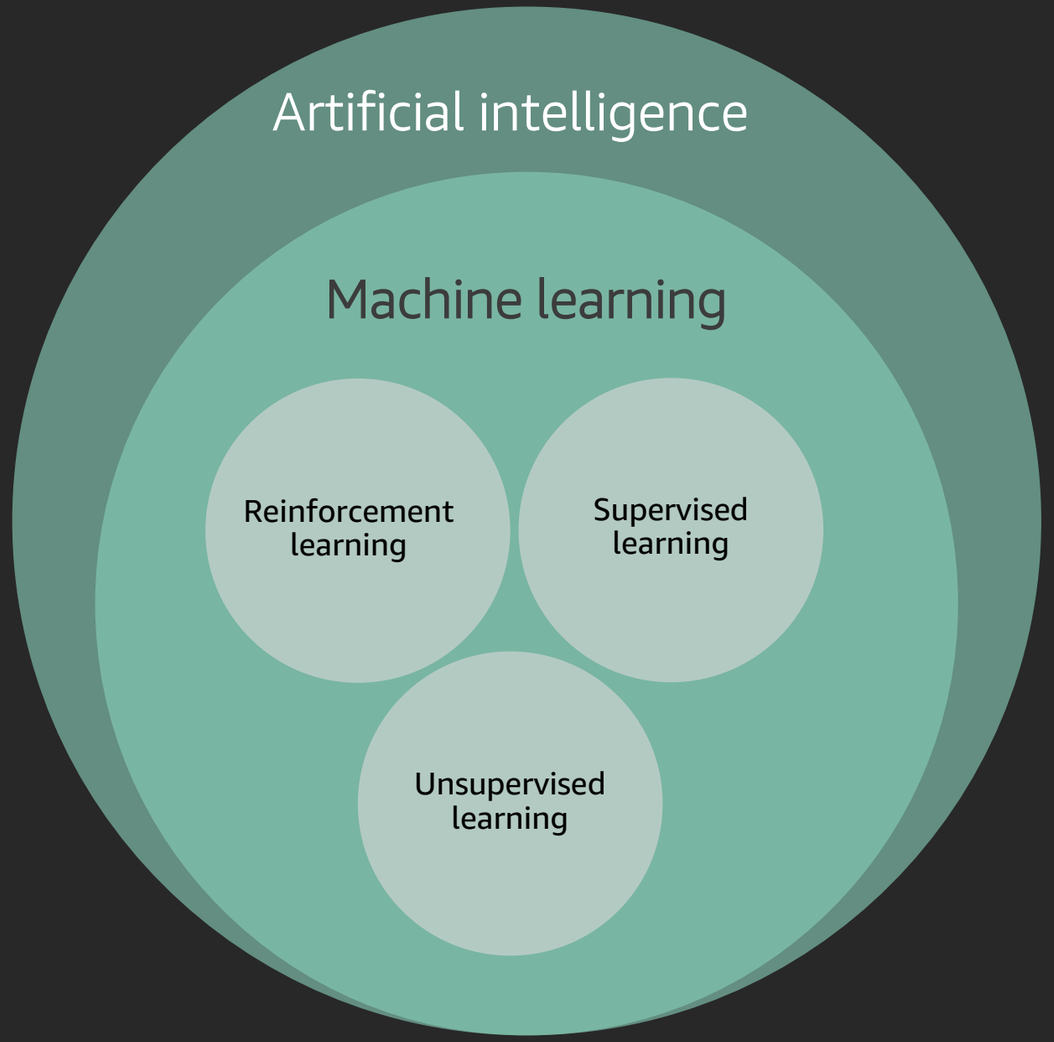


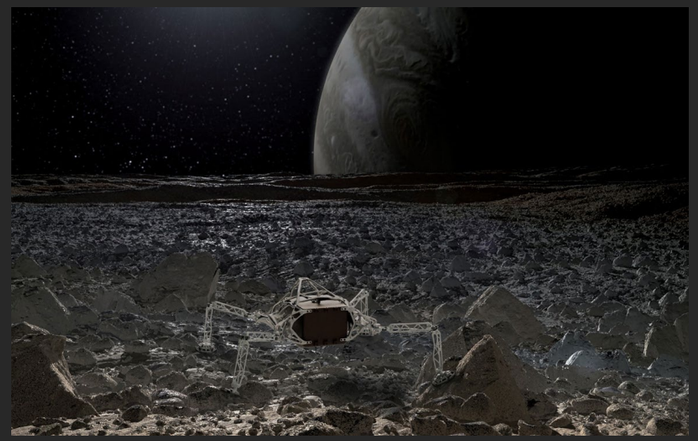
Generative AI

One of the most promising advances in AI in the past decade

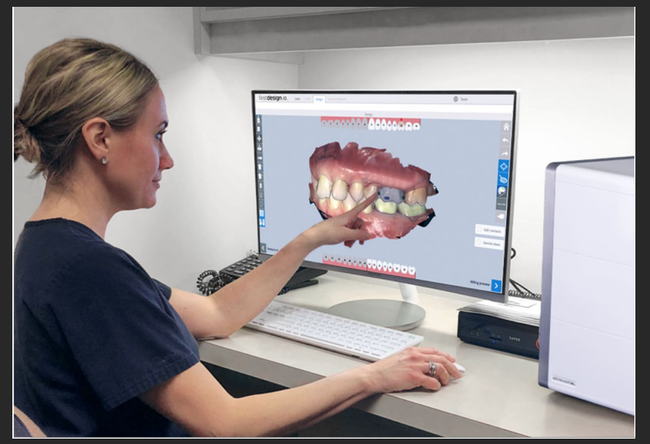
MIT Technology Review

Practical uses of Generative AI

Autodesk – Airbus



Autodesk – NASA JPL



Gildewell Laboratories

Practical uses of Generative AI

Autodesk – Airbus

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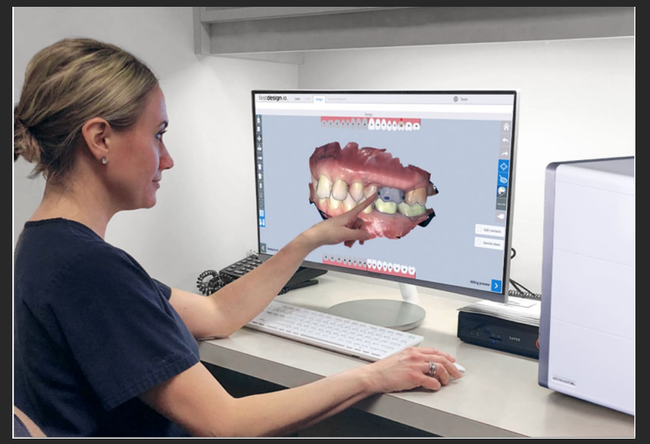

Gildewell Laboratories

Practical uses of Generative AI

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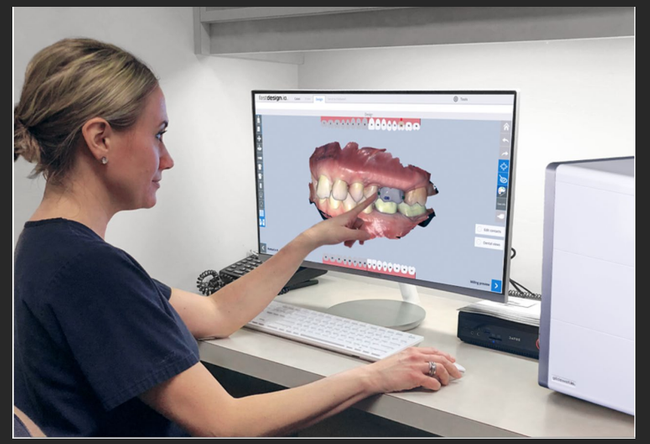

Gildewell Laboratories

Generative Adversarial Network (GAN)

Generative Adversarial Network (GAN)

Generative Adversarial Network (GAN)

Creative Meets Generative

1

Input a melody by connecting the AWS DeepComposer keyboard

2

Choose from jazz, rock, pop, classical, or build your own custom genre model in Amazon SageMaker

3

Publish your tracks to SoundCloud from the console; export MIDI files to your favorite DAW

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Knowledge Check

https://kahoot.it/

Lab 1 - Compose music with AWS DeepComposer models

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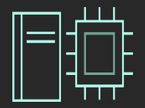
aws

Self-Paced Lab Instructions



1. Find the instruction manual on GitHub: https://github.com/aws-samples/aws-deepcomposer-samples
2. Select Lab 1
3. 35 minutes

Input melody: 

Output melody: 

How to access the console

- Find the link to access AWS DeepComposer console in Lab1 https://github.com/aws-samples/aws-deepcomposer-samples

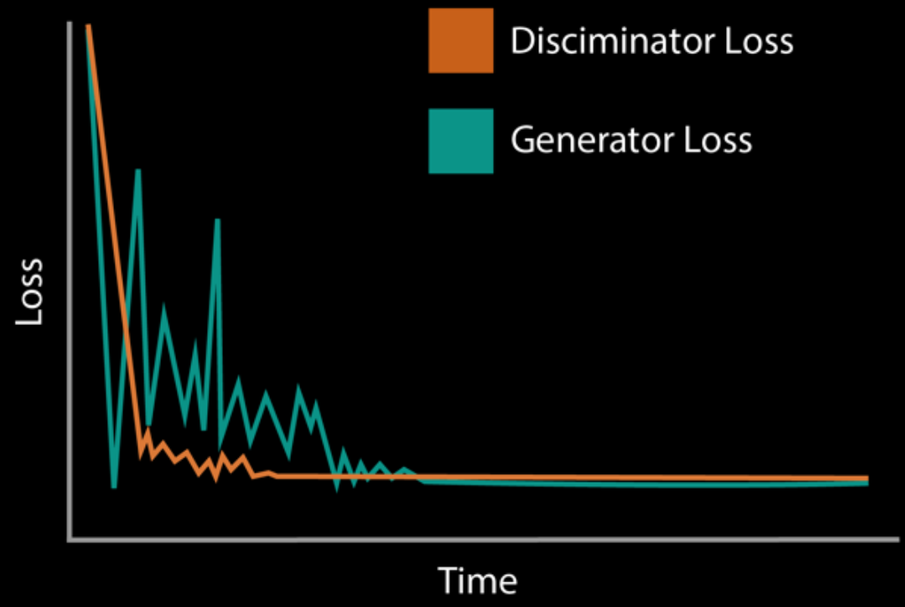
- We’ve created a special AWS account for AWS DeepComposer labs. Please find the printouts on your desk.

- This account will be active until Friday, December 6, 2019, 11:59:59 Pacific Time (GMT-7). So, please grab the printouts before you leave!

Model Training and Output

Generative Model

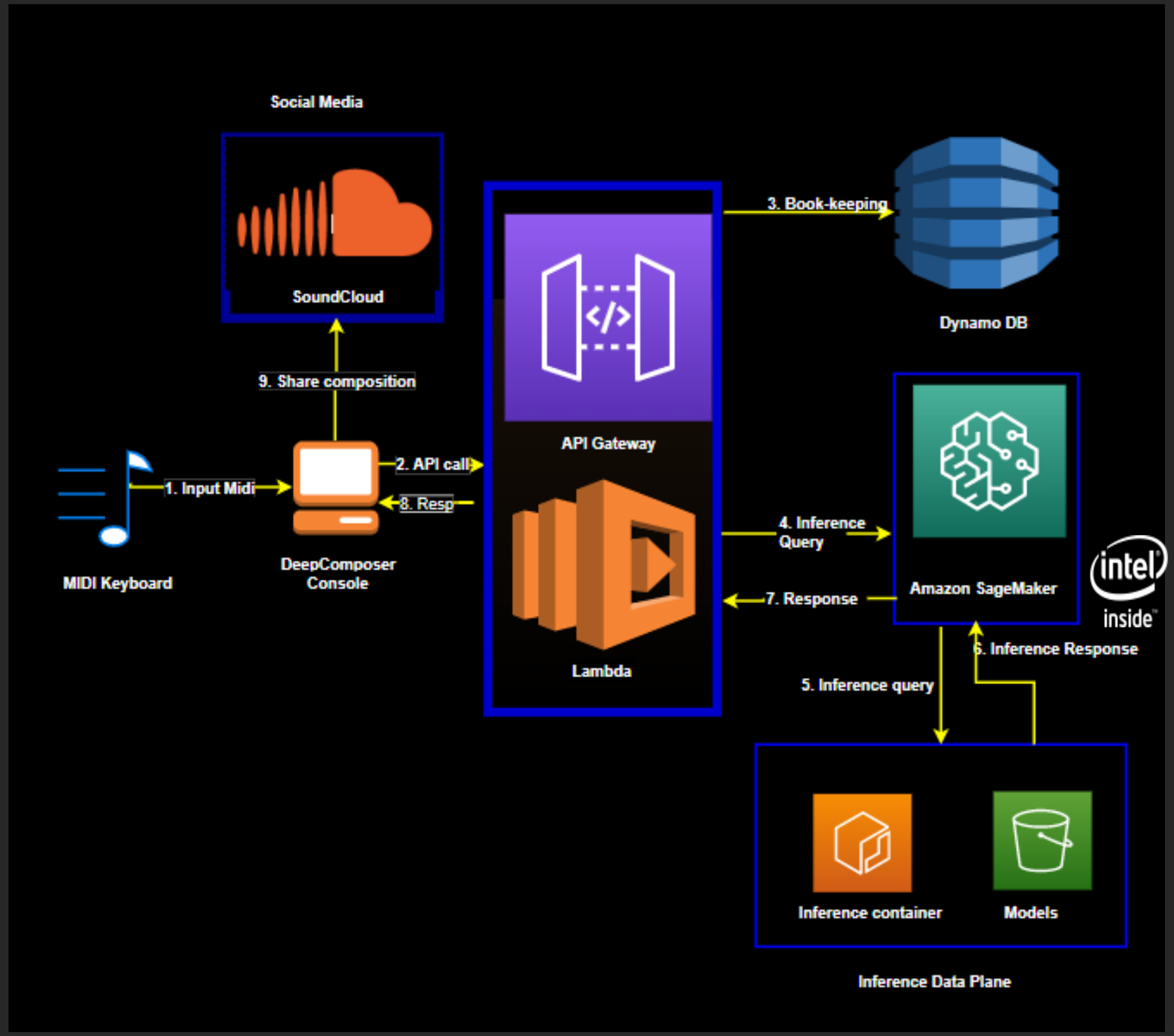
Discriminator



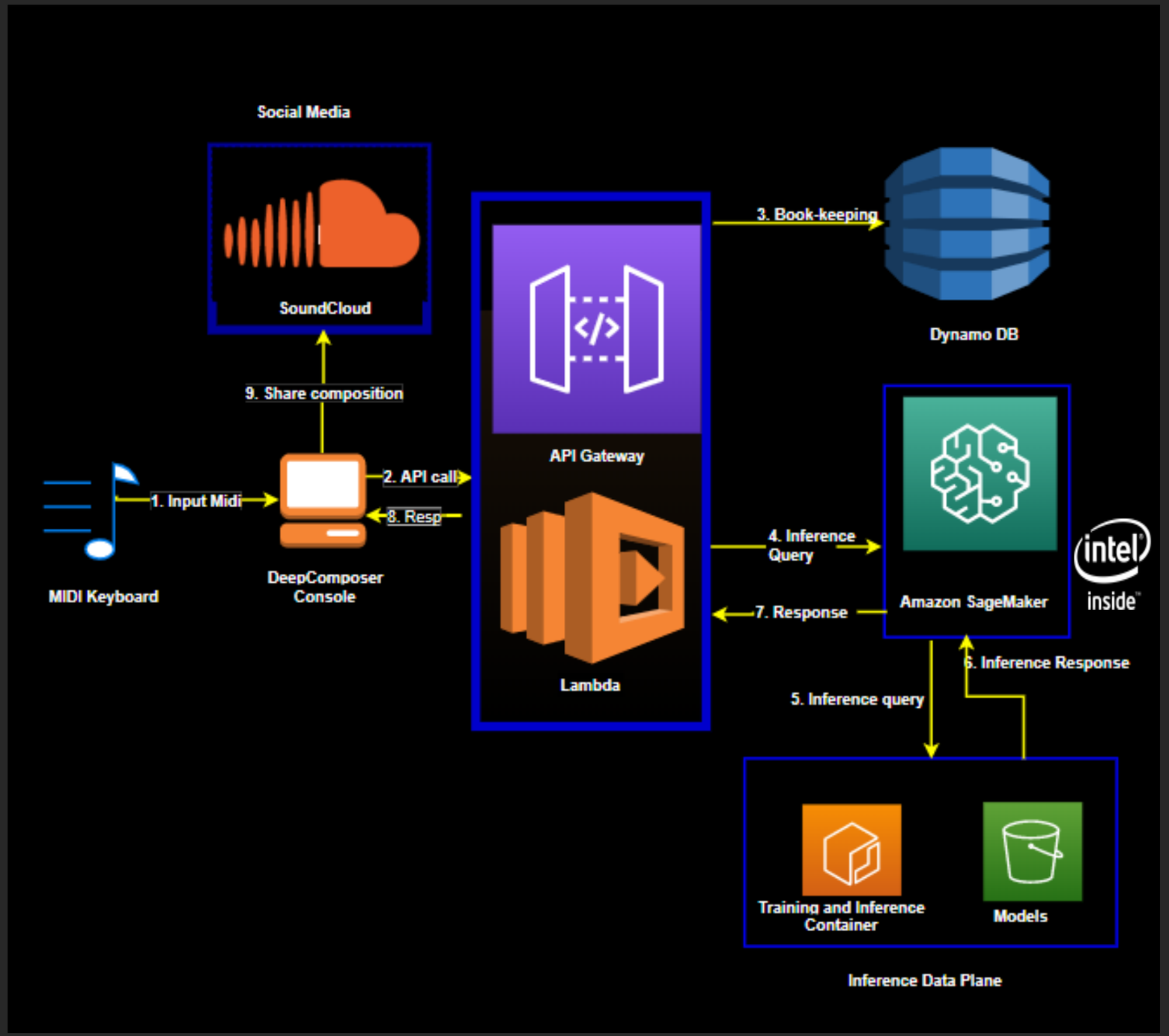
Epoch 3000

Epoch 60,000

Lab 1 – Under the hood



Lab 1 – Under the hood

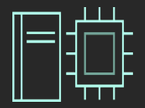


Knowledge Check

https://kahoot.it/

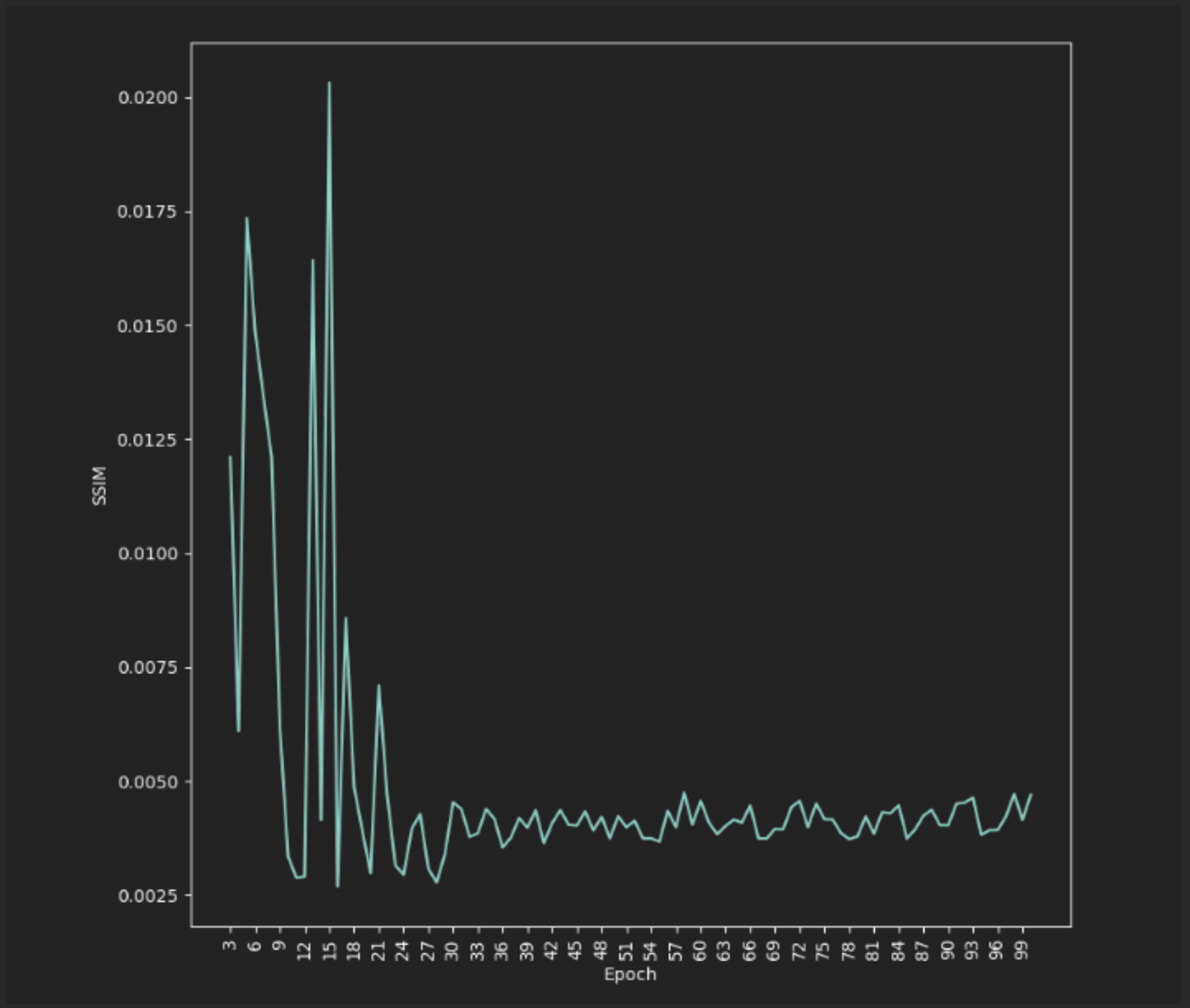
Lab 2 - Train a custom GAN model

Self-Paced Lab Instructions



1. Find the instruction manual on GitHub: https://github.com/aws-samples/aws-deepcomposer-samples
2. Select Lab 2
3. 50 minutes

Understanding Lab 2



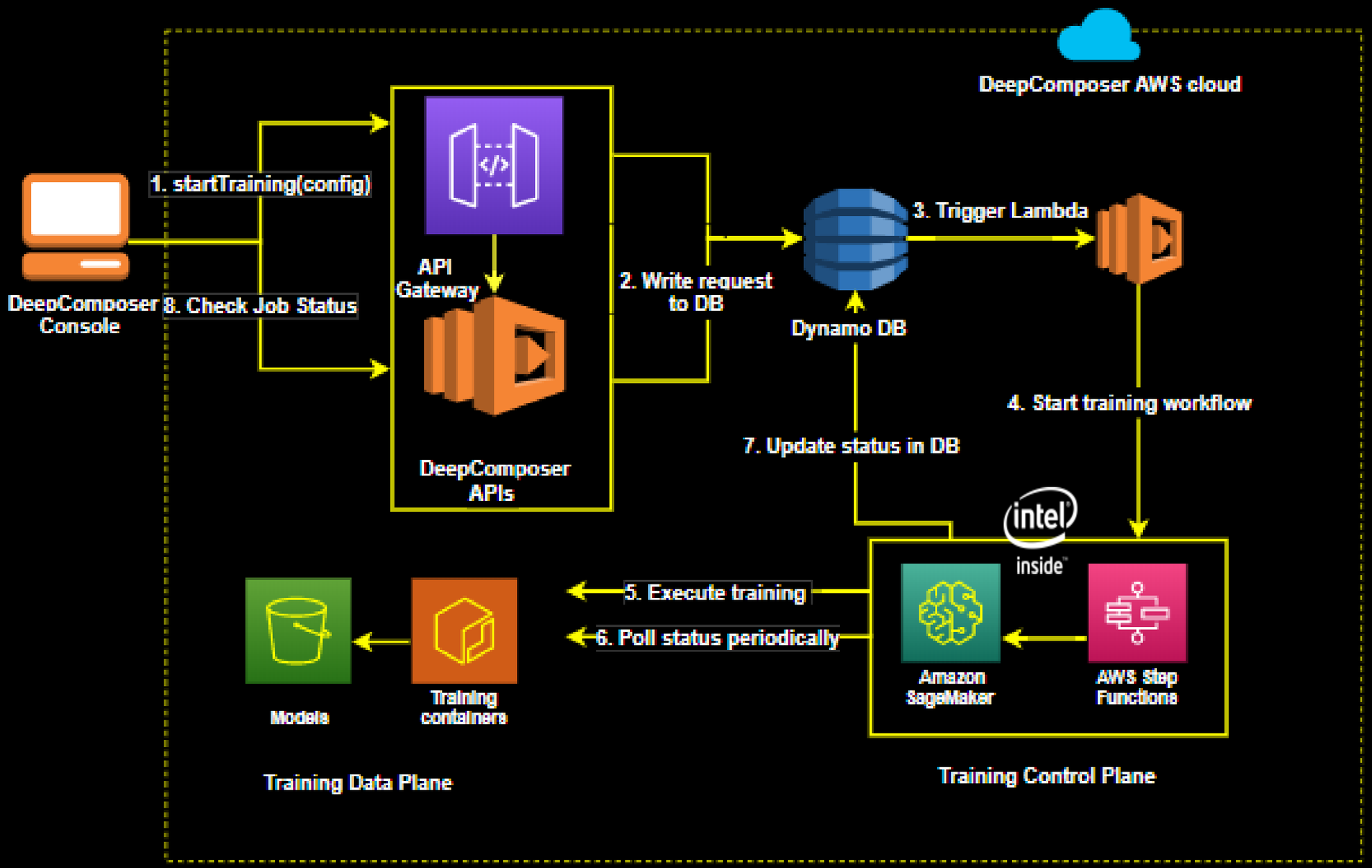
Epoch 3,000

Epoch 10,300

Epoch 20,500

Epoch 60,000

Training architecture



Challenges in training

1. Clean datasets are hard to obtain
2. GANs take time to converge during training
3. Complexity in defining subjective metrics for music creation
4. Complexity in defining quantitative metrics for music creation

Knowledge Check

https://kahoot.it/

Conclusion

What you learned today

- What are Generative AI algorithms?
- What are GANs
- GAN architecture and training process
- Generated a composition from an input melody – Lab1
- How AWS DeepComposer inference works
- Built a GAN model in Amazon SageMaker notebook – Lab2
- How AWS DeepComposer performs model training for building custom models

Get your free device

- Attendees who have attended the AWS DeepComposer workshop are eligible to receive a AWS DeepComposer device
- Giveaways can be picked up at the SWAG desk located in Venetian, Level 2, Hall C

Device Shipping

AWS
DeepComposer

If you do not wish to carry your AWS DeepComposer with you to your final destination, please fill in this card and take it to the **VENETIAN FedEx Business Center** to have it shipped, on us!

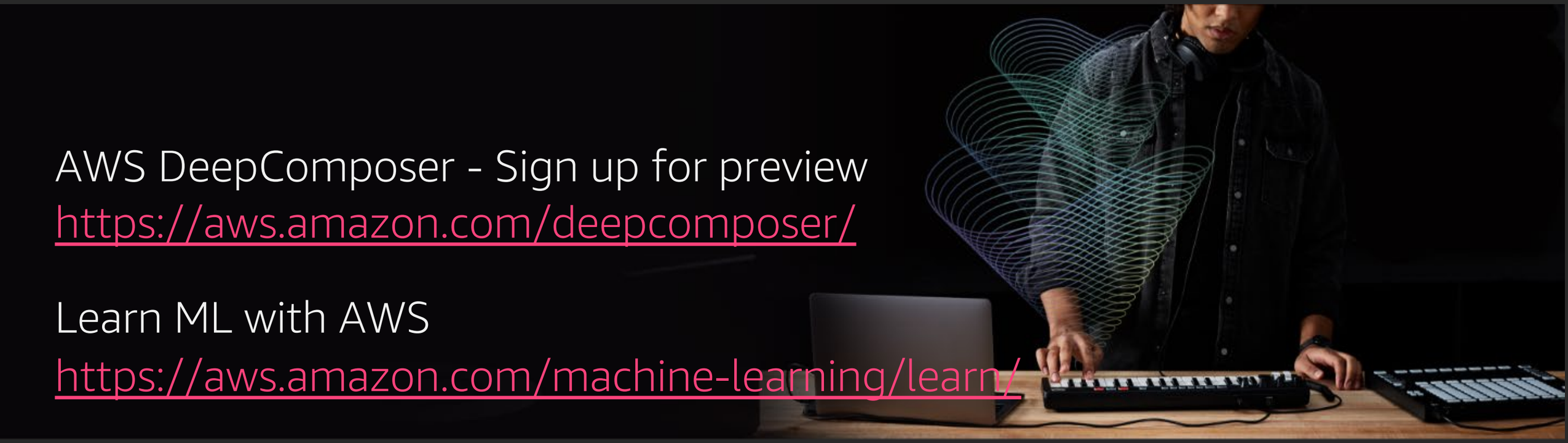
Please note: Redeemable at VENTETIAN FedEx Business Center only. Covers complementary US Ground and International Economy shipping. International shipping subject to local country restrictions regulating the shipping and receipt of certain items. Redeemable at Venetian, Level 2, FedEx Business Center only. Please write legibly in order to avoid complications in device delivery.

Recipient's Name:	Country:
Ship To Address:	
City, State, Zip:	
Phone Number:	Email:

Learn More

AWS DeepComposer - Sign up for preview
https://aws.amazon.com/deepcomposer/

Learn ML with AWS
https://aws.amazon.com/machine-learning/learn/



Questions?

Thank you!

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Please complete the session survey in the mobile app.