

Computer Vision on AWS Jumpstart

Dylan Tong, AI/Machine Learning Partner Solutions Architect

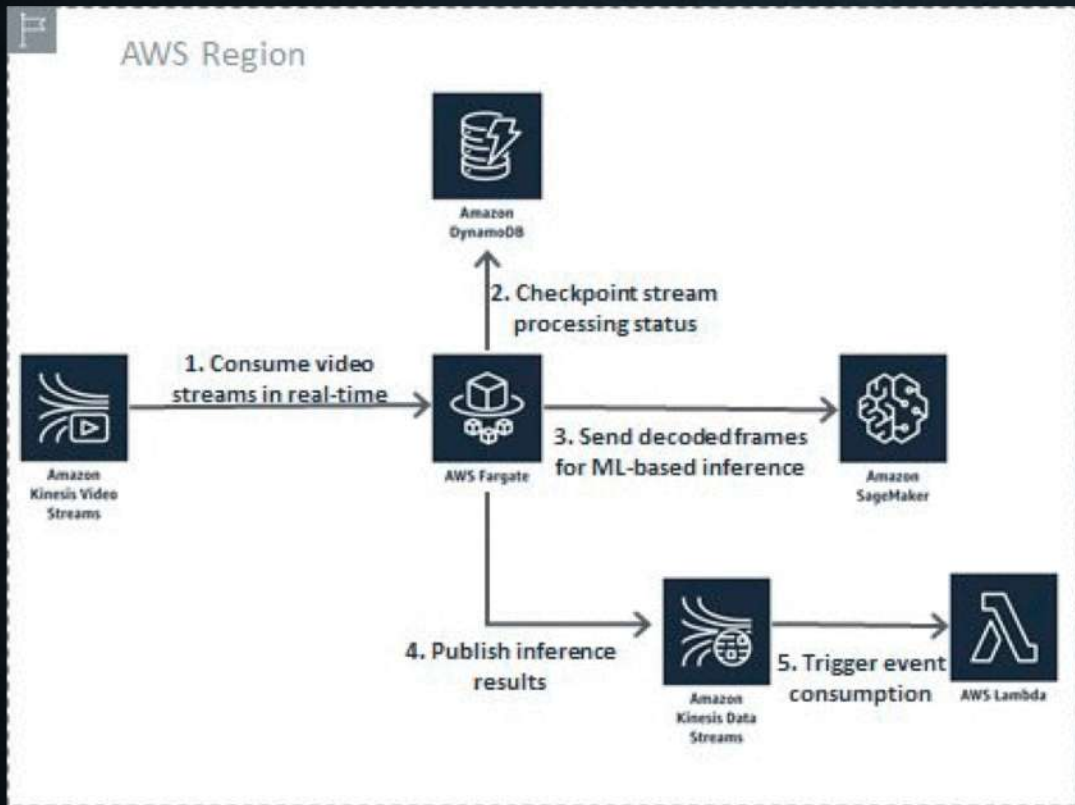
Jumpstart Workshop Menu

- Object Detection
- TBD...

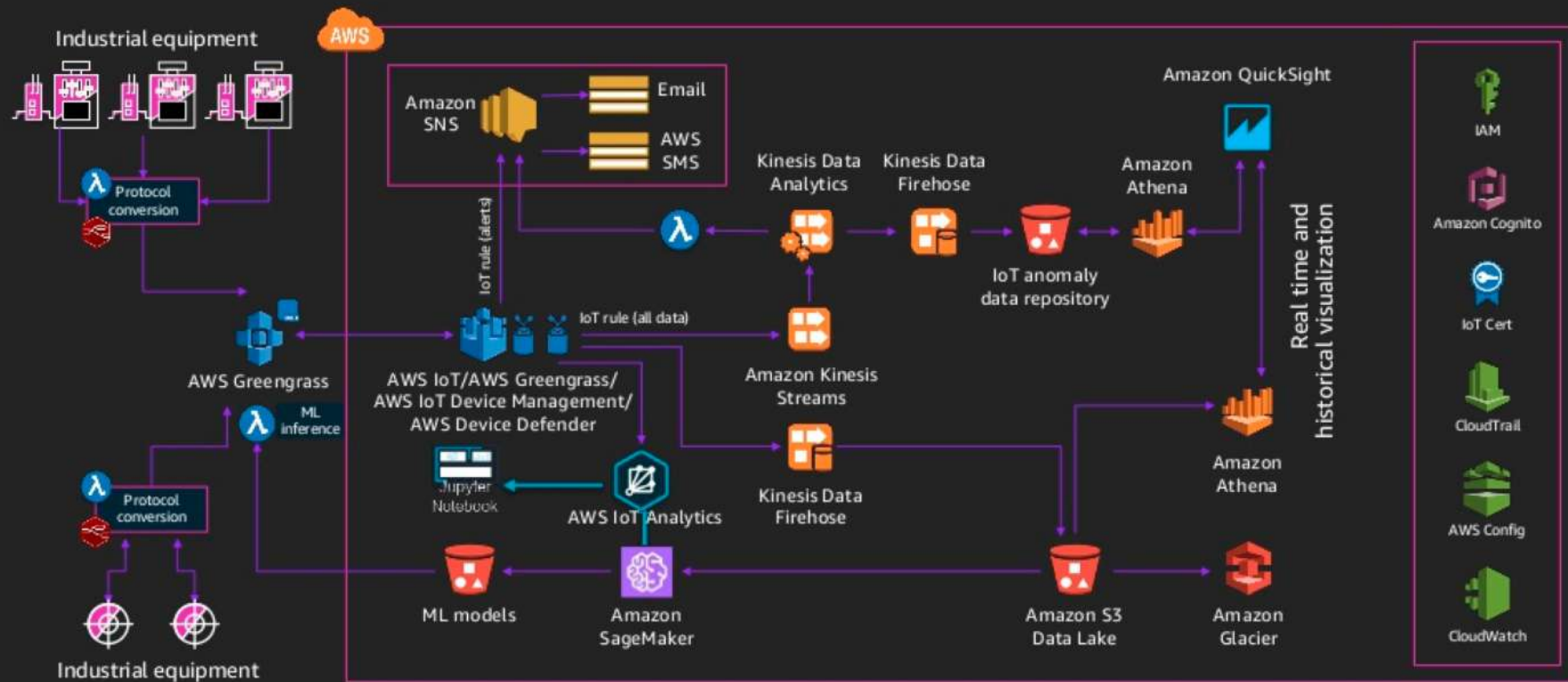
Object Detection Workshop

Reference Architectures

Cloud Inference on Streaming Video

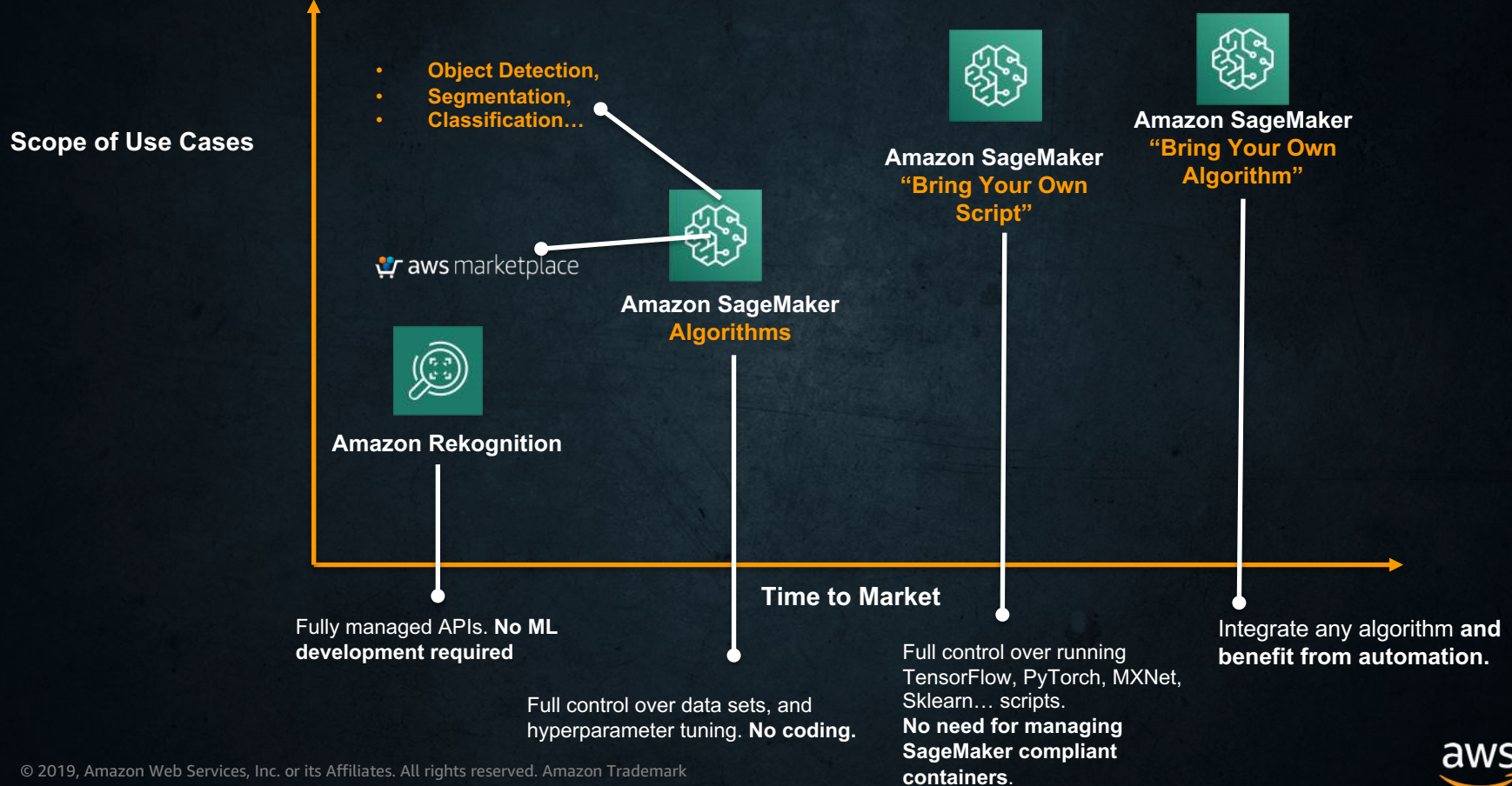


AWS industrial IoT reference architecture



Workshop Objectives and Agenda

Select the Right Strategy

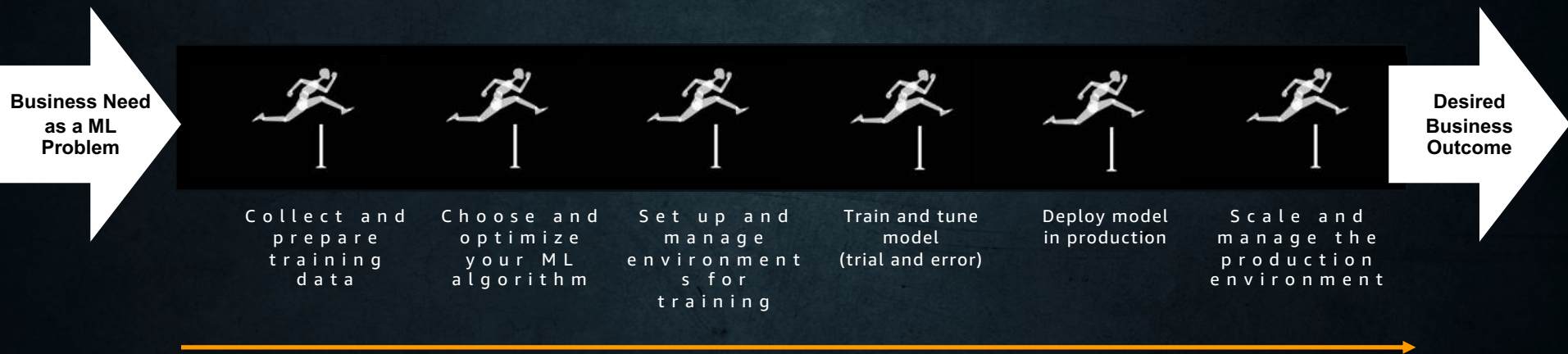


Right Tool for the Use Case



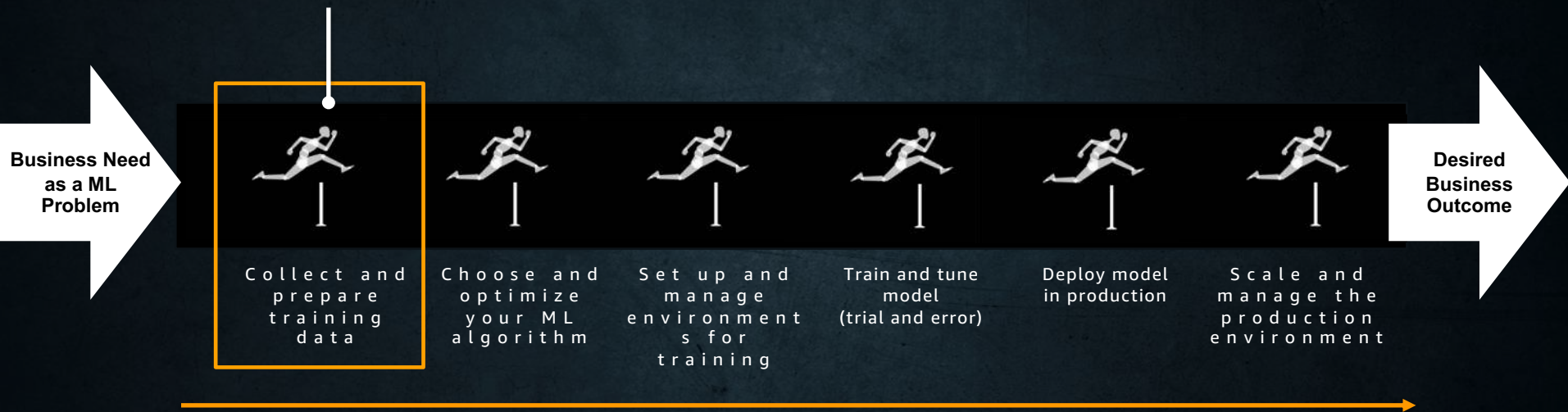
Amazon SageMaker

BRINGING MACHINE LEARNING TO ALL DEVELOPERS



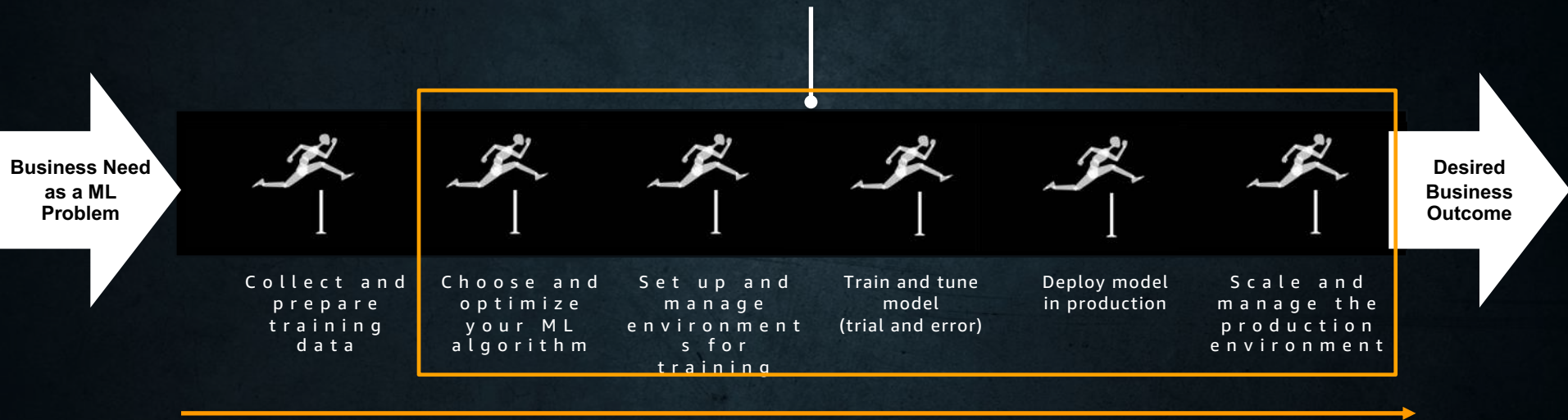
SIMPLIFY THE END-TO-END MACHINE LEARNING PROCESS

Lab 1: Managing a high
quality training set at
scale using **SageMaker**
GroundTruth



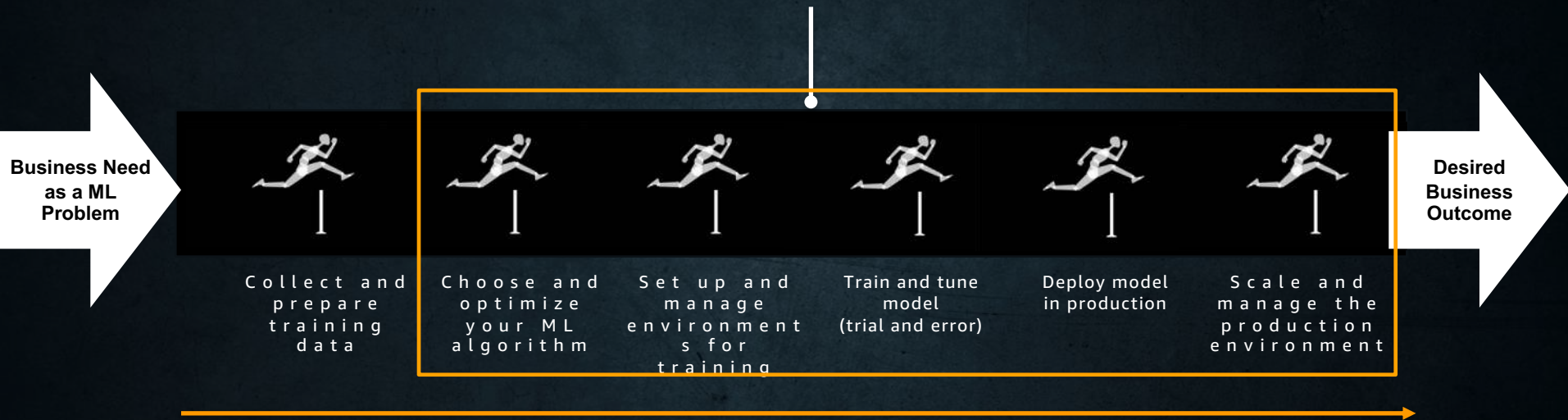
SIMPLIFY THE END-TO-END MACHINE LEARNING PROCESS

Lab 2: Train, tune and
deploy a custom object
detector (**SSD**) with **zero
coding**.




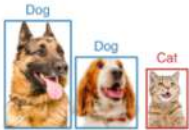



SIMPLIFY THE END-TO-END MACHINE LEARNING PROCESS

Lab 3: “Bring Your Own Script:” train, tune and deploy a custom object detector (YOLOv3) on GluonCV (MXNet).



SIMPLIFY THE END-TO-END MACHINE LEARNING PROCESS

Supported Applications

Application	Illustration	Available Models
<u>Image Classification:</u> recognize an object in an image.		50+ models, including ResNet , MobileNet , DenseNet , VGG , ...
<u>Object Detection:</u> detect multiple objects with their bounding boxes in an image.		Faster RCNN , SSD , Yolo-v3
<u>Semantic Segmentation:</u> associate each pixel of an image with a categorical label.		FCN , PSP , DeepLab v3
<u>Instance Segmentation:</u> associate each pixel of an image with an instance label.		Mask RCNN
<u>Pose Estimation:</u> detect human pose from images.		Simple Pose

Algorithm variants :

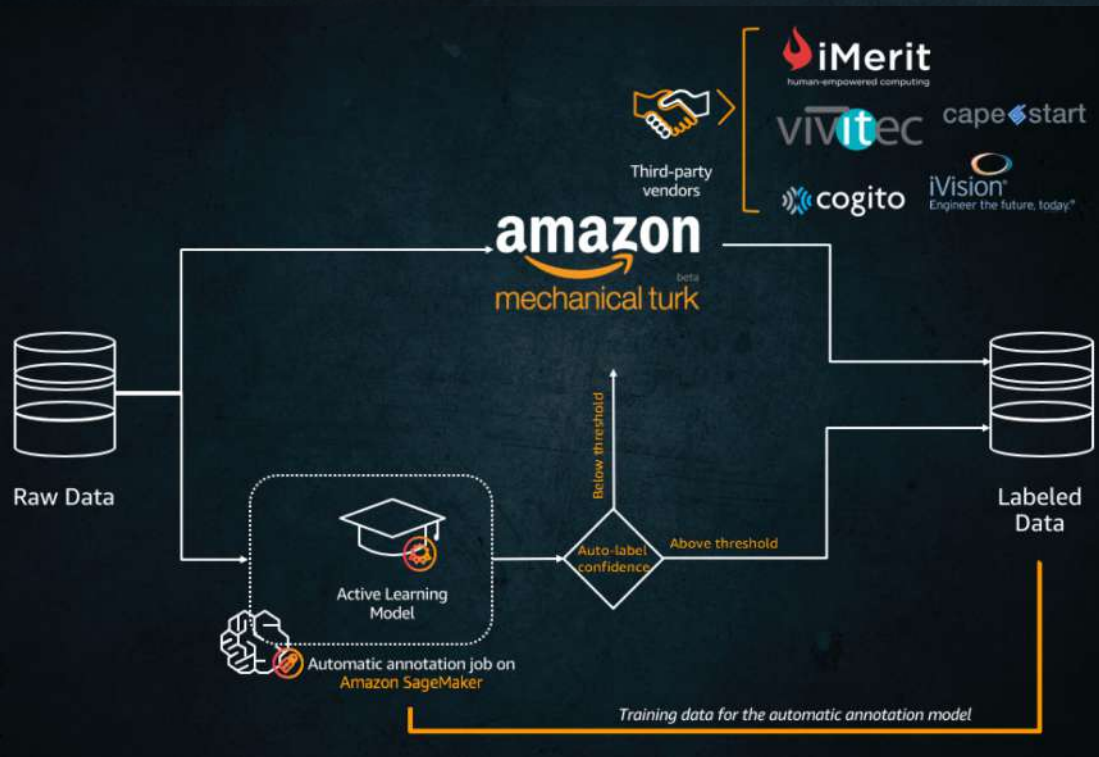
For instance, in **Object Detection**, different algorithms offer trade-offs between **accuracy (mAP)** and **latency (fps)**

Future labs

- By feedback and demand! dylatong@amazon.com
- Recognition:
 - Face Search
 - People Tracking
- Textract solutions
- More Amazon SageMaker use cases:
 - Segmentation, Pose Estimation, Similarity Search

Lab 1

Manage a high-quality data set at scale

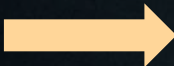


1. Launch a Notebook Instance.
2. Manage a private workforce.
3. Create an annotation job for Object Detection.
4. Generate a dataset and metadata compatible with Amazon SageMaker algorithms without further data wrangling!

Lab 2

Create a custom object detector with zero coding

SAGEMAKER OPTIMIZED ALGORITHMS

- 
- [BlazingText Algorithm](#)
 - [DeepAR Forecasting Algorithm](#)
 - [Factorization Machines Algorithm](#)
 - [Image Classification Algorithm](#)
 - [IP Insights Algorithm](#)
 - [K-Means Algorithm](#)
 - [K-Nearest Neighbors \(k-NN\) Algorithm](#)
 - [Latent Dirichlet Allocation \(LDA\) Algorithm](#)
 - [Linear Learner Algorithm](#)
 - [Neural Topic Model \(NTM\) Algorithm](#)
 - [Object2Vec Algorithm](#)
 - **[Object Detection Algorithm](#)**
 - [Principal Component Analysis \(PCA\) Algorithm](#)
 - [Random Cut Forest \(RCF\) Algorithm](#)
 - [Semantic Segmentation Algorithm](#)
 - [Sequence-to-Sequence Algorithm](#)
 - [XGBoost Algorithm](#)

1. Configure a hyperparameter tuning job for an Object Detection Algorithm.
2. Train on GPU
3. Deploy a managed endpoint.
4. Test and visualize!

Lab 3

Bring Your Own Script and automate the ML process

Examples

Training: Only modifications required is to set script certain parameters values from SageMaker container environment variables.

[GluonCV YOLOv3 training script](#)

[PyTorch Siamese Network training script](#)

Inference: requires overriding programmatic interface implementation.

[GluonCV YOLOv3 model serving script](#)

[PyTorch Siamese Network model serving script](#)

- **input_fn:** request format pre-processing
- **model_fn:** how to load the model
- **predict_fn:** inference logic
- **output_fn:** response format processing

1. Bring your own YoloV3 script on GluonCV
2. Prepare your data set and environment
3. Explore and prototype locally
4. Automate model tuning, and train
5. Deploy, test and visualize!

<https://github.com/dylan-tong-aws/aws-cv-jumpstarter>

aws.ai

Appendix

How we can help...



ML Solutions Lab

Brainstorming
Custom modeling
Training
Work side-by-side with Amazon experts



Machine Learning Training & Certification

Practical education on ML for new & experienced practitioners
Based on the same material used to train Amazon developers