Agenda

09:00 Welcome and Introductions
09:15 Data Science Lifecycle
10:30 Lab 1: Understanding and preparing data with S3, Glue and Athena
11:15 Lunch
12:00 Model training, testing and deploying with Sagemaker
12:45 Lab 2: Train, test and deploy your first model with Sagemaker
13:45 Break
14:00 Continuous Delivery of ML models
14:30 Lab 3: Continuous Delivery of ML models to Amazon SageMaker
15:15 Bring your own model
15:45 Wrap Up

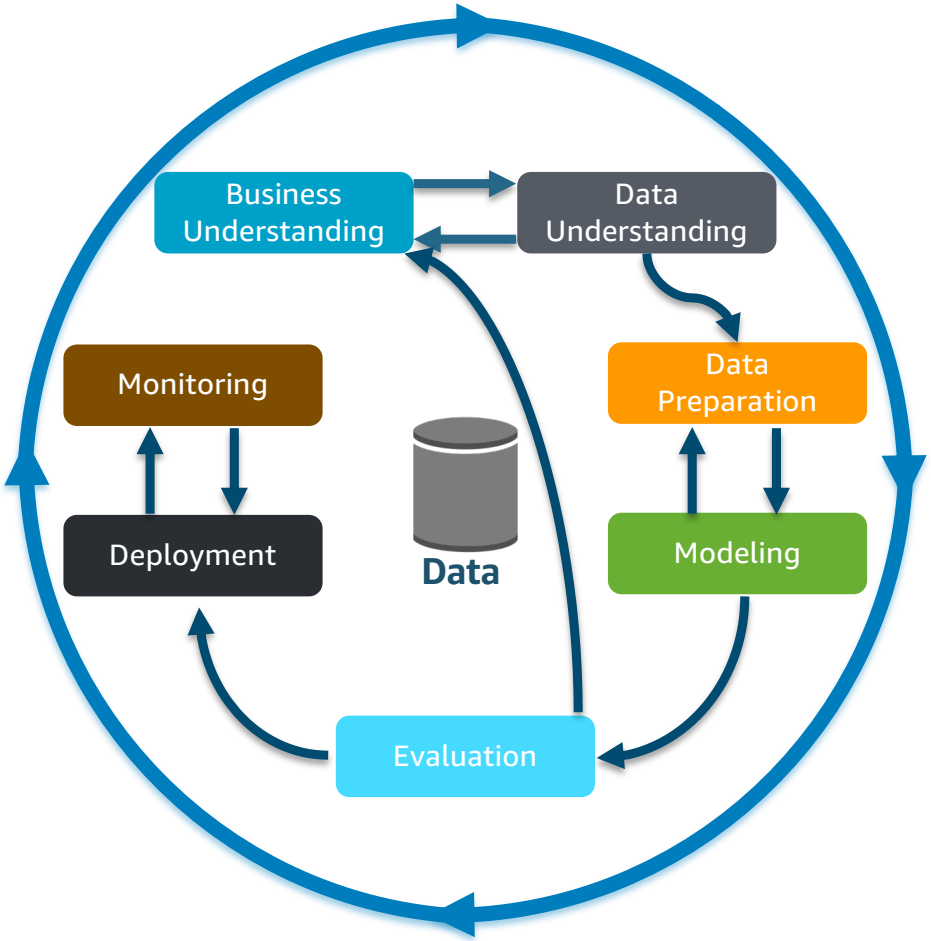
aws

Model training, testing and deploying with Amazon SageMaker

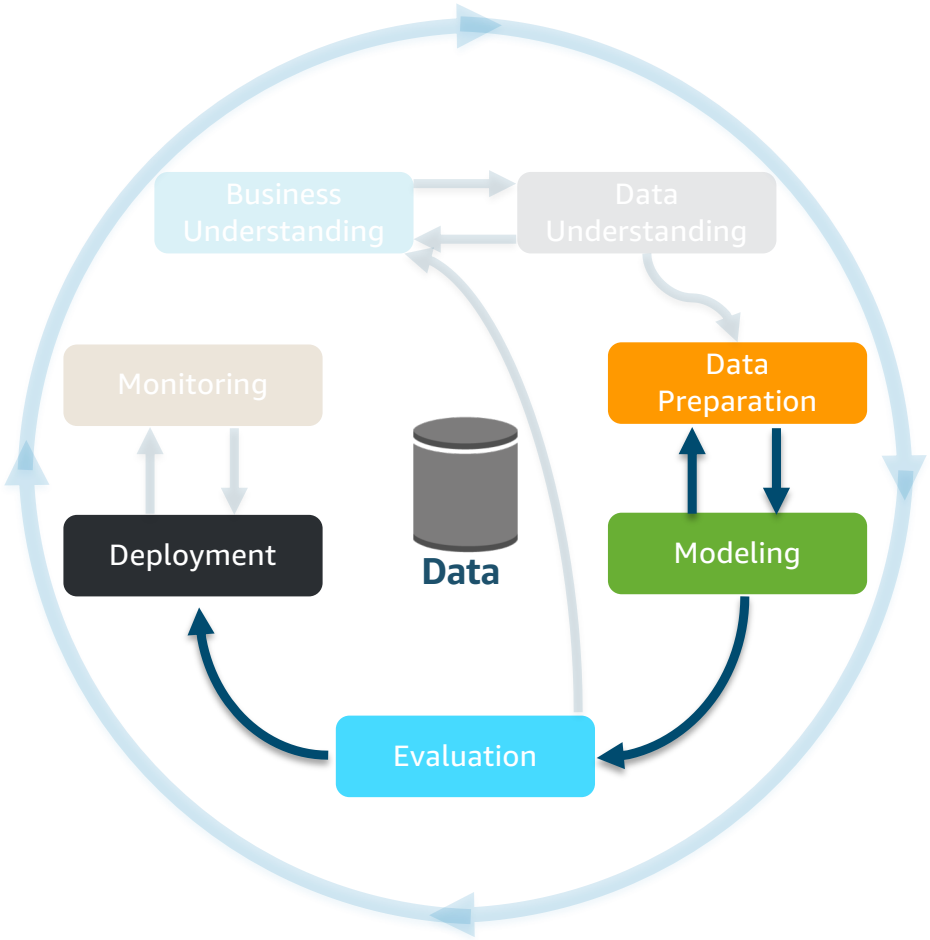
Machine Learning Immersion Day

Module 2

Data Science Lifecycle

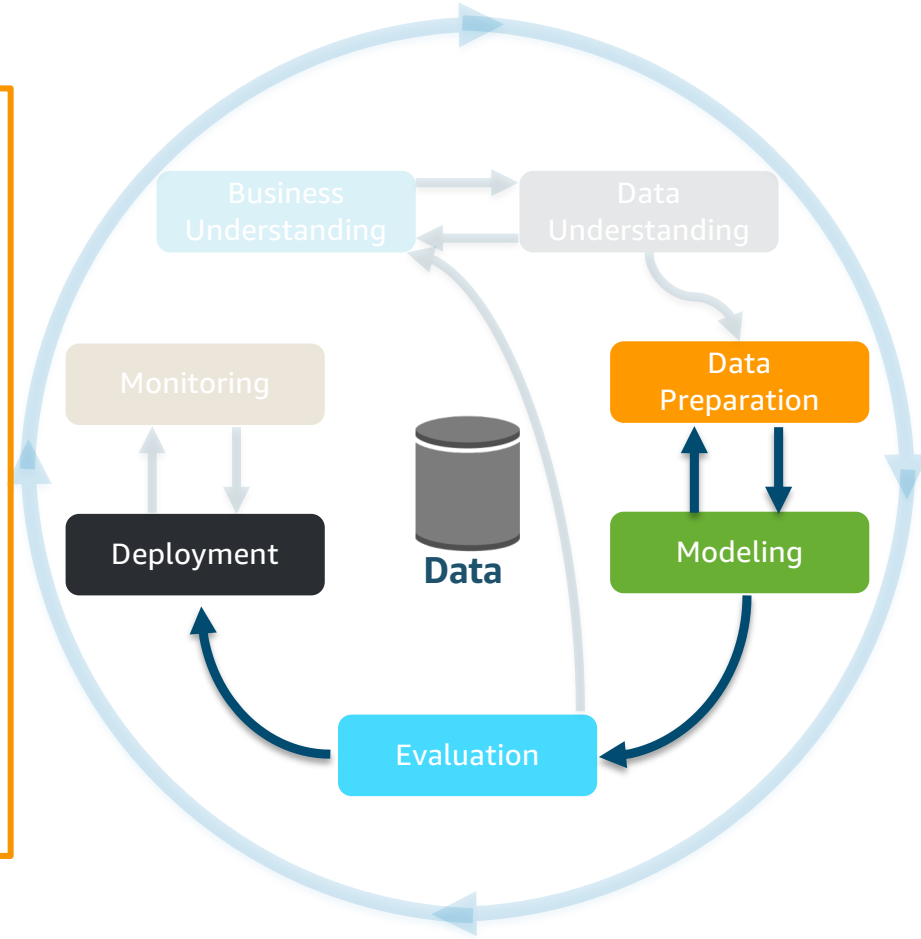


Data Science Lifecycle



ML Heavy Lifting

- Setup and manage Model Inference Clusters
- Manage and Scale Model Inference APIs
- Monitor and Debug Model Predictions
- Models versioning and performance tracking
- Automate New Model version promotion to production (A/B testing)



- Setup and manage Notebook Environments
- Setup and manage Training Clusters
- Write Data Connectors
- Scale ML algorithms to large datasets
- Distribute ML training algorithm to multiple machines
- Secure Model artifacts

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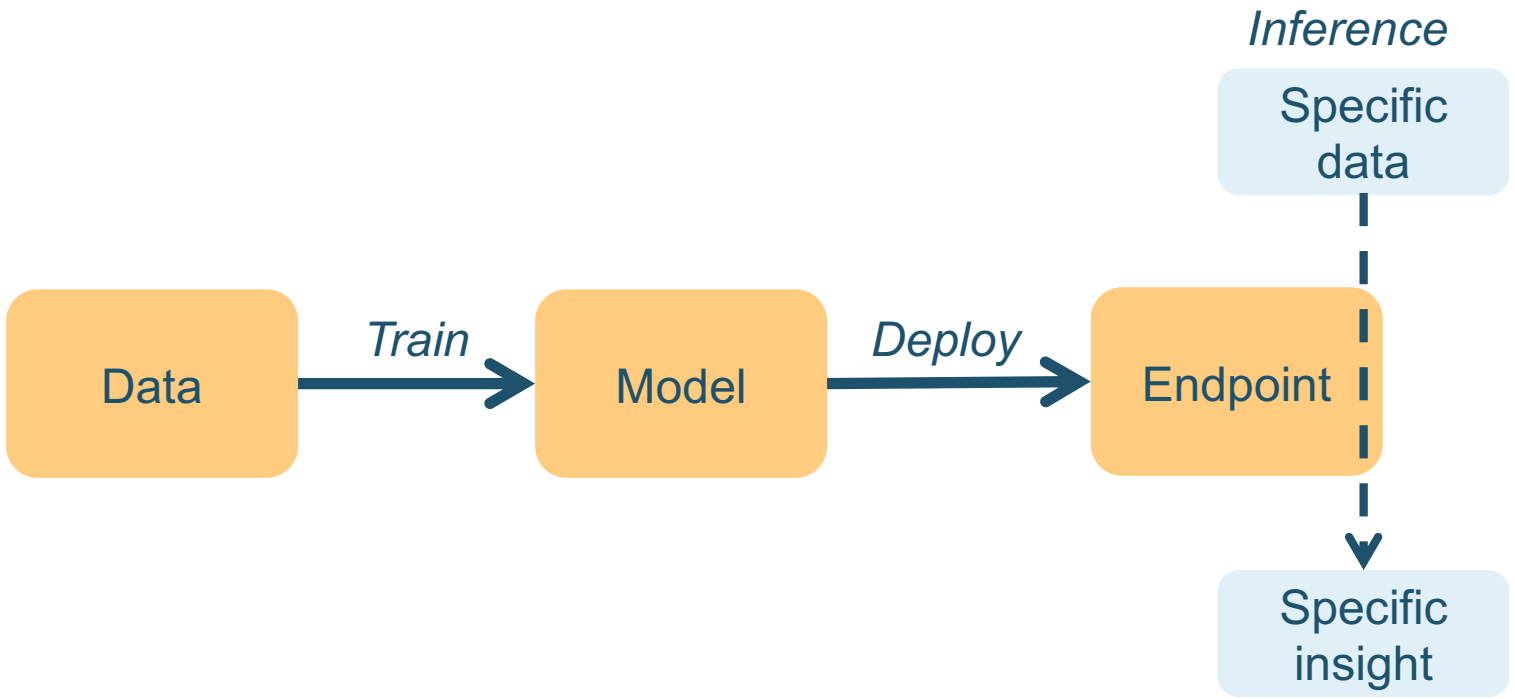
ML terminology



Amazon SageMaker

A managed service
that provides **the quickest and easiest way** for
data scientists and developers to get
ML models from idea to production.

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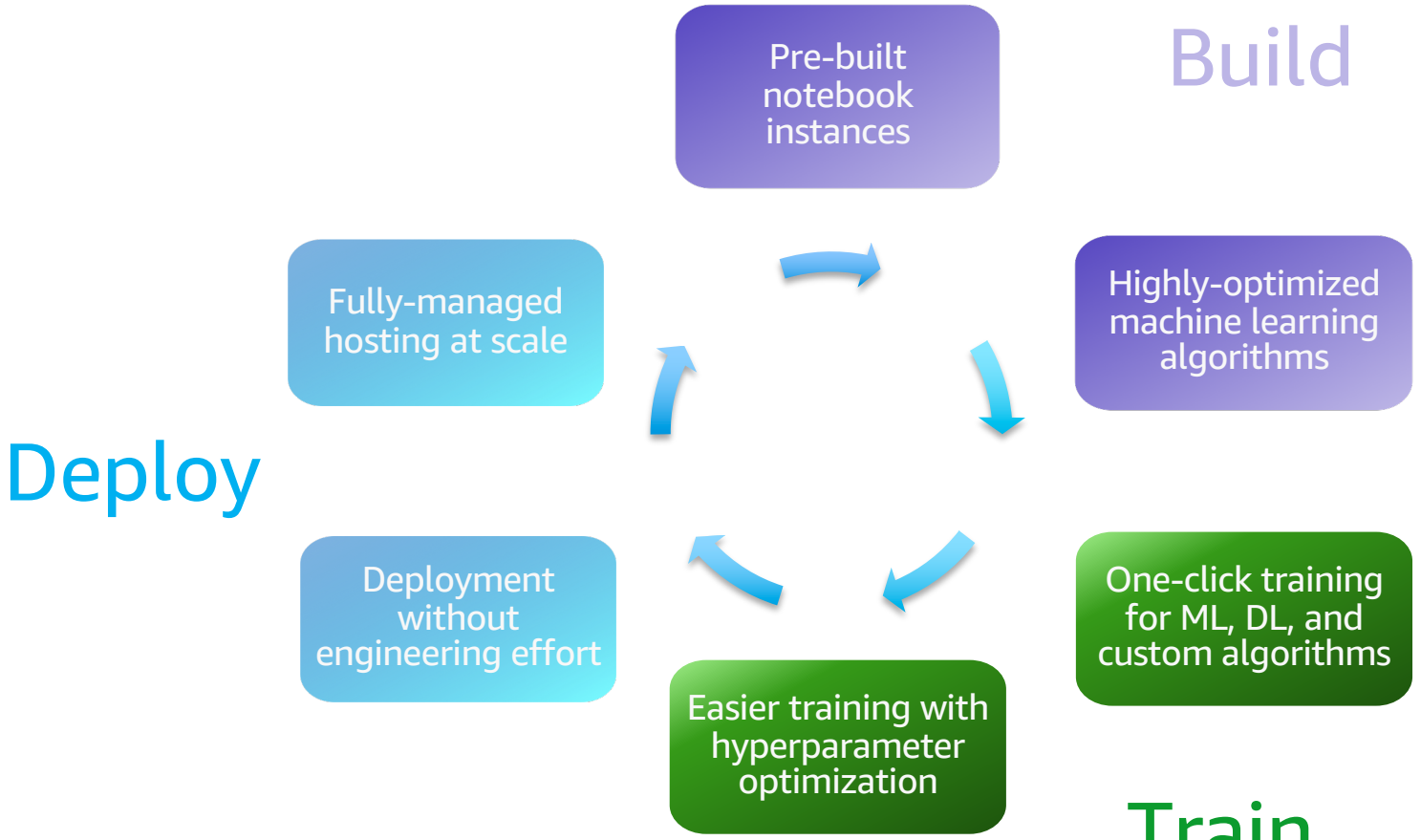
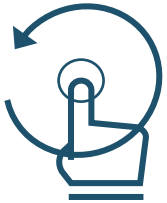
Amazon SageMaker

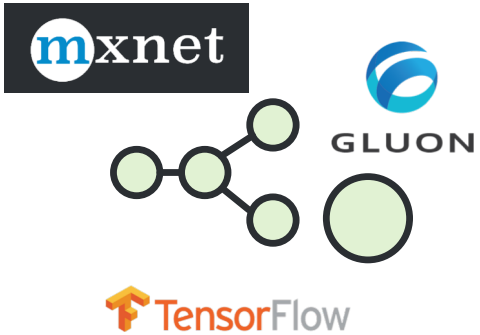


Amazon SageMaker

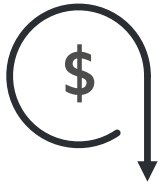


End-to-End Machine Learning Platform

Zero setup



Flexible Model Training



Pay by the second

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Amazon SageMaker components - UX

UX | **Training** | **Hosting**

Amazon's fast, scalable algorithms

Idiomatic, distributed TensorFlow & MXNet

Bring your own algorithm

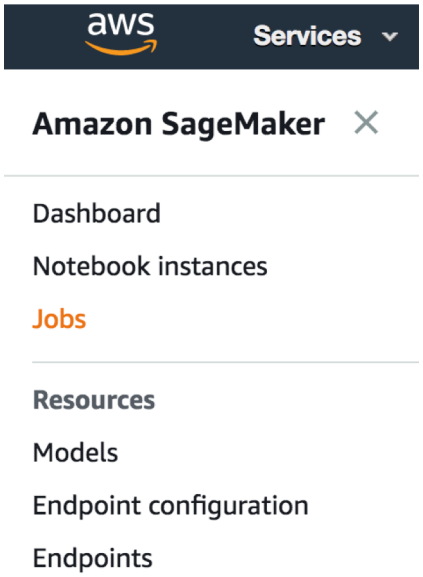
Hyperparameter optimization

aws

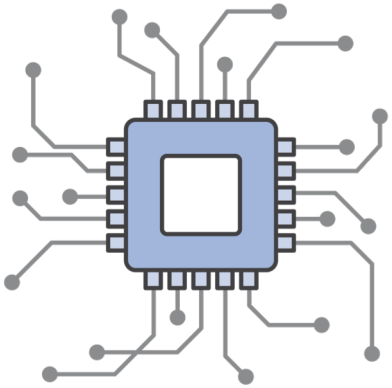
UX

Use SageMaker's hosted Notebook Instances…

… or Apache Spark through EMR and the SageMaker Spark SDK…



… or SageMaker's Console for a point and click experience…



… or your own device (EC2, laptop, etc.)

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Amazon SageMaker components - training

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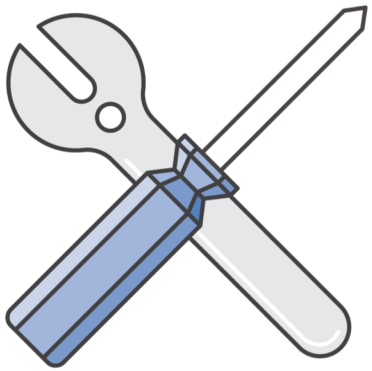
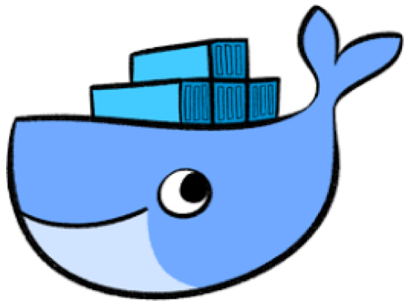
Training



Zero setup

Streaming datasets + distributed compute



Docker / ECS

Deploy trained models locally or to SageMaker, Greengrass, DeepLens

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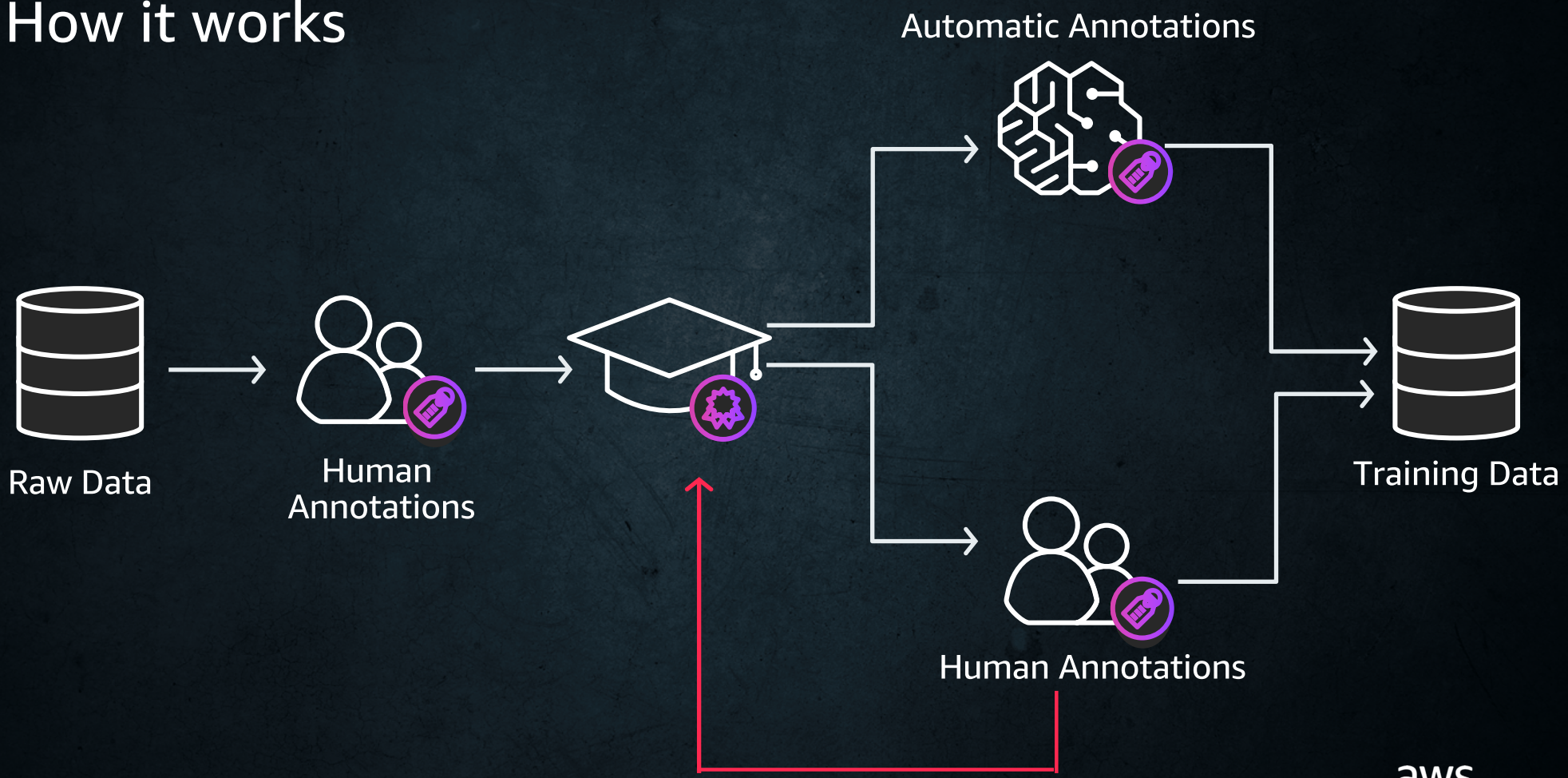
Amazon SageMaker Ground Truth
How it works

NEW



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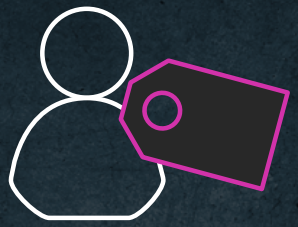
NEW

Amazon SageMaker Ground Truth
Label machine learning training data easily and accurately

Quickly label training data



Easily integrate human labelers

Get accurate results

KEY FEATURES

- Automatic labeling via machine learning
- Ready-made and custom workflows
- Private and public human workforce
- Label management

Tyson

CHANGE HEALTHCARE

Automagi

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Amazon SageMaker components - hosting

UX	Training	Hosting
	Amazon's fast, scalable algorithms	
	Idiomatic, distributed TensorFlow & MXNet	
	Bring your own algorithm	
Hyperparameter optimization		

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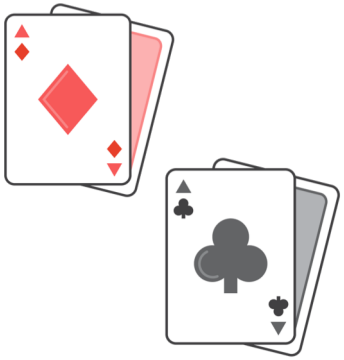
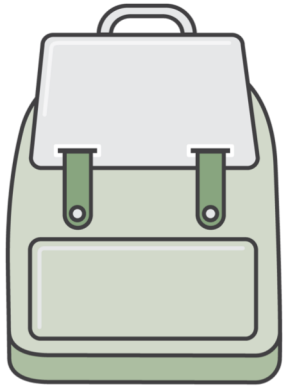
Hosting

One step deployment

Low latency, high throughput, and high reliability



A/B testing



Use your own model

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Amazon SageMaker components – Built-in Algorithms

UX | **Training** | **Hosting**

Amazon's fast, scalable algorithms

Idiomatic, distributed TensorFlow & MXNet

Bring your own algorithm

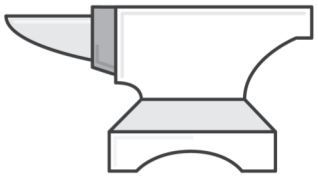
Hyperparameter optimization

aws

Amazon SageMaker

Streaming datasets, for cheaper training

Train faster, in a single pass



Greater reliability on extremely large datasets

Choice of several ML algorithms

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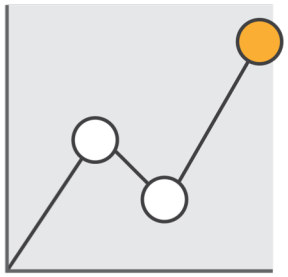
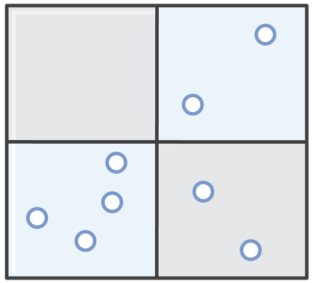
Built-in algorithms



XGBoost, FM, Linear, and Forecasting for supervised learning



Kmeans, PCA, and BlazingText (Word2Vec) for clustering and pre-processing

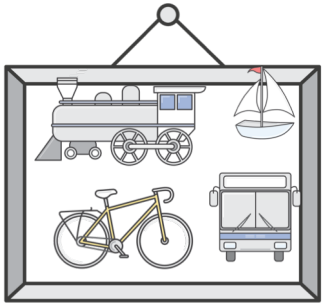
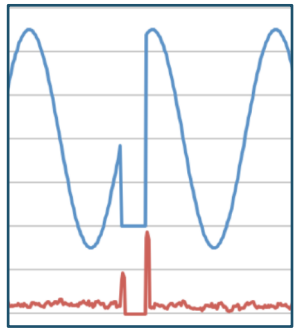


Image classification with convolutional neural networks

LDA and NTM for topic modeling, seq2seq for translation



Random Cut Forest for anomaly detection

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Amazon SageMaker components – Hyperparameter optimization

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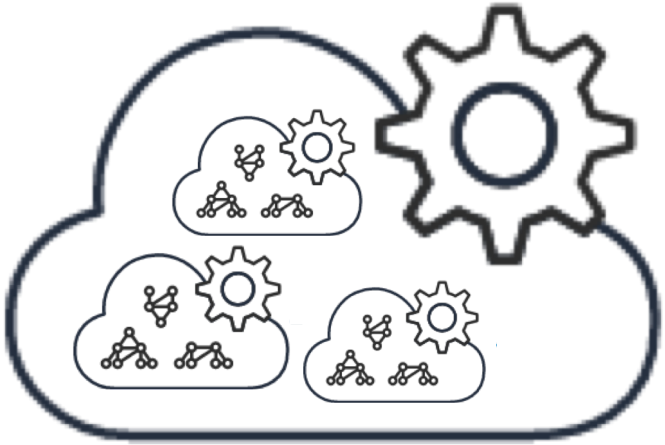
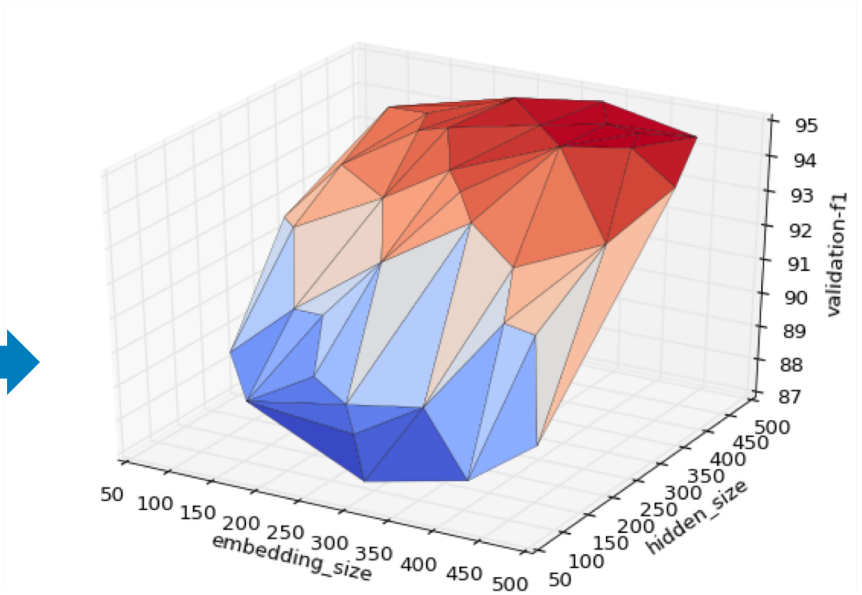
Hyperparameter Optimization





Run a large set of training jobs with varying hyperparameters...

... and search the hyperparameter space for improved accuracy.

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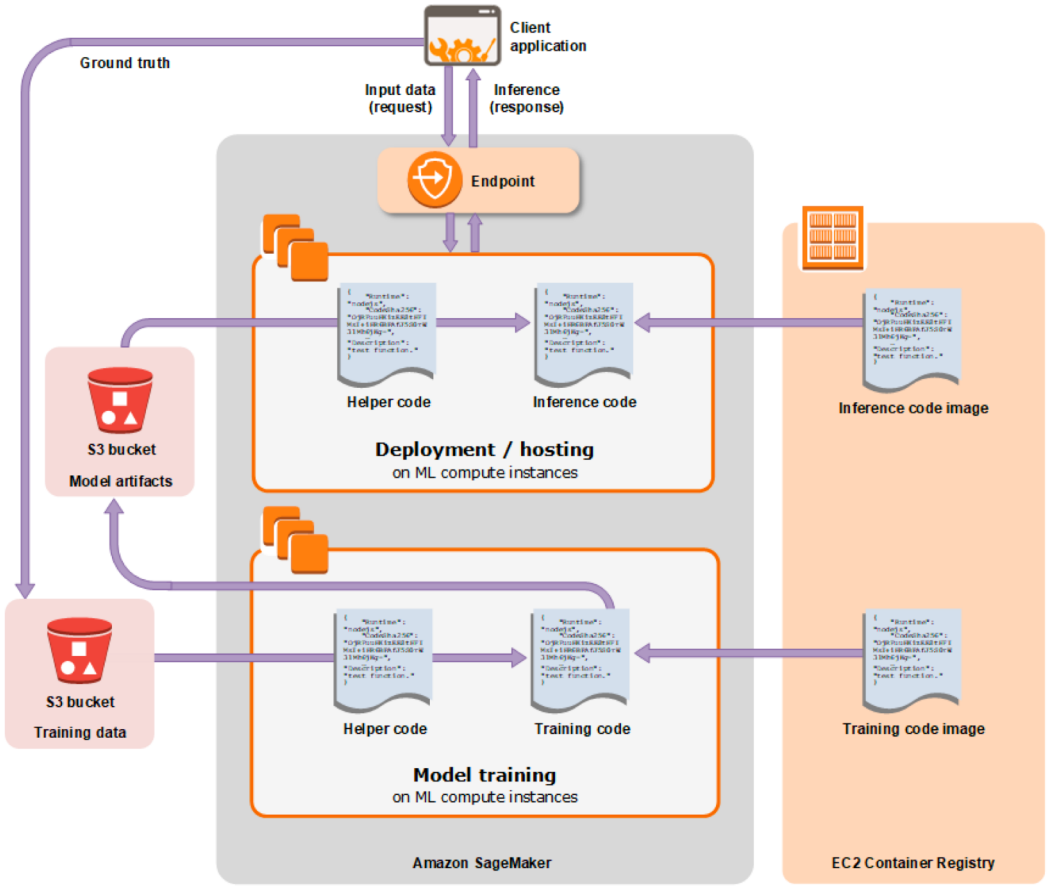
From training to inference



Data preparation

Recommender systems and Factorization Machines

- Enhance user experience using a recommender system based on ratings from previous users
- Often many users and many items but few recommendations
- FMs efficient on large sparse datasets
- Linear training time
- Factorize recommendation matrix

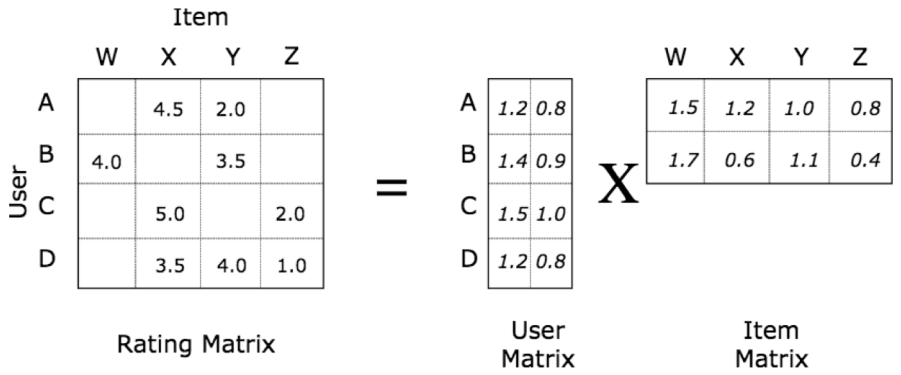


Image source: http://data-artisans.com

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Data preparation

1. Separate MovieLens data to training and test set
2. For each set, build a sparse matrix holding one-hot encoded data samples.
3. For each set, build a label vector holding ratings.
4. Write both sets to protobuf-encoded files.
5. Copy these files to an Amazon S3 bucket.

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One-hot encoding

- Mark 1 for one user and one movie per line in sparse feature matrix.
- Mark 1 if rating >=4, else 0 in label vector

User	Movie	Rating
2	2	4
1	3	5
3	1	4
1	1	2

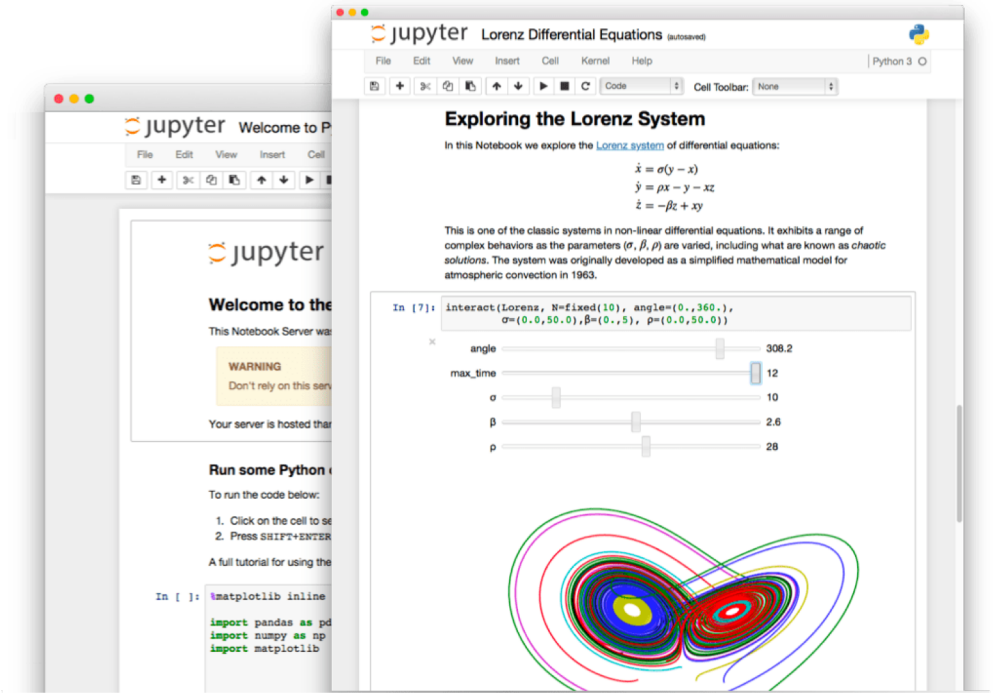
User 1	User 2	User 3	...	User M	Movie 1	Movie 2	Movie 3	...	Movie N
	1					1			
1							1		
		1			1				
1					1				

Label
1
1
1
0

aws

Jupyter notebooks

- Web-based interactive computational environment
- Collects code, text (Markdown), mathematics, plots
- Ordered input/output cells



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Questions?