AWS re:Invent

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AIM415

Real-time recommendations using Amazon SageMaker Feature Store

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Agenda

Learning objectives

Amazon SageMaker Feature Store introduction

What you will be building

Workshop structure

Build time (90-plus minutes)

Wrap-up

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Learning objectives

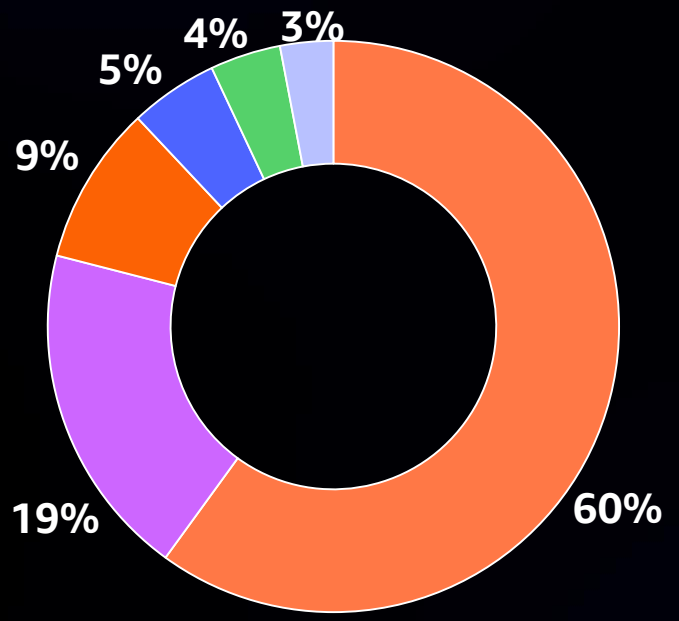
- Ingest batch and streaming data into Amazon SageMaker Feature Store
- Aggregate features in real time using Amazon SageMaker Feature Store
- Use features and models to make real-time personalized recommendations

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Amazon SageMaker Feature Store introduction

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60% of time spent on data preparation



What data scientists spend the most time doing

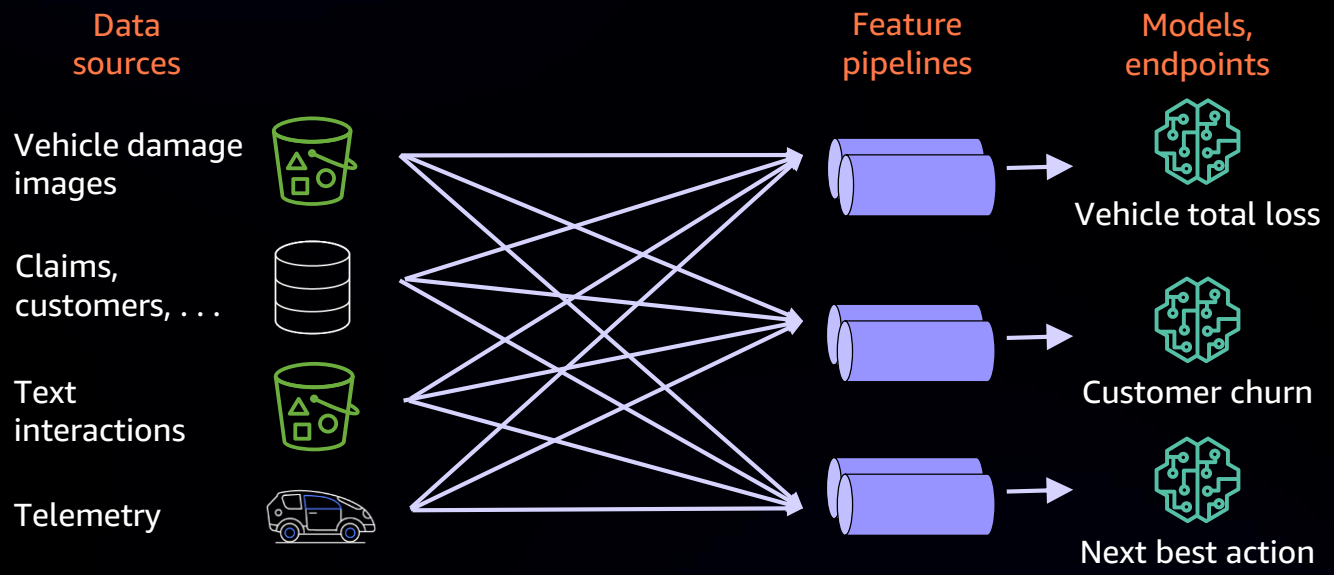
- Cleaning and organizing data
- Collecting datasets
- Mining data for patterns
- Other
- Refining algorithms
- Building training sets

Source: Forbes survey of 80 data scientists, March 2016
https://bit.ly/307YuVi

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Teams too often start from scratch

STANDALONE FEATURE ENGINEERING FOR EACH NEW MODEL



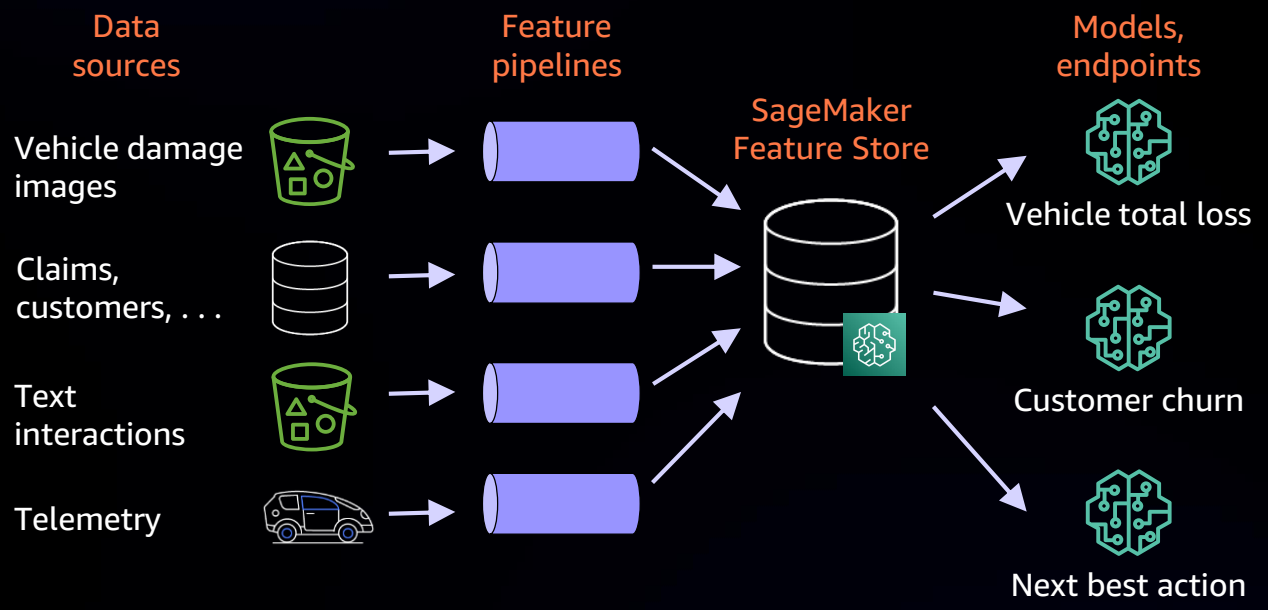
Challenges

- Feature duplication
- Slow time to market
- Inaccurate predictions

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Amazon SageMaker Feature Store

BUILD FEATURES ONCE, AND THEN REUSE THEM ACROSS TEAMS AND MODELS



Benefits

- Feature reuse
- Reproducible features
- Accurate training datasets
- Low-latency inference
- Consistent features for training and inference

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Amazon SageMaker Feature Store

Securely store, discover, and share features for both real-time inference and training



Batch and streaming ingestion

High-throughput writes for ingesting features



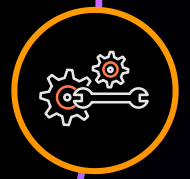
Online and offline features

Online features for real-time prediction, and offline features for historical data for model training and batch prediction



Feature discovery and reuse

Search for features to reuse, before starting new development



Feature metadata and data cataloging

Store metadata for features, and leverage automatic data cataloging to easily query and extract feature data



Security and access control

Access control for feature data and feature metadata, and support for encryption at rest, Amazon VPC, and AWS PrivateLink



Fully managed

Online features cached in low-latency store; maintain consistency between online and offline store to avoid train-infer skew

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What you will be building

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Use case

Use a synthetic online grocer dataset to make real-time product recommendations to users

Ingest ecommerce data into Amazon SageMaker Feature Store

- Offline features to train the recommendation engine models
- Online aggregated features for real-time, low-latency feature lookups during inference

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Data

Customers
customer_id
name
sex
state
age
is_married
customer_health_index

Products
product_name
product_category
product_id
product_health_index

Orders
customer_id
product_id
purchase_amount

Click stream
customer_id
sum_activity_weight_last_2m
avg_product_health_index_last_2m

Click stream
product_id
customer_id
rating
healthy_activity_last_2m
propensity_to_buy

healthy_activity_last_2m – Quantifies user product interaction behavior toward healthy products in a theoretical range of [0, ∞)

The higher the quantity, the more healthy products the user interacted with in the past 2 minutes

[customer/product]_health_index – A value between 0 and 1 indicating how strong the customer's preference (learned from activity history) is in general for buying healthy products or how healthy a product is

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Collaborative filtering

Predict interests of a user by looking at the interests of many more users

- Recommend an item to user A based on the interest of a similar user B

Common methods

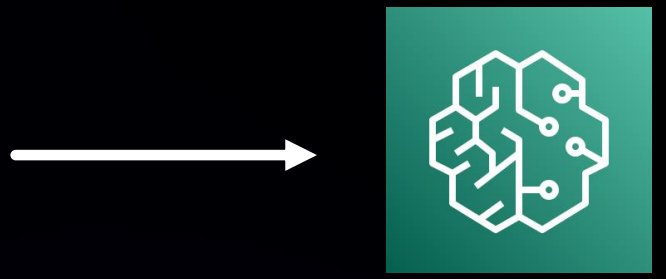
- Factorization Machines
- k-nearest neighbors

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Collaborative filtering model

Recommend products based on historical user-product interaction

Collaborative filtering model features
Onehot encoded “product_id”
Onehot encoded “customer_id”
Onehot encoded “is_married”
“age”
Onehot encoded “state”
tf_idf “product_name”
rating (target)



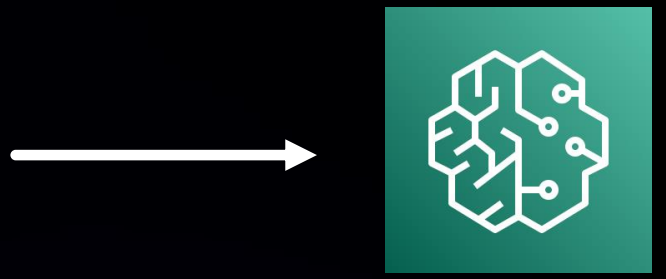
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Ranking model

Rerank the recommended products

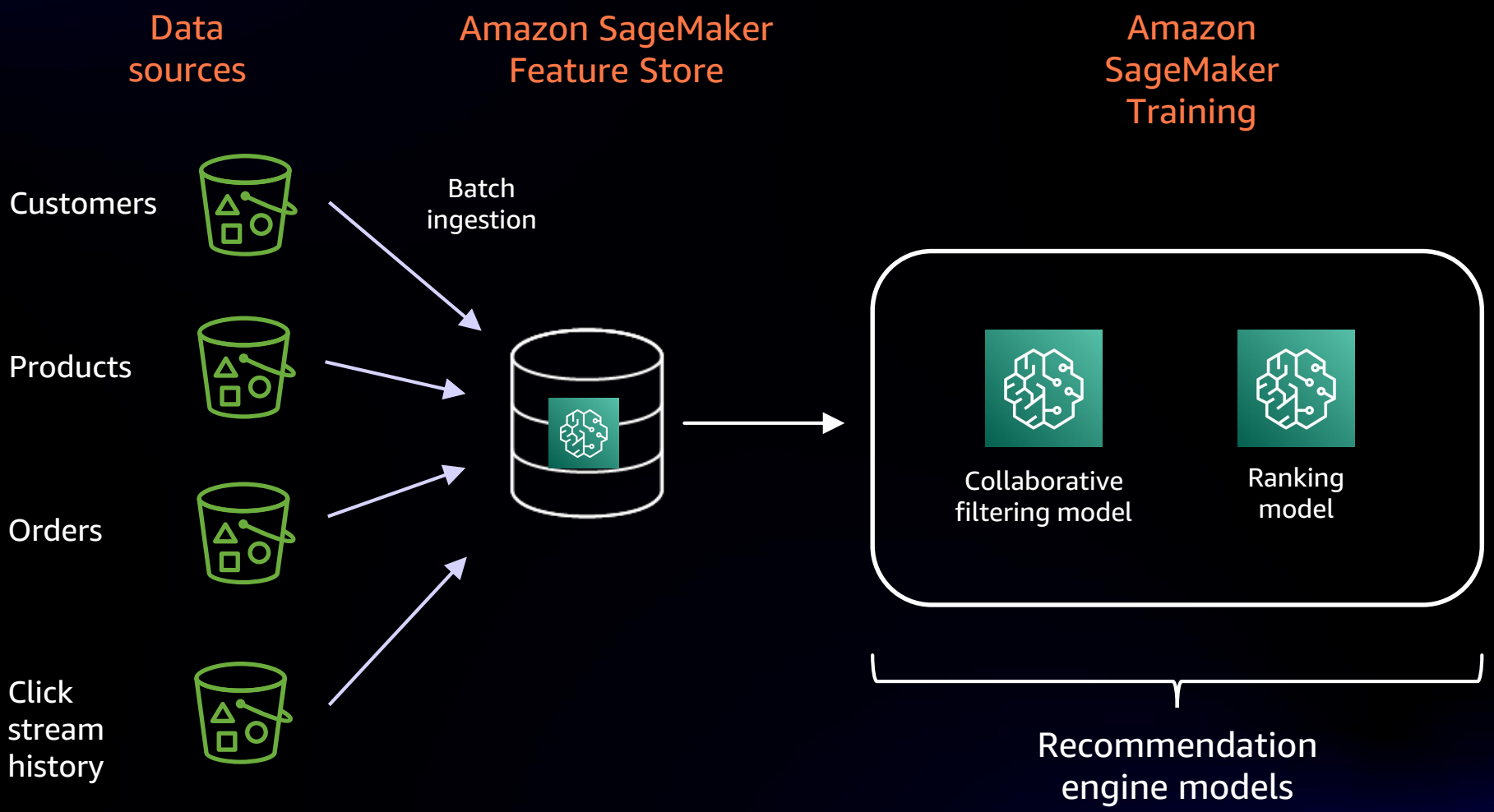
Ranking model features
bought (target)
healthy_activity_last_2m
product_health_index
Onehot encoded “product_category”
customer_health_index



XGBoost

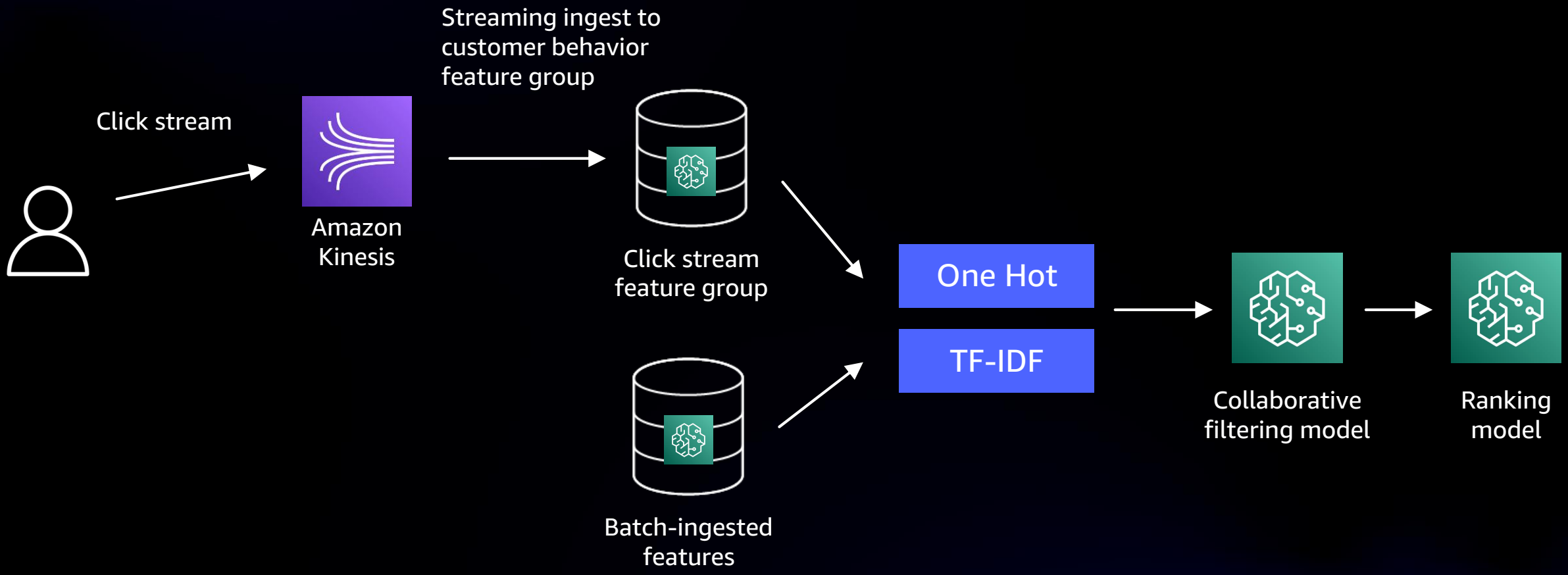
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Solution architecture overview – Training



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Solution architecture overview – Inference



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Structure of the workshop

1. Notebook 1: Feature store
2. Notebook 2: Recommendation engine models
3. Notebook 3: Real-time click-stream events using Amazon Kinesis
4. Notebook 4: Real-time recommendations
5. Notebook 5: Cleanup

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Workshop moderators















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Now let’s build!

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How to get started

https://bit.ly/AIM415

Event hash: ff89-1f81cad614-9a

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Wrap-up

Let’s see what you just built!

- Ingested batch and streaming data into SageMaker Feature Store
- Fetched aggregate features in real time using SageMaker Feature Store
- Used features and models to make real-time personalized product recommendations

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Thank you!

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