Creating and operating ML models from event-based data using a feature engine and a feature store

Davor Bonaci
CEO
KASKADA

Dr. Charna Parkey
VP, Product
KASKADA

Taimur Rashid
Chief Business Development Officer
redis

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Delivery Trends - Pandemic

- 30% drop in ordered items being found
- Average customer basket size +>35% month over month
- 500% increase in year over year order volume
- More localized events needed to predict which items will sell out
  - Increase in the number of items needing to be scored
  - Increase in the number of shops needing predictions
  - Noise reduction is critical

ML models can only be as good as the data we give it

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Latency is an outage

500

million

You need native time travel and a low latency, high throughput feature store

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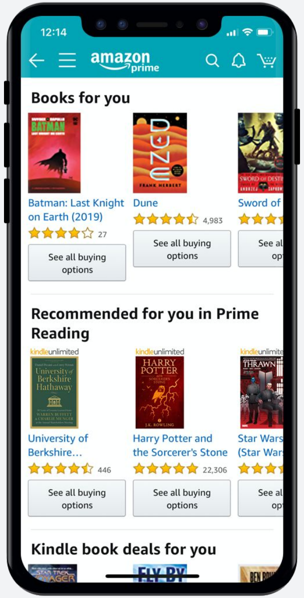
Feature Stores for ML

Time travel is hard



Personalization

Amazon: *Contributes 35% of revenue*

Recommendations

Netflix: *+13% in revenue due to savings*

Fraud Alerts

FICO: *+30% in detection of CNP fraud*

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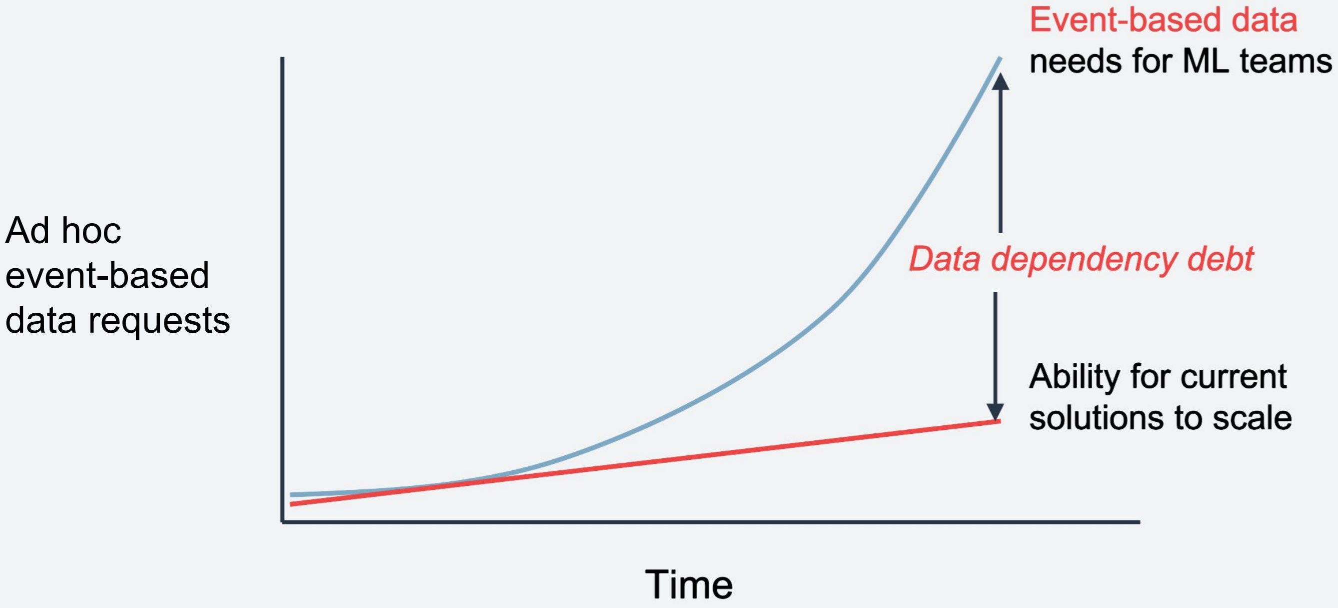
Feature Stores for ML

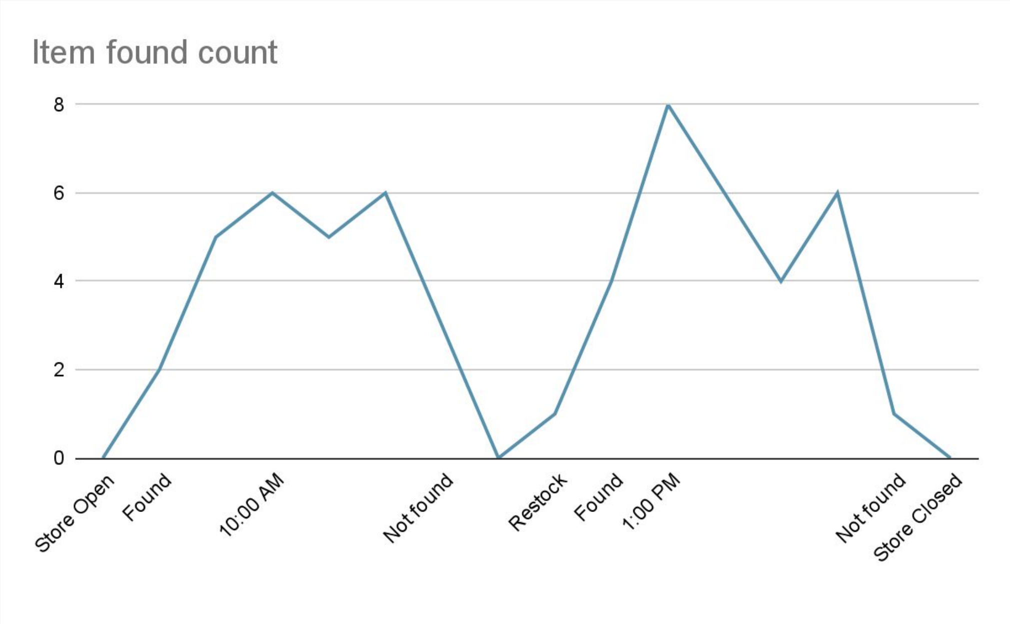
The growth in demand for unpredictable event-based data needs is increasing



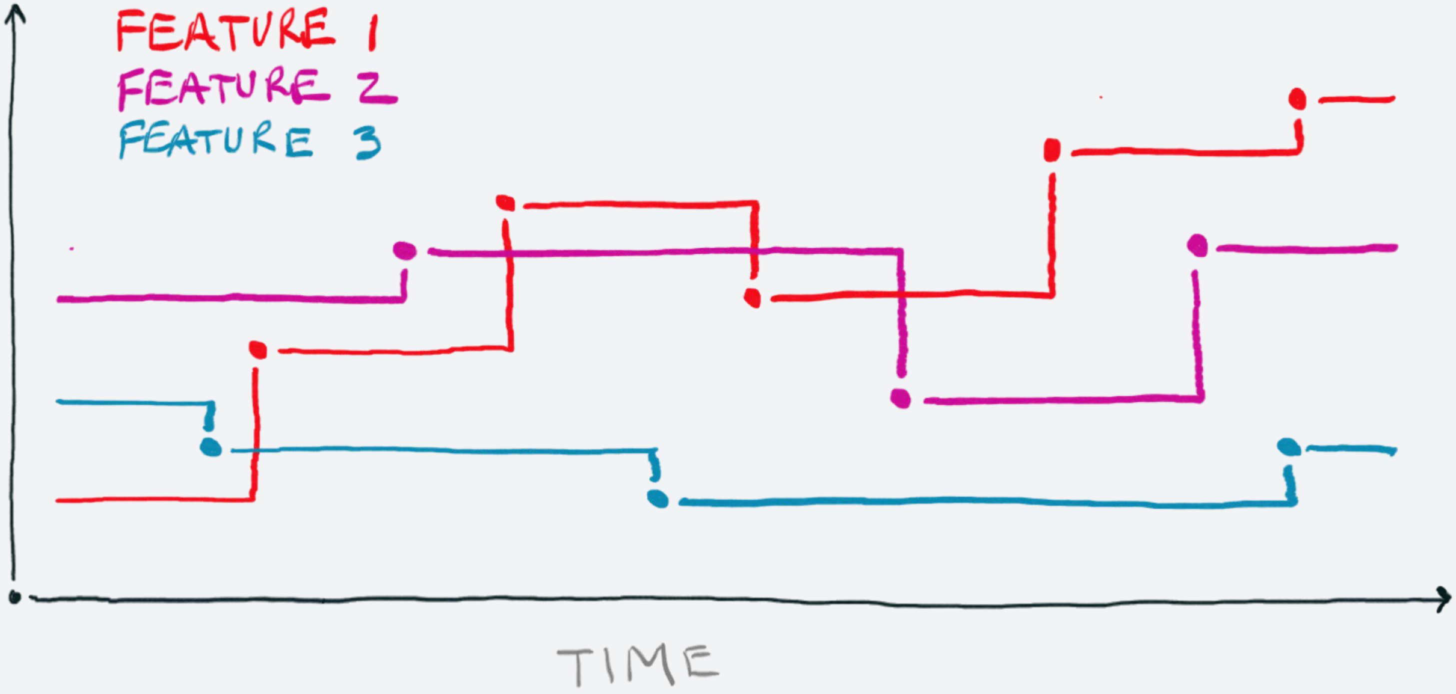
Instant Iteration Requires

- Historical feature value generation to try new features
- Expressive time selection to specify your model context iteratively
- Joining values between different entities, at precise times — without leakage
- Shared feature definitions to power live models

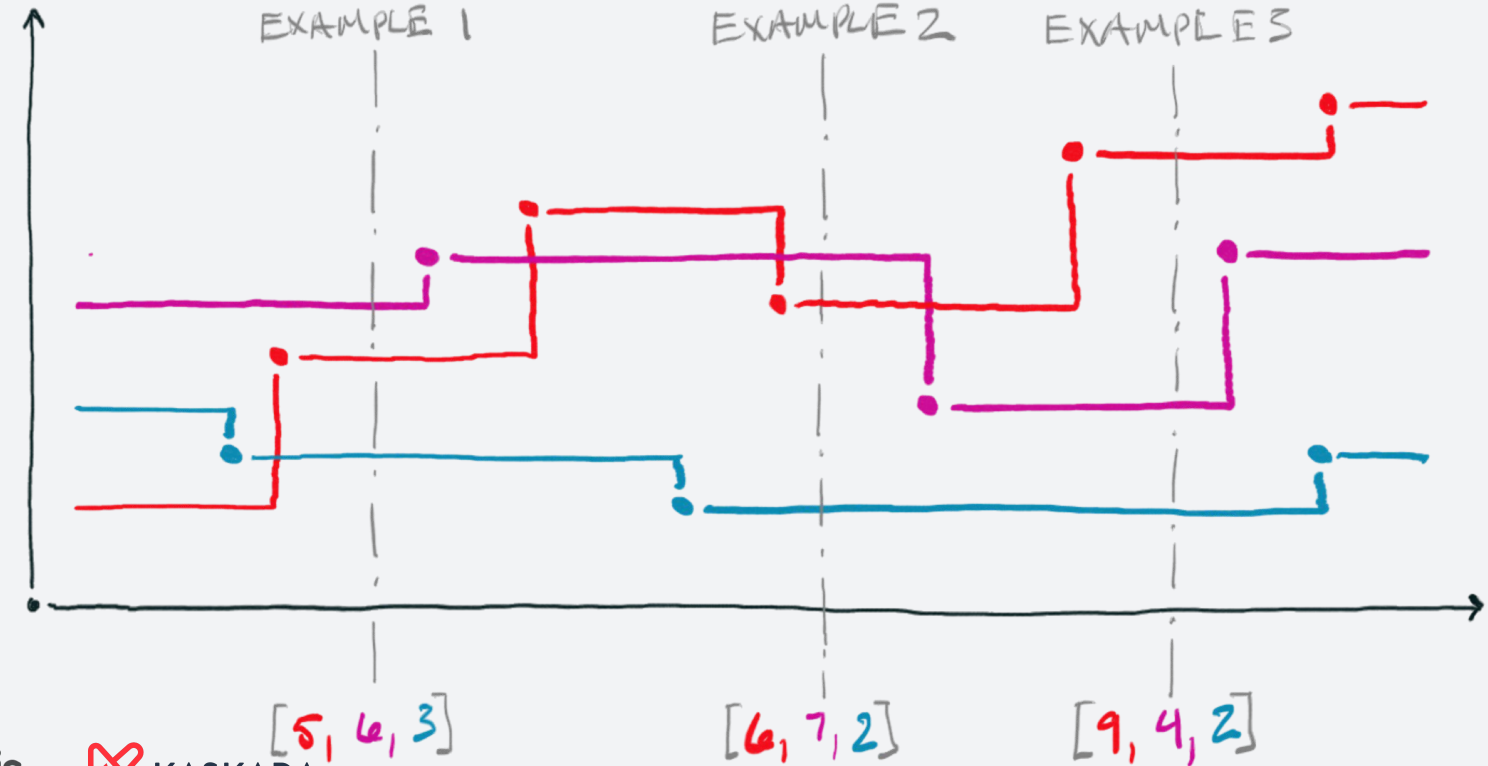
Relative event times are important



Feature definitions define *what* to compute



Time selection defines *when* to compute



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Feature Stores for ML

Discrete + continuous time temporal processing

Item Entity Features

- Historical purchase count
- Historical replacement rate
- Historical found rate
- Time since last found
- Expected time to next not found

Shopper Features

- Time of day shopping begins
- Day of week shopping begins

Retailer Entity Features

- Historical retailer availability
- Store location
- Restock times
- Store hours

Region Features

- Found rate of parent product category in the region

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Getting to production is hard for real-time inferencing

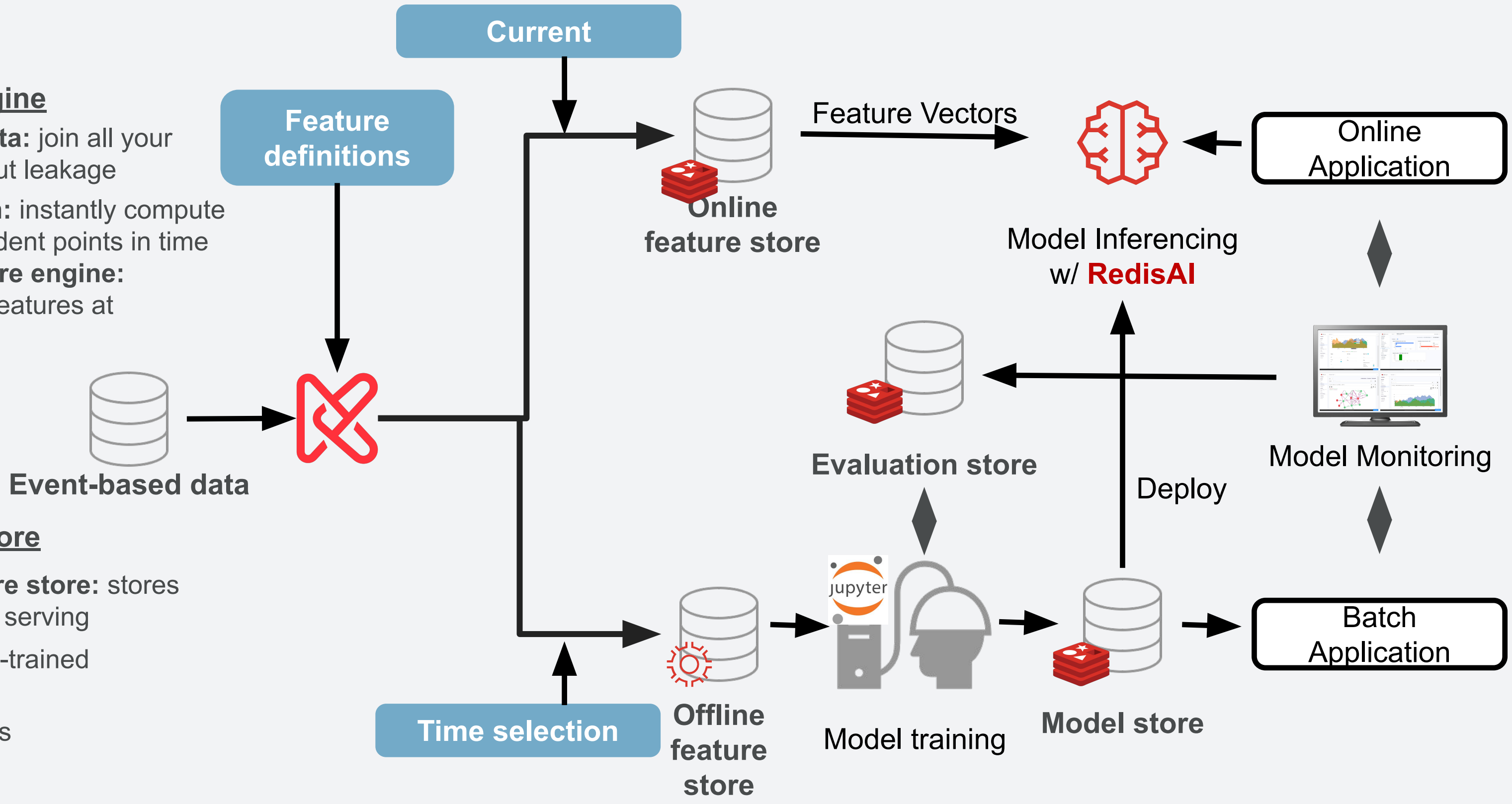
- Over **40% of decision-makers** agree their architectures are not good enough to meet the demands of ML
- The high demand for real-time model inferencing (using ML models in production) expose major challenges with **accuracy**, **latency**, and **reliability** in current architectures
- Running ML model **inferencing in-database** where data is stored solves some of these critical challenges

Forrester Consulting, 2021

Core ML + AI Computing and Serving for Production Stage

Kaskada as a feature engine

- **Connect directly to data:** join all your event-based data without leakage
- **Flexible time selection:** instantly compute at arbitrary, data-dependent points in time
- **Offline & Online Feature engine:** compute and maintain features at relevant points in time



Redis as primary data store

- **Online & Offline feature store:** stores features for low-latency serving
- **Model store:** stores pre-trained models (binaries)
- **Evaluation store:** stores response of the models

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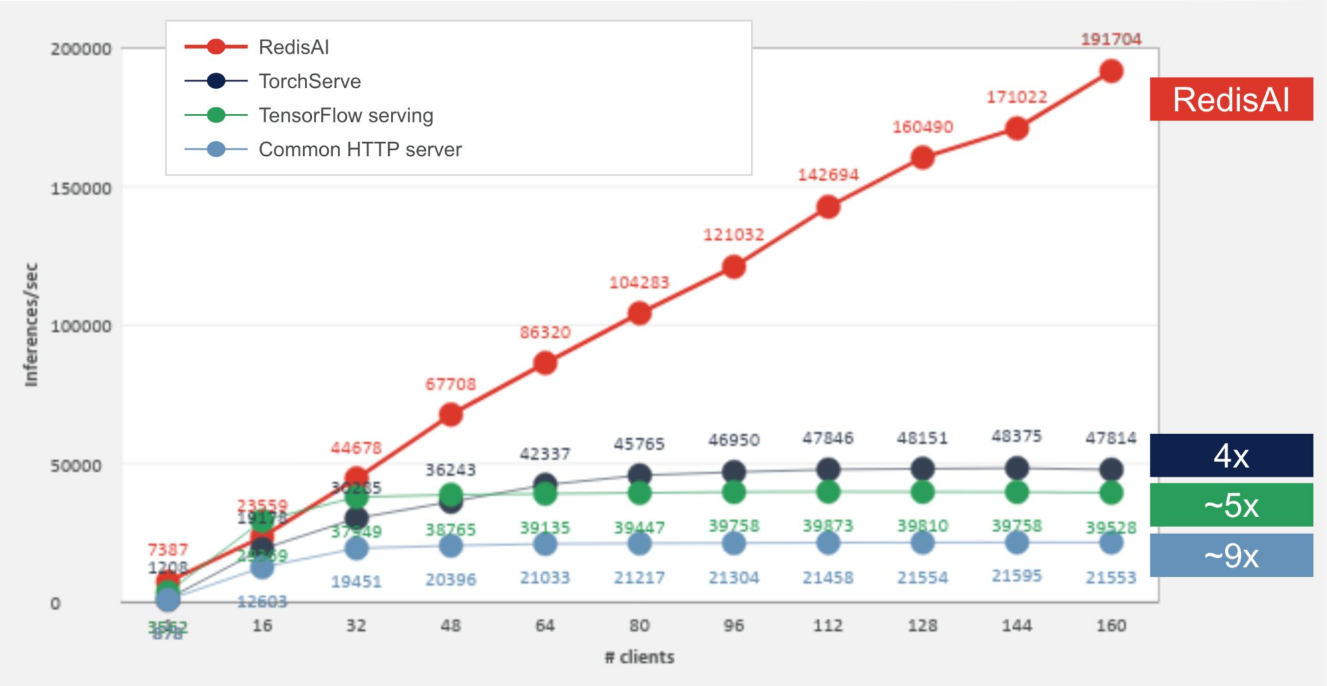
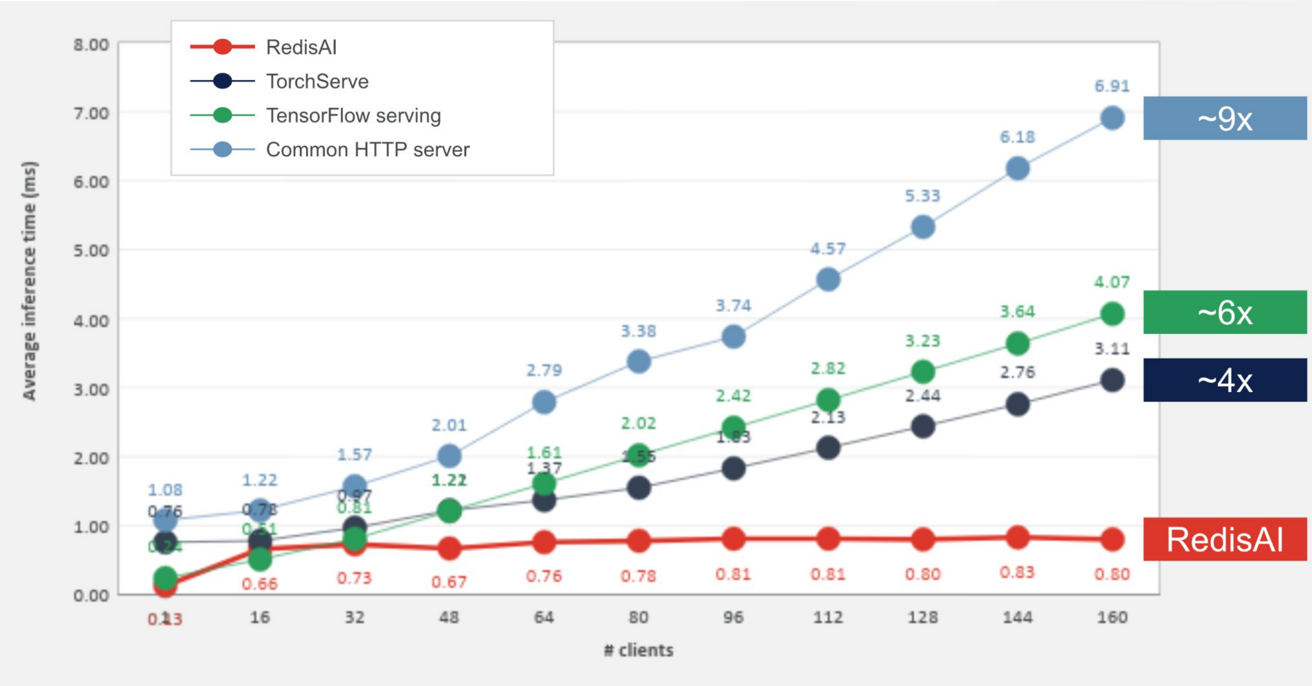
Feature Stores for ML

High throughput required for scoring



Feature Stores for ML

Low latency required for serving



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Feature Stores for ML

Demo

Summary

Creating models from event based data

- Compute features directly from event based data in order
- Enable iteration by exposing time selection + feature definitions in the feature engineering process
- Join values between different entities at precise times historically to prevent leakage
- Instantly compute values at arbitrary data dependent points in time — discrete and continuous

Operating models from event based data

- Eliminate data discrepancies in production via shared feature definitions
- Low latency applications need a feature store to run model inference in database where the data is stored
- Address real-time throughput needs with a high-throughput feature store

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Feature Stores for ML

Thank you!

Do you have any questions?

Davor Bonaci
CEO @ Kaskada

@BonaciDavor

Dr. Charna Parkey
VP, Product @ Kaskada

@CharnaParkey

Taimur Rashid
Chief Business Development Officer @ Redis

@taimurrashid