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re:Invent

ENT305

How do you innovate to drive business outcomes?

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Agenda

- Innovation fundamentals
- Starting the innovation journey
- Customer stories



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Innovation fundamentals

- Formula for innovation

  f(x) = business objective + action

- Keys to success

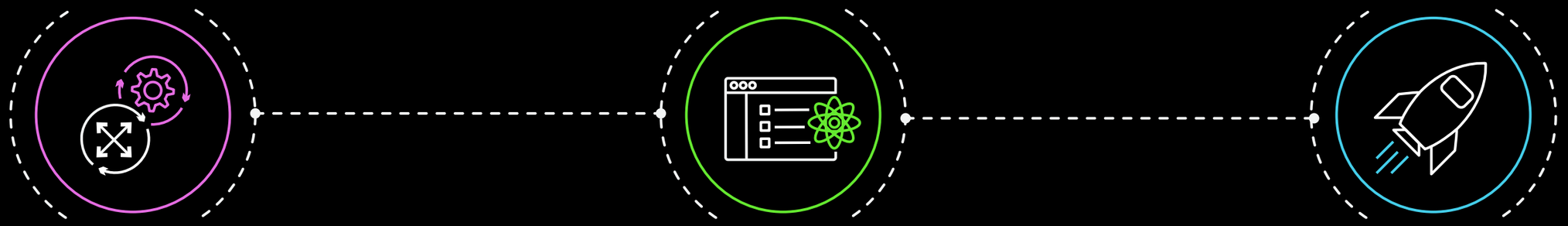
  Tailor to fit

  Experiments are a must

  Journey, not a destination



Start of the innovation journey



Automation **Enrichment** **Differentiate**

Automation



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CATHAY PACIFIC



Challenges

- Unauthorized users in a customer-facing application
- Detection and extra validation checks to rule out unauthorized users

Solutions

- XGBoost classifier model to classify users as unauthorized or legitimate
- Novel Natural Language Processing (NLP) techniques using pretrained word embeddings to feature user names, increasing model speed and accuracy

Outcomes

- Models were deployed into production by using Amazon SageMaker endpoints
- Models have a tunable threshold for the business to decide on tradeoffs between catching unauthorized users vs. impacting legitimate customers
- Model detected more than 75% of unauthorized users while impacting less than 1% of legitimate customers

TOYOTA
RESEARCH INSTITUTE



Challenges

- ML models for self-driving trucks require large amounts of accurately labeled data
- Toyota Research Institute needed an approach of identifying, assessing, and quantifying the occurrence of labeling errors for large quantities of images

Solutions

- Amazon SageMaker training jobs with custom containers for image preparation
- Amazon SageMaker Ground Truth pipelines
- Amazon SageMaker notebook-based reporting

Outcomes

- Accelerated project progress by allowing Toyota Research Institute to focus on research value vs. technical implementation
- Identified edge cases and error rates by class, allowing identification and focus on highest-value areas
- Improved insights into labeling quality and additional label details

Enrichment



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Chesterfield County Public Schools



Challenge

Identify chronically absent students (more than 10% of school days missed) in a timely fashion so the institution can effectively intervene

Solutions

- R-based exploratory data analysis and reporting to provide visualizations of student trends
- Amazon SageMaker XGBoost classification model to identify high-risk students

Outcomes

- As a result of identifying a set of student IDs that have a high risk of being chronically absent, the school system was able to proactively intervene
- Enabled Chesterfield County Public Schools to reuse and iterate on predictive model for future academic terms





Challenge

Need for a more accelerated TV viewer forecast per telecast program per demographic

Solution

Amazon SageMaker

- Word embeddings
- XGBoost
- Hyperparameter optimization

Outcomes

- 1 year ahead upfront sales forecasts vs. 2 weeks ahead
- 86% increase in viewer forecast accuracy
- Identification of undersold opportunities (39x accuracy)

Differentiate



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AstraZeneca

What science can do



Challenge

Assess overall kidney injury, by locating and scoring all glomeruli to a predefined injury class

Solutions

- Single Shot Multibox Detection
- Image classification

Outcomes

- Reduction in time to reach scientific insight
- Reduction in manual assessment by increasing accuracy and reduction in human bias and errors
- Reduction in operations cost and add scale to pathologists

MERCURIA



Challenge

Access to intelligent data is critical to making sound business and trading decisions

Solutions

- DeepAR and Prophet
- Fully automated ML pipeline with Amazon RDS data extraction and Amazon SageMaker

Outcomes

- Improved abilities to access accuracy and distribution of data
- Reusable framework to experiment and productionize other models

Thank you!



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