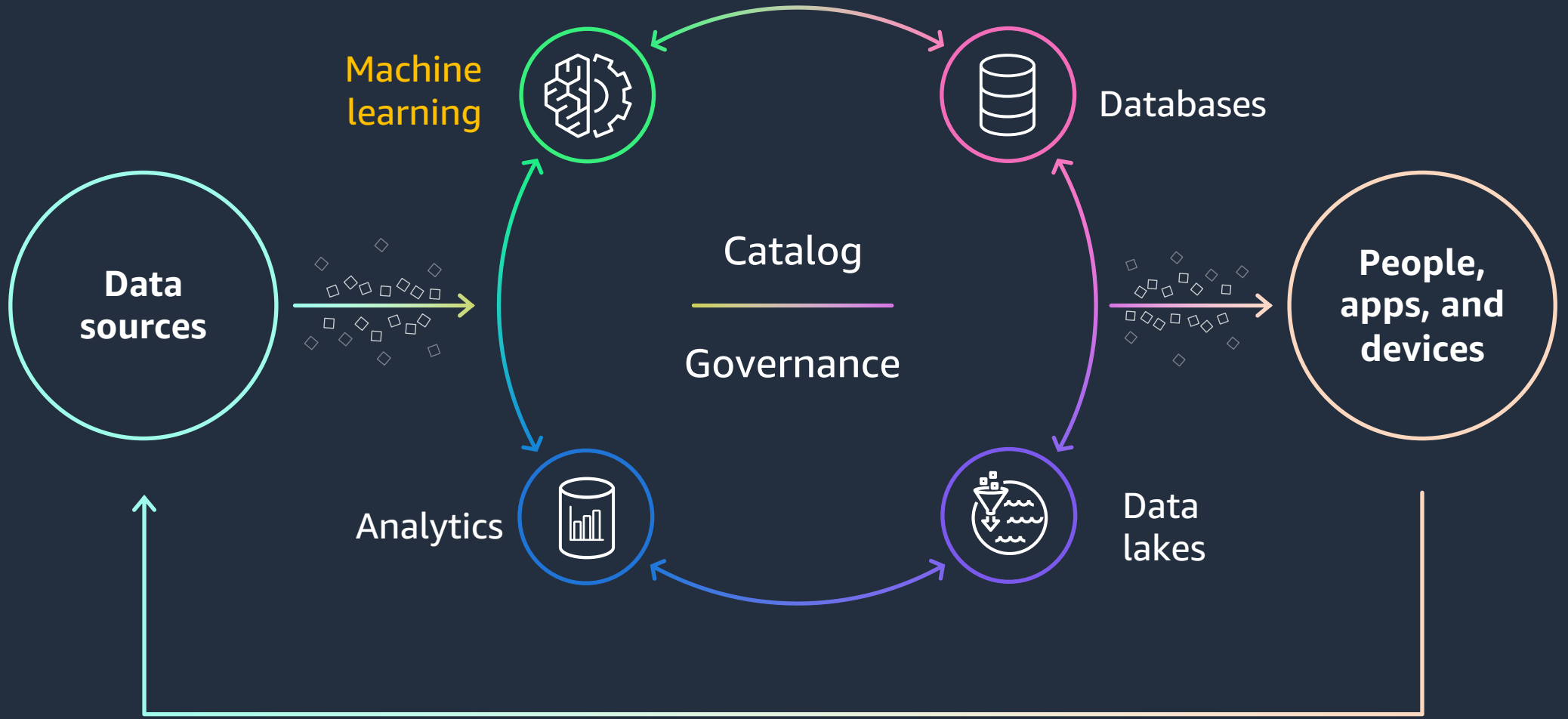
COLUMBUS LEARNING DAYS
DATA AND ANALYTICS TRACK

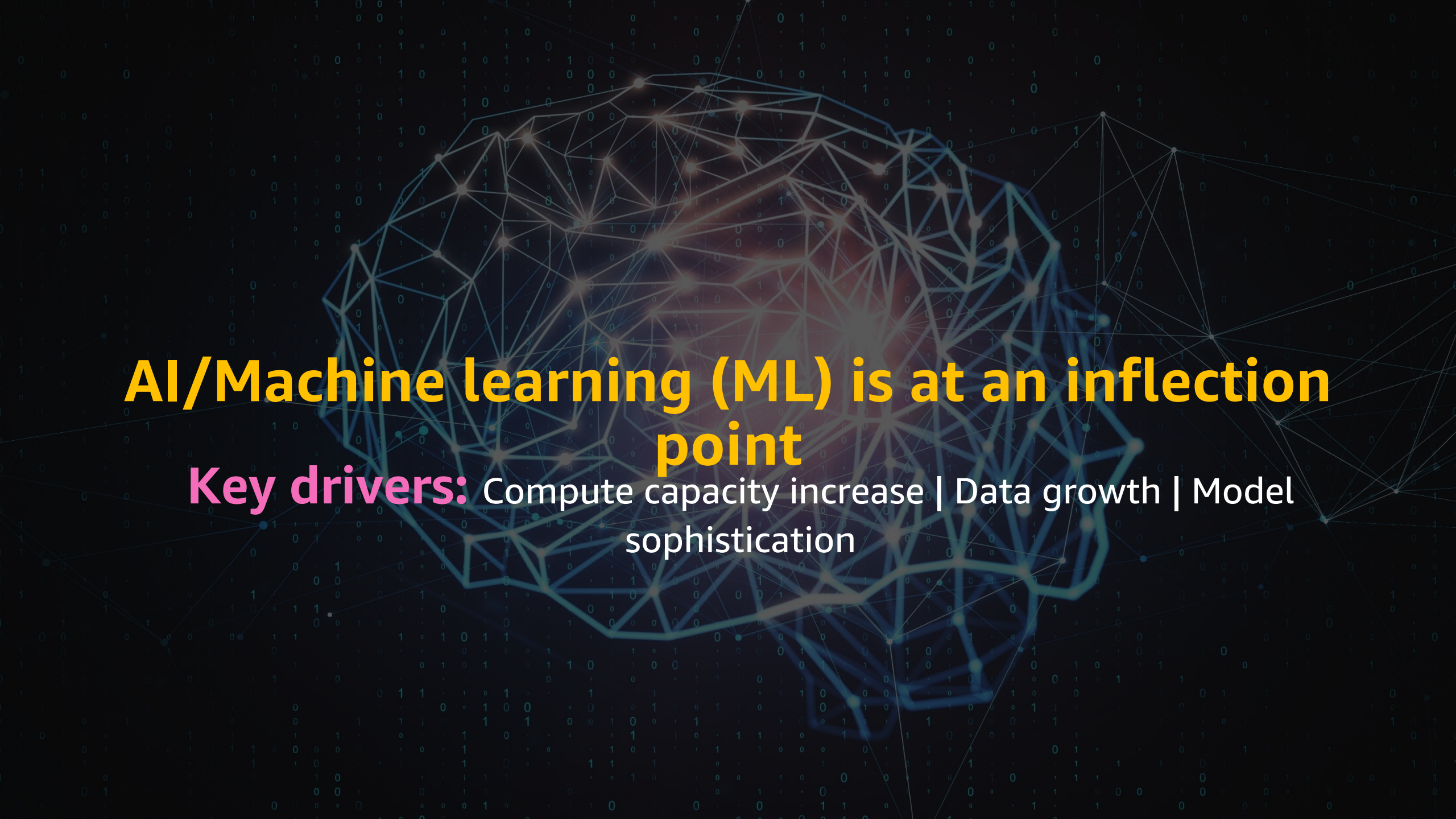
AI/ML for data and analytics

Greg Grieff
Sr. Solutions Architect
WWPS – Enterprise Higher Education
Amazon Web Services
ggrieff@amazon.com

Neaz Kishore
Sr. Technical Account Manager
WWPS – Enterprise Higher Education
Amazon Web Services
neazk@amazon.com

Modern data strategy in action

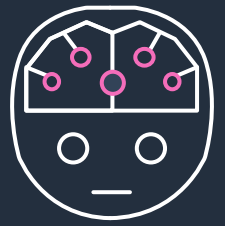




AI/Machine learning (ML) is at an inflection point

Key drivers: Compute capacity increase | Data growth | Model sophistication

AI, ML, deep learning?



Artificial intelligence (AI)

Any technique that allows computers to mimic human intelligence using logic, if-then statements, and machine learning

Machine learning (ML)

A subset of AI that uses machines to search for patterns in data to build logic models automatically

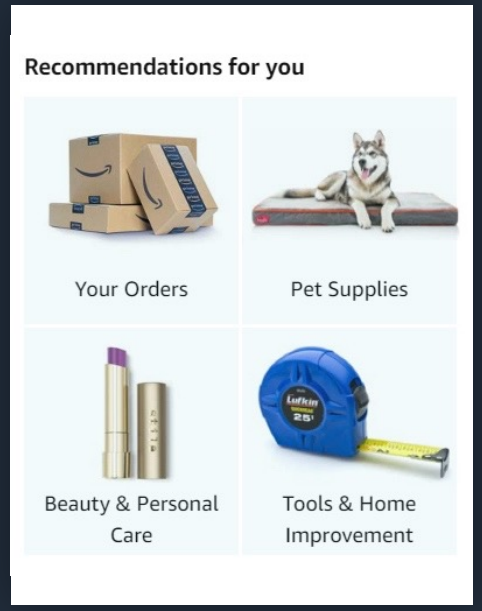
Deep learning (DL)

A subset of ML composed of deeply multi-layered neural networks that perform tasks like speech and image recognition

Generative AI

Powered by large models that are pretrained on vast corpuses of data and commonly referred to as foundation models (FMs)

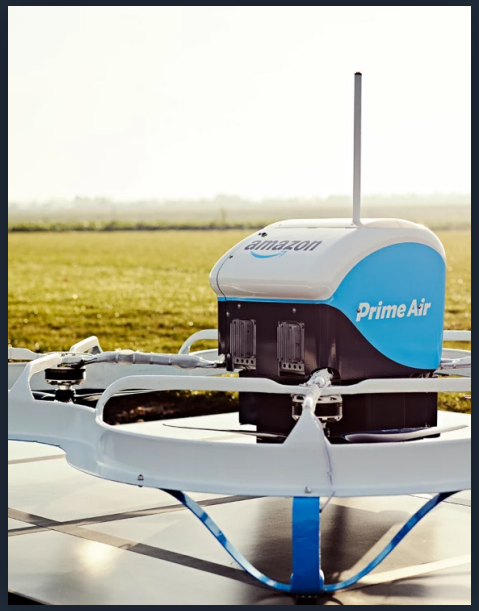
ML innovation is in Amazon's DNA



4,000 products per minute sold on Amazon.com

1.6M packages every day

Billions of Alexa interactions each week



First Prime Air delivery on **December 7, 2016**

The Amazon Web Services AI/ML stack

Consumer

AI SERVICES

Generative AI

SCALING GENERATIVE AI
- Amazon Bedrock

AMAZON BUILT FOUNDATIONAL MODEL
- Amazon Titan

Specialized AI Services

BUSINESS PROCESSES
- Amazon Personalize
- Amazon Forecast
- Amazon Fraud Detector
- Amazon Lookout for Metrics

SEARCH
- Amazon Kendra

CONVERSATION
- Amazon Lex
- Contact Lens
- Voice ID
- Amazon Transcribe Call Analytics

CODE + DEVOPS
- Amazon CodeGuru
- Amazon CodeWhisperer
- Amazon DevOps Guru

INDUSTRIAL
- Amazon Monitron
- Amazon Lookout for Equipment
- Amazon Lookout for Vision

HEALTH
- Amazon HealthLake
- Amazon Comprehend Medical
- Amazon Transcribe Medical
- Amazon Omics

Core

TEXT
- Amazon Translate
- Amazon Comprehend

SPEECH
- Amazon Polly
- Amazon Transcribe

VISION
- Amazon Textract
- Panorama
- Amazon Rekognition
- AWS

Tuner

AMAZON SAGEMAKER

JUMPSTART
Use pre-built models in SageMaker

CANVAS
No-code ML for business analysts

STUDIO LAB
Learn ML

GROUND TRUTH
Label data

STUDIO IDE
- Prepare data
- Store features
- Geospatial ML
- Build with notebooks
- Train models
- Tune parameters
- Deploy in production
- Manage and monitor

CI/CD | GOVERNANCE | RESPONSIBLE ML

Provider

ML FRAMEWORKS AND INFRASTRUCTURE

PyTorch, TensorFlow | Amazon EC2 | CPUs | GPUs | AWS Inferentia | AWS Trainium | Habana Gaudi | FPGA

aws

Challenges we are hearing from state and local government customers

Demand for government services is rising while resources and capacity to deliver them **aren't keeping pace**

Citizens increasingly expect government to **provide modern digital experiences** for conducting online transactions

Aging infrastructure for data capture, storage, and management **creates friction** for leveraging data for analytics and machine learning

Complex security, privacy, and compliance requirements create barriers to change and block adoption of many SaaS solutions

Risk averse culture and institutional inertia slow innovation

Machine learning is going mainstream in public sector

Emergency management
Emergency management, emergency response

Finance and administration
Tax, revenue, regulatory/compliance, fraud, budget, purchasing/procurement

Health and benefits
Local hospitals and clinics, public health, child welfare, homelessness, seniors/youth, health/food, environmental

Assessments and permitting
Planning and zoning, assessment, land admin/recorder of deeds, mapping, watershed, housing

Economic development
Grants and benefits administration, workforce development, corporate relations, land clearance/redevelopment

Constituent engagement
Contact center, website, mobile

Enforcement
Police, jails, courts, animal control

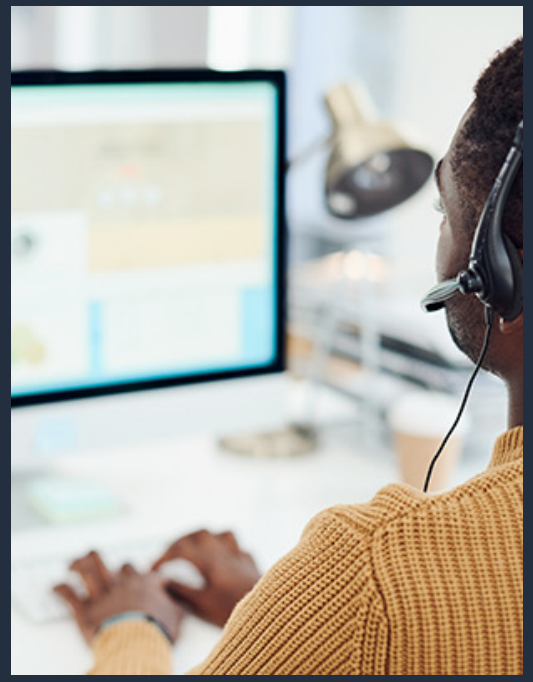
Elections
Registration, voter management, polling, voting management, candidate management

Utilities
Electric/gas/water/sewer, waste management, generation/distribution

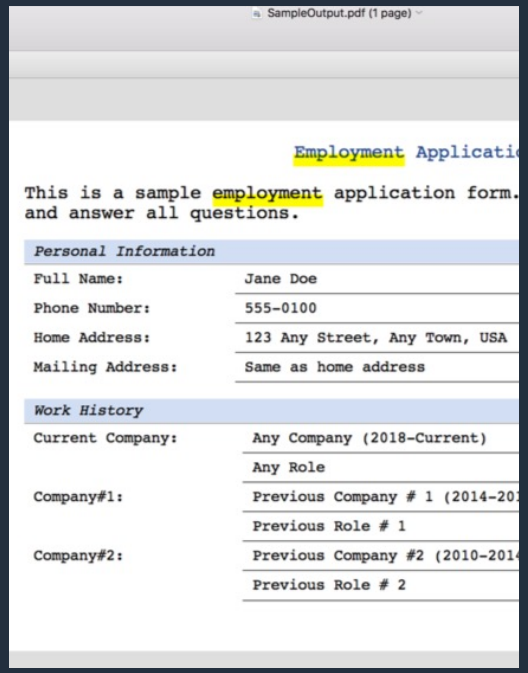
Education and library
K–12 and early childhood, adult education, library

Transportation
Traffic, mass transit, parking, airports, ports

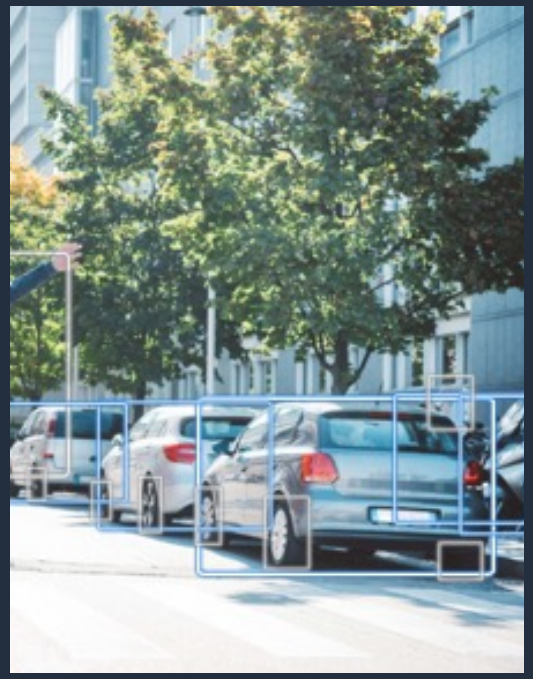
Top AI/ML use cases for state and local government



Speech and language



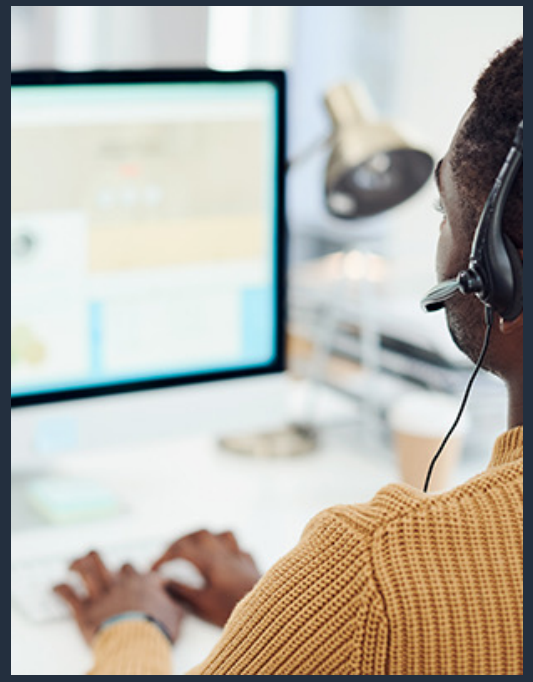
Intelligent document processing



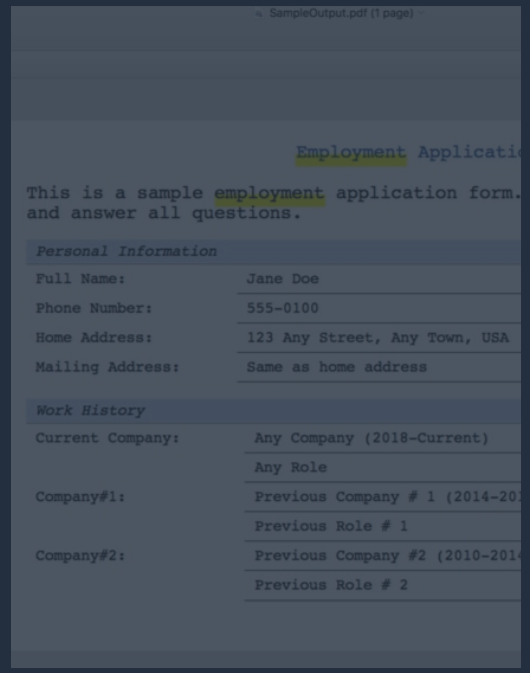
Computer vision

Predictions and insights

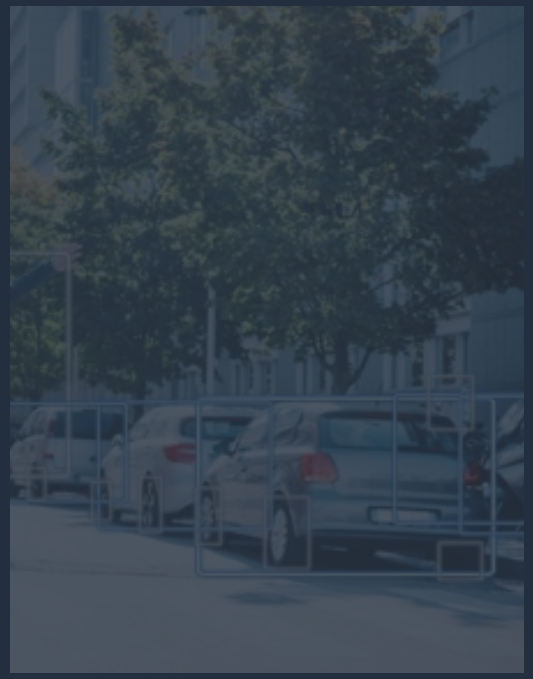
Top AI/ML use cases for state and local government



Speech and language



Intelligent document processing



Computer vision

Predictions and insights

AI/ML-Enabled Citizen engagement

Engage citizens and drive improvements in customer satisfaction

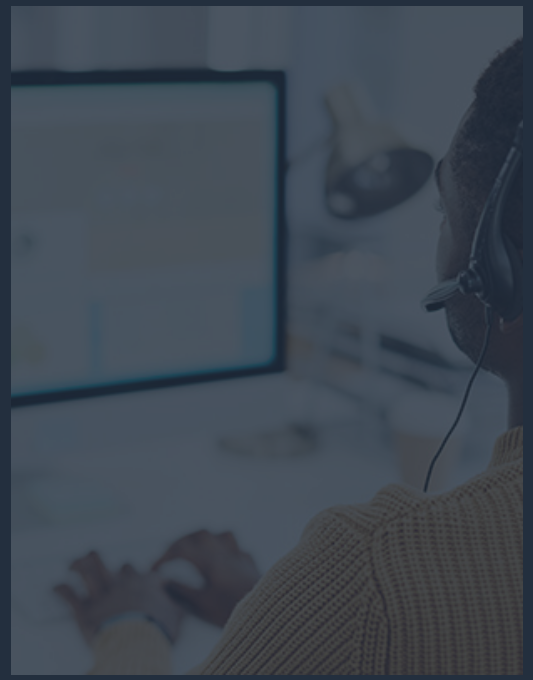
- Improve contact center agent effectiveness with real-time translation and decision support using Amazon Connect and Contact Center Intelligence
- Analyze call and text interactions with citizens to spot issues and trends and drive improvement
- Improve self service

Using AI to improve agent efficiency

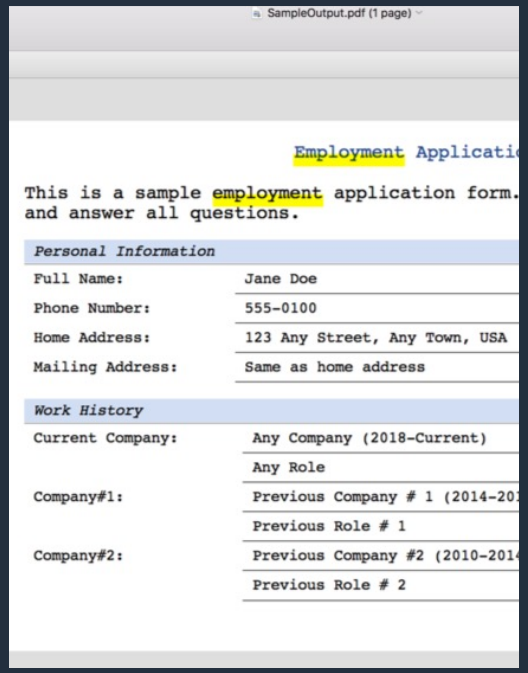
"During peak hours, previously you're 45-50 minutes on hold, and now that's has been reduced to about three and a half minutes. One of the other benefits we've gotten from Amazon Connect is sentiment analysis. On a call, we get real-time feedback on whether or not the customer was happy, frustrated, or angry…"

—Benny Chacko, Deputy General – LA County Internal Services Department

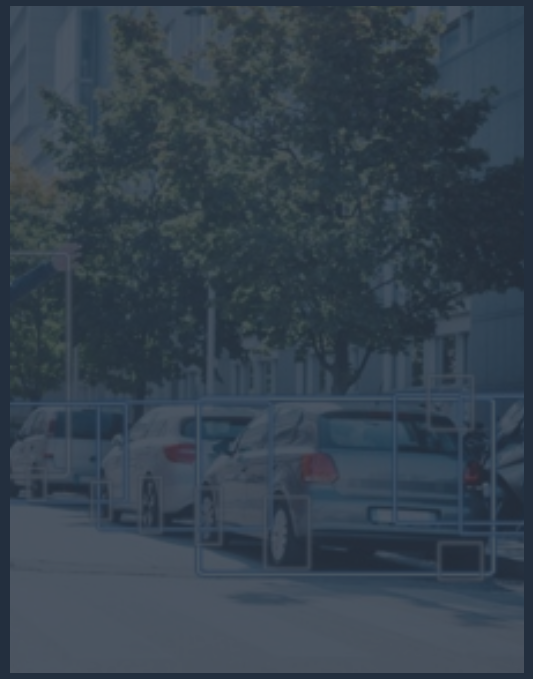
Top AI/ML use cases for state and local government



Speech and language



Intelligent document processing



Computer vision

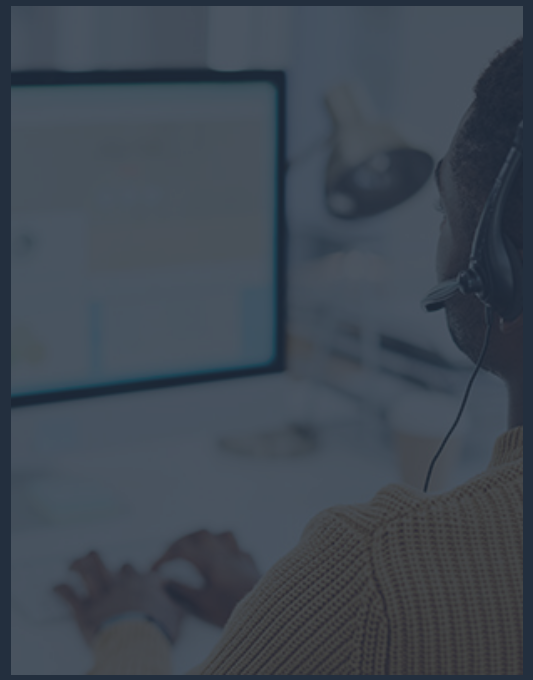
Predictions and insights

Extract insights from unstructured content

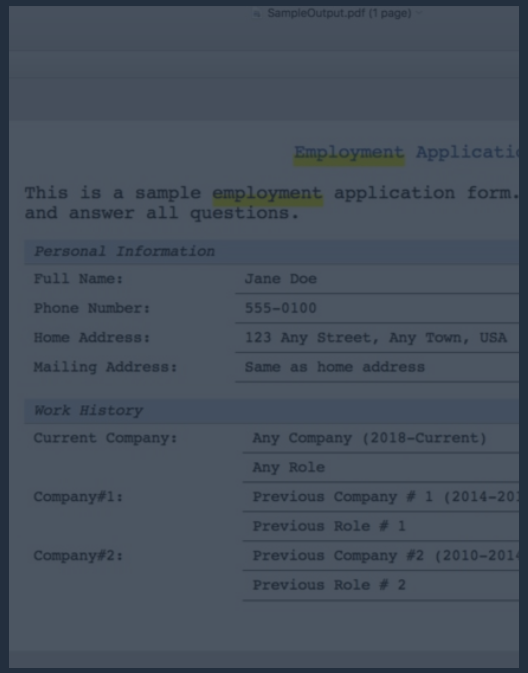
Extract insights from unstructured documents and forms, like images, PDFs, and audio

- Analyze text with natural language processing (NLP) to identify topics, extract entities, understand sentiment, and classify documents with Amazon Textract, Amazon Rekognition, and Amazon Comprehend
- Translate content at scale with Amazon Translate

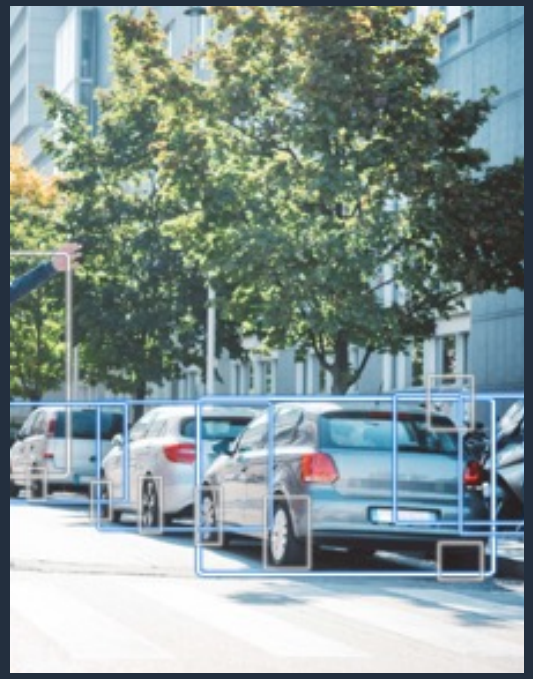
Top AI/ML use cases for state and local government



Speech and language



Intelligent document processing



Computer vision

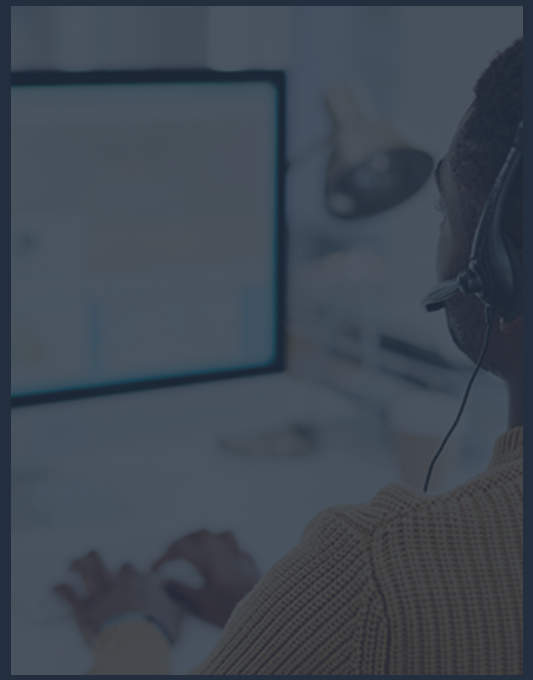
Predictions and insights

Content analysis and object detection

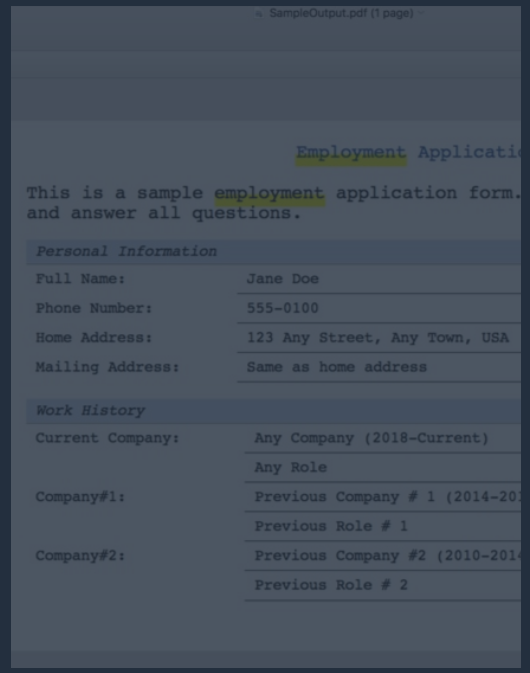
Extract insights and identify objects of interest from large volumes of images and videos with Amazon Rekognition

- Detect personal protective equipment (PPE) to improve worker safety
- Analyze vehicle traffic and pedestrian and bicycle safety
- Detect objects of interest in video and reduce human effort required to review footage

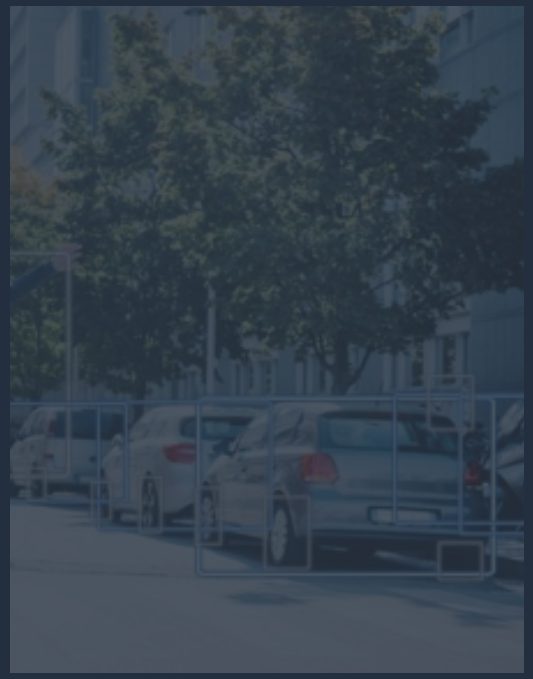
Top AI/ML use cases for state and local government



Speech and language



Intelligent document processing



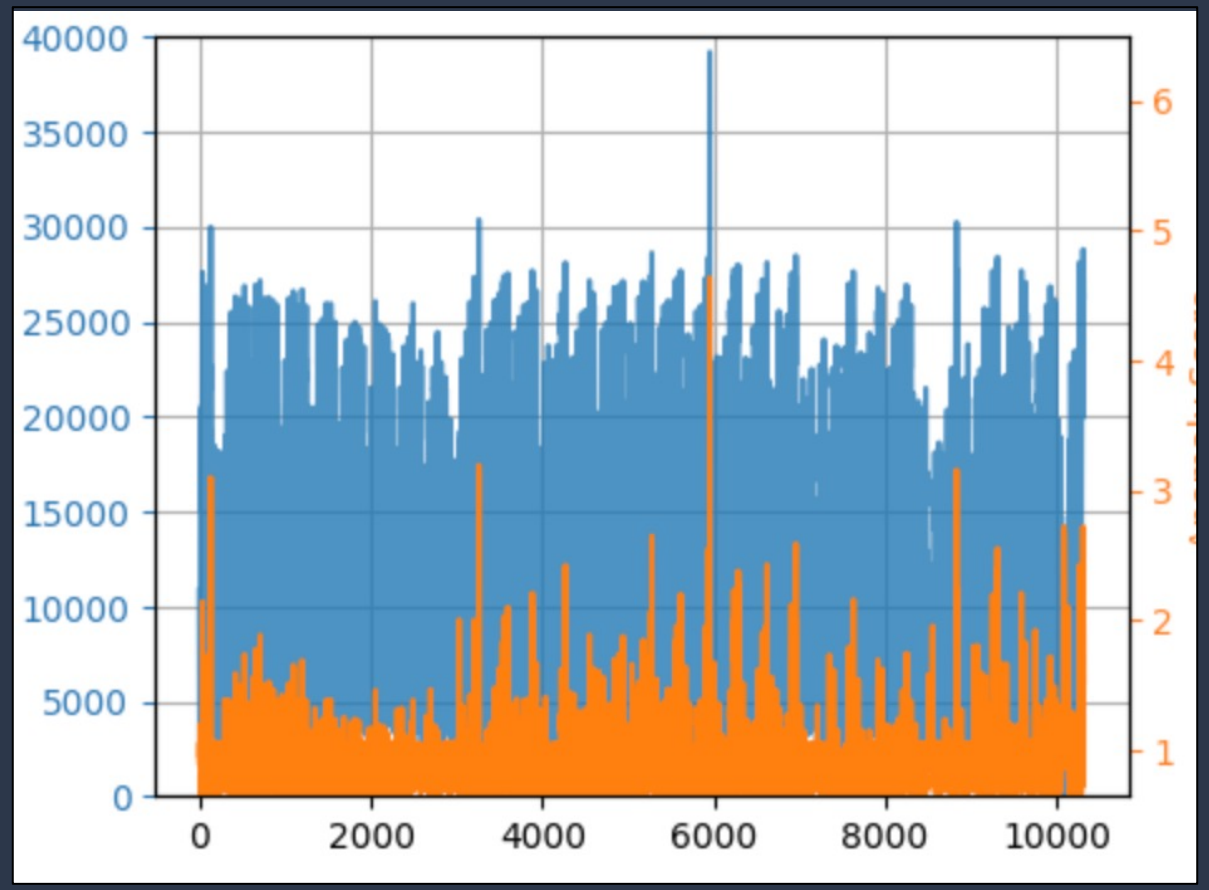
Computer vision

Predictions and insights

Fraud detection and prevention

Detect and prevent fraud, waste, and abuse

- Enhance accuracy and speed to help detect and prevent waste fraud and abuse
- Managed service approach with prebuilt ML models for fraud detection
- Supervised and unsupervised models for developing highly targeted models to utilize customer data as part of fraud prevention efforts



aws machine learning

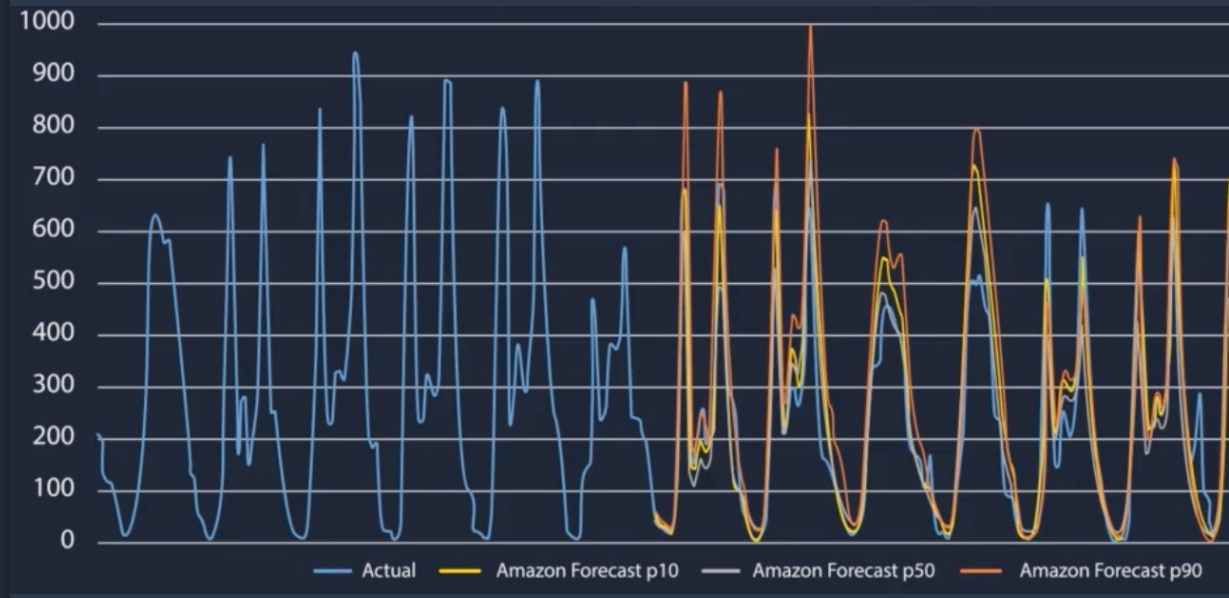
Identify fraud and other anonymous activities

FINRA, one of the largest security regulators in the United States, was established to monitor and regulate financial trading practices; using Amazon EMR, FINRA can capture, analyze, and store a daily influx of 135 billion records in order to identify fraud and other anonymous activities

Machine learning to forecast trends and support decisions

Accurate, time series forecast with machine learning

- Predicting service demand or program activities
- Allocating resources to optimize impact and outcomes for citizens
- Financial planning and revenue/cost forecasts



Predictions and forecasts from IoT and sensor data

Leverage data from smart cities and facilities

- Smart cities
- Predictive maintenance
- Facility management

Learn more about Amazon Monitron

Innovation can **transform industries**

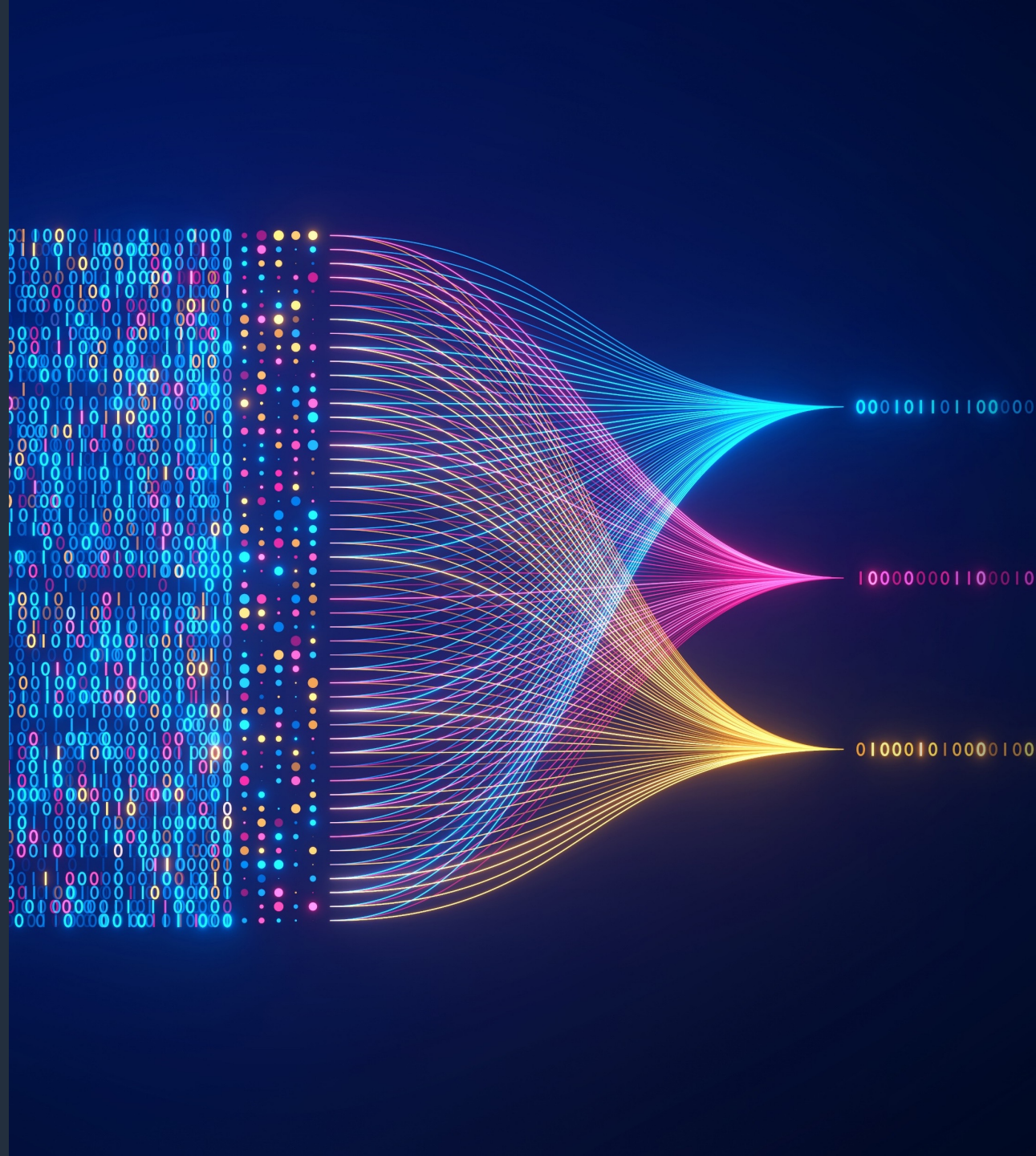
Generative AI is powered by foundation models

Pretrained on vast amounts of unstructured data

Contain large number of parameters that make them capable of learning complex concepts

Can be applied in a wide range of contexts

Customize FMs using your data for domain specific tasks



Generative AI stack

APPLICATIONS THAT LEVERAGE LLMs AND OTHER FMs

Amazon Q | Amazon Q in Amazon QuickSight | Amazon Q in Amazon Connect | Amazon CodeWhisperer

TOOLS TO BUILD WITH LLMs AND OTHER FMs

Amazon Bedrock

Guardrails | Agents | Customization Capabilities

INFRASTRUCTURE FOR FM TRAINING AND INFERENCE

GPUs | Trainium | Inferentia | SageMaker

UltraClusters | EFA | EC2 Capacity Blocks | Nitro | Neuron

aws

Amazon Bedrock

The easiest way to build and scale generative AI applications with LLMs and other FMs

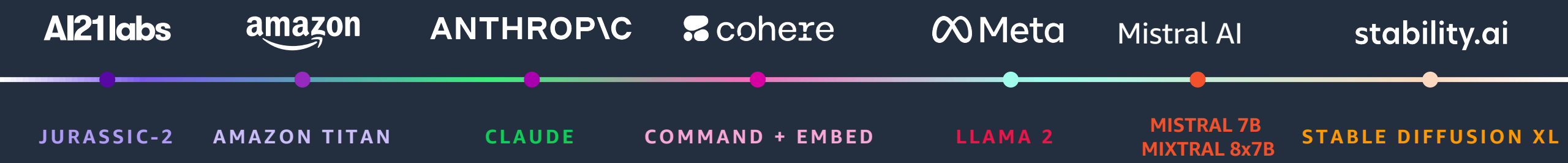
Choice of industry-leading FMs from AI21 Labs, Amazon, Anthropic, Cohere, Meta, Mistral AI, and Stability AI

Customize FMs using your organization's data

Enterprise-grade security and privacy

Amazon Bedrock

Broad choice of models



Instead of sending your data to the model, bring the model to your data.

Common use cases

Text generation

Q&A

Text summarization

Text extraction

Paraphrase rephrase

Search

Code generation

Image generation

Image classification

Audio generation

Video generation

Generative AI public sector application examples

Constituent communications

Citizen engagement and feedback, transparency

Public health

Personalized care, population health assessments

Public safety

Public safety and crime prevention, emergency response and disaster management

Transportation

Trafic optimization, autonomous vehicle control, personalized transportation experiences

Finance

Budget optimization, fraud detection, risk assessment and mitigation

Constituent services

Urban planning, personalized urban services

Energy and utilities

Energy management, waste management, smart grid optimization

Research and engagement

Environmental monitoring

Amazon Q

AMAZON Q **BUSINESS**

AMAZON Q **DEVELOPER**

EMBEDDED

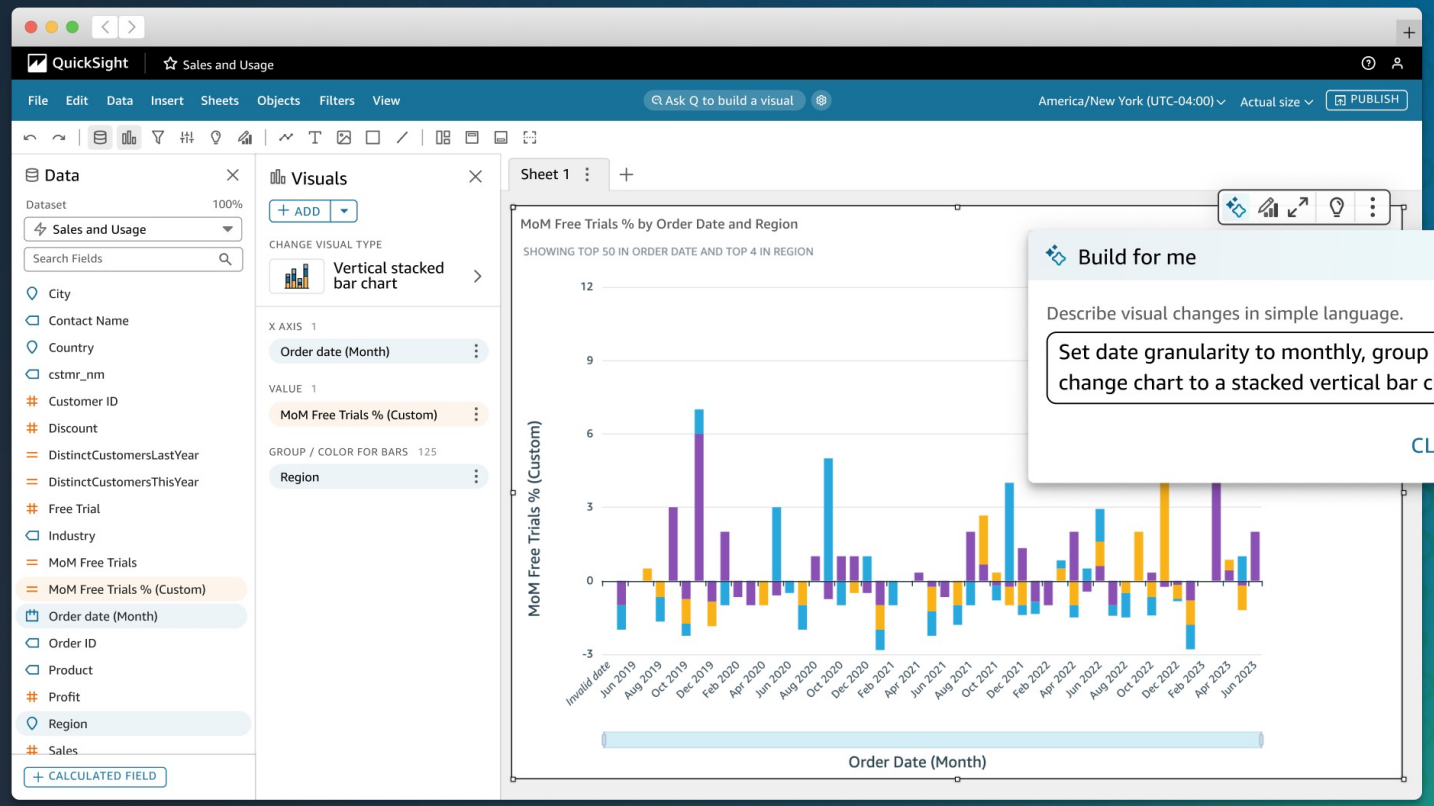
Amazon Q In Connect

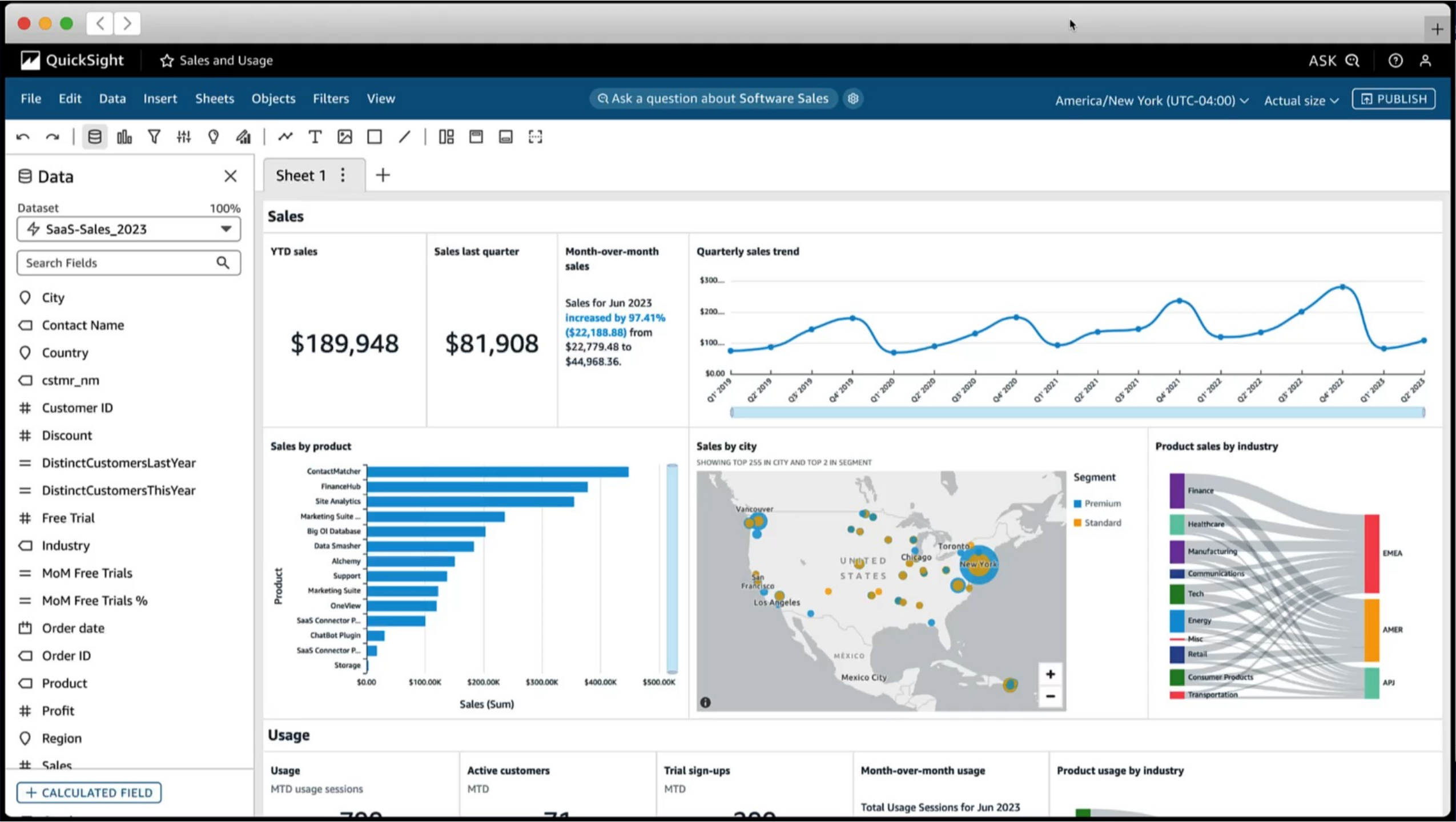
Amazon Q In QuickSight

Amazon Q In AWS Supply Chain

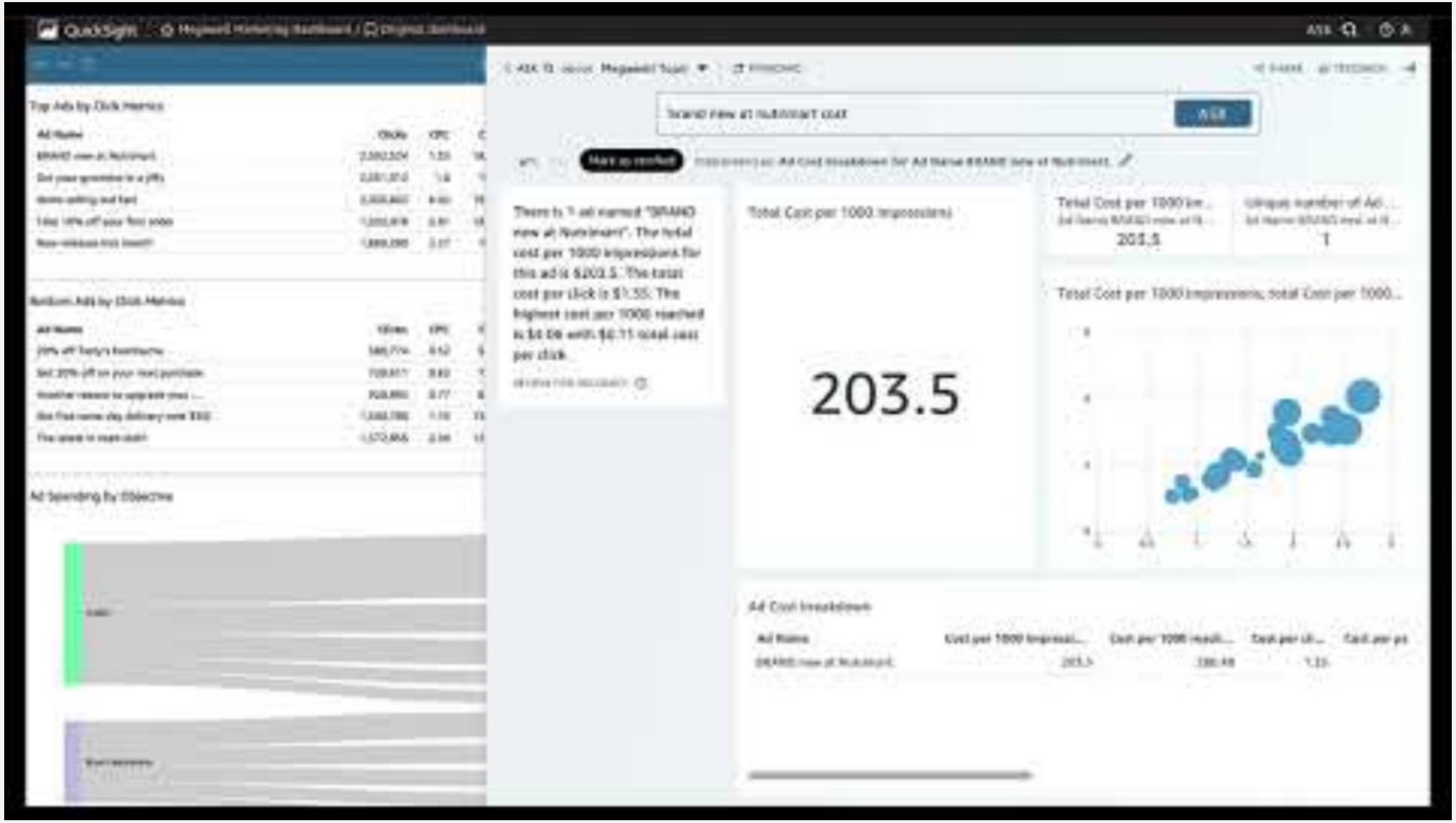
Visual authoring in **QuickSight**

Use everyday language to generate and fine-tune visuals in seconds




QuickSight
Sales and Usage
ASK
File Edit Data Insert Sheets Objects Filters View
Ask a question about Software Sales
America/New York (UTC-04:00)
Actual size
PUBLISH
Data
Dataset 100%
SaaS-Sales_2023
Search Fields
City
Contact Name
Country
cstmr_nm
Customer ID
Discount
DistinctCustomersLastYear
DistinctCustomersThisYear
Free Trial
Industry
MoM Free Trials
MoM Free Trials %
Order date
Order ID
Product
Profit
Region
Sales
+ CALCULATED FIELD
Sheet 1
Sales
YTD sales
$189,948
Sales last quarter
$81,908
Month-over-month sales
Sales for Jun 2023 increased by 97.41% ($22,188.88) from $22,779.48 to $44,968.36.
Quarterly sales trend
$300...
$200...
$100...
$0.00
Q1' 2019
Q2' 2019
Q3' 2019
Q4' 2019
Q1' 2020
Q2' 2020
Q3' 2020
Q4' 2020
Q1' 2021
Q2' 2021
Q3' 2021
Q4' 2021
Q1' 2022
Q2' 2022
Q3' 2022
Q4' 2022
Q1' 2023
Q2' 2023
Sales by product
ContactMatcher
FinanceHub
Site Analytics
Marketing Suite ...
Big OI Database
Data Smasher
Alchemy
Support
Marketing Suite
OneView
SaaS Connector P...
ChatBot Plugin
SaaS Connector P...
Storage
Product
$0.00
$100.00K
$200.00K
$300.00K
$400.00K
$500.00K
Sales (Sum)
Sales by city
SHOWING TOP 255 IN CITY AND TOP 2 IN SEGMENT
Segment
Premium
Standard
Vancouver
Toronto
Chicago
New York
UNITED STATES
San Francisco
Los Angeles
MÉXICO
Mexico City
Product sales by industry
Finance
Healthcare
Manufacturing
Communications
Tech
Energy
Misc
Retail
Consumer Products
Transportation
EMEA
AMER
APJ
Usage
Usage
MTD usage sessions
Active customers
MTD
Trial sign-ups
MTD
Month-over-month usage
Total Usage Sessions for Jun 2023
Product usage by industry

Generative BI with Amazon Q in QuickSight



(Play video)

How to address Generative AI in Public Sector

- How can we support you in ensuring accuracy and authority of model outputs?
- How can we use “guardrails” to minimize inappropriate content?
- How can we maximize the public investment and minimize cost?
- What are your latency requirements for specific use cases?
- What are the potential regulatory, data privacy, and security considerations that may dictate model architecture.
- How can we ensure proprietary, copyrighted and IP concerns are addressed?

Calls to action:

Think about specific use cases within your organization

Connect with SA’s at the Ask the Experts Table

Further reading:

https://aws.amazon.com/machine-learning
https://aws.amazon.com/generative-ai

Thank you!

Greg Grieff
ggrieff@amazon.com

Neaz Kishore
neazk@amazon.com

Please complete the session survey

Track: Data and analytics track

Topic: AI/ML for data and analytics