



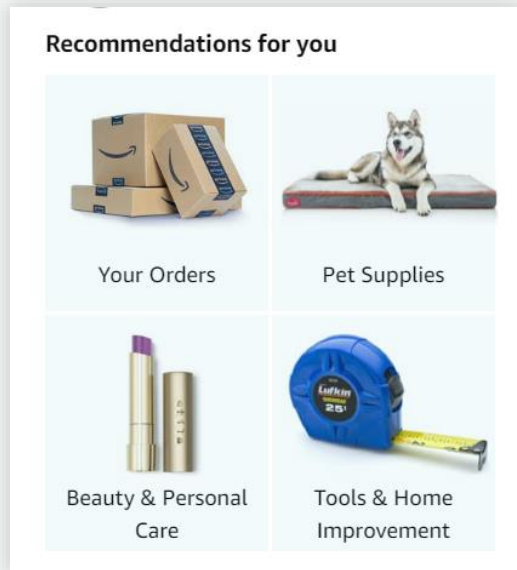
Building AI and ML powered applications without machine learning expertise

Aditya Challa

Sr. Solutions Architect
AWS



Amazon—Machine learning innovation at scale



**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

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)



**Enhance
customer
experience**



**Better and faster
decision-making**



**Improve business
operations**



**New products
and services**

The universe of Artificial Intelligence (AI)/Machine Learning (ML) is ever expanding

AI/ML use cases			
Forecasting	Anomaly detection	Contact center intelligence	Conversational AI
Intelligent document processing	Intelligent search	Media intelligence	ML modernization
AI for DevOps	Personalization	Identity verification	Automated content creation
Autonomous systems	Fraud Detection	Content moderation	Credit decisioning and underwriting
Cybersecurity	Digital twin/advanced digital simulation	AI for health	HR automation
AI for IT operations	Predictive maintenance	Quality control	Process automation
Supply chain optimization	Visual inspection	Workplace safety	+ Other use cases



The universe of Artificial Intelligence (AI)/Machine Learning (ML) is ever expanding

AI/ML use cases			
Forecasting	Anomaly detection	Contact center intelligence	Conversational AI
Intelligent document processing	Intelligent search	Media intelligence	ML modernization
AI for DevOps	Personalization	Identity verification	Automated content creation
Autonomous systems	Fraud Detection	Content moderation	Credit decisioning and underwriting
Cybersecurity	Digital twin/advanced digital simulation	AI for health	HR automation
AI for IT operations	Predictive maintenance	Quality control	Process automation
Supply chain optimization	Visual inspection	Workplace safety	+ Other use cases





Contact Center Intelligence & Conversational AI

Contact Center Intelligence use cases



Self-service bots &
virtual agents



Real-time call analytics
and Agent Assist



Post-call
analytics

Conversational AI use cases



Self-service bots &
Voice Assistants



Proactive help
based on usage
behavior



Transactional bots

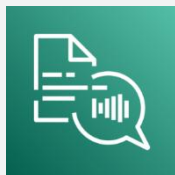
AWS AI services powering AWS CCI & Conversational AI solutions

Amazon
Lex



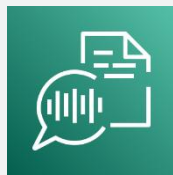
Conversational AI

Amazon
Polly



Text to speech

Amazon
Transcribe



Speech to text

Amazon
Comprehend



Natural language
processing

Amazon
Kendra



Intelligent
search

Amazon
Translate



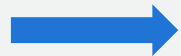
Machine
translation


Conversational AI




FAQ

(Chatbot)





DMV Chatbot



You can ask me for help. Just type a question or click on the mic and say it.

Menu of Services. You can also type any question.


RENEW LICENSE

PERMIT TEST @ HOME

OCTANK TRAVEL ID

MOTOR VEHICLE RECORDS

Type here or click on the mic



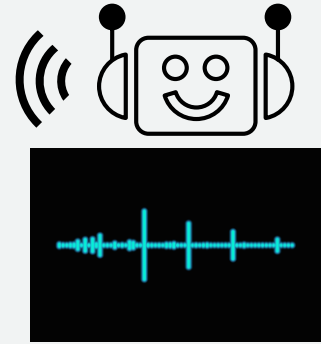
Get answers to frequently asked questions.

FAQ

(Voice)



Thank you for calling DMV.
How can we help you?

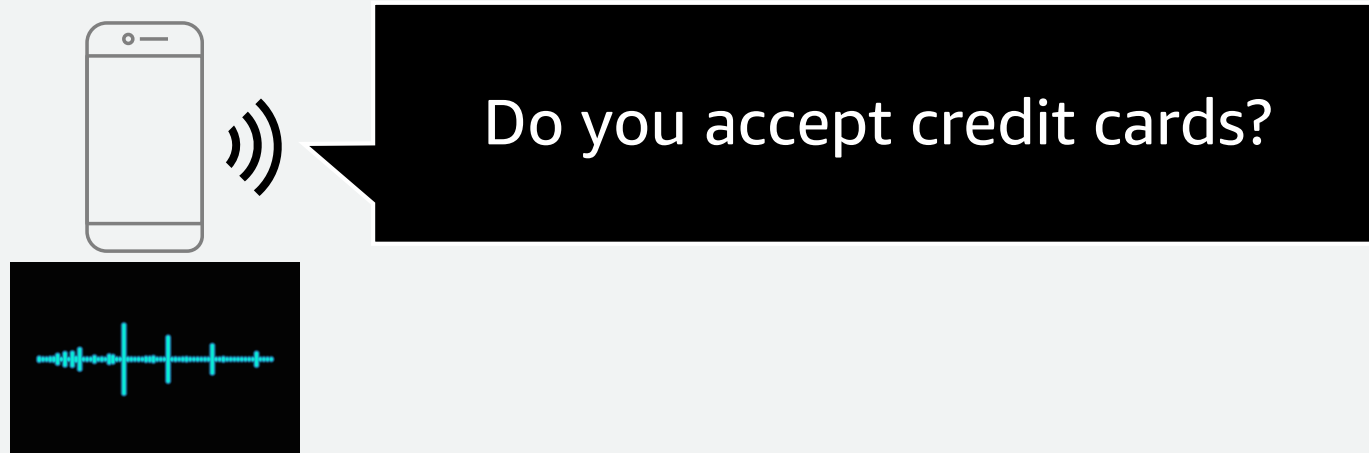


FAQ

(Voice)

FAQ

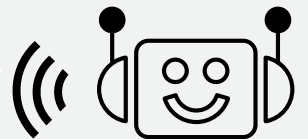
(Voice)



FAQ

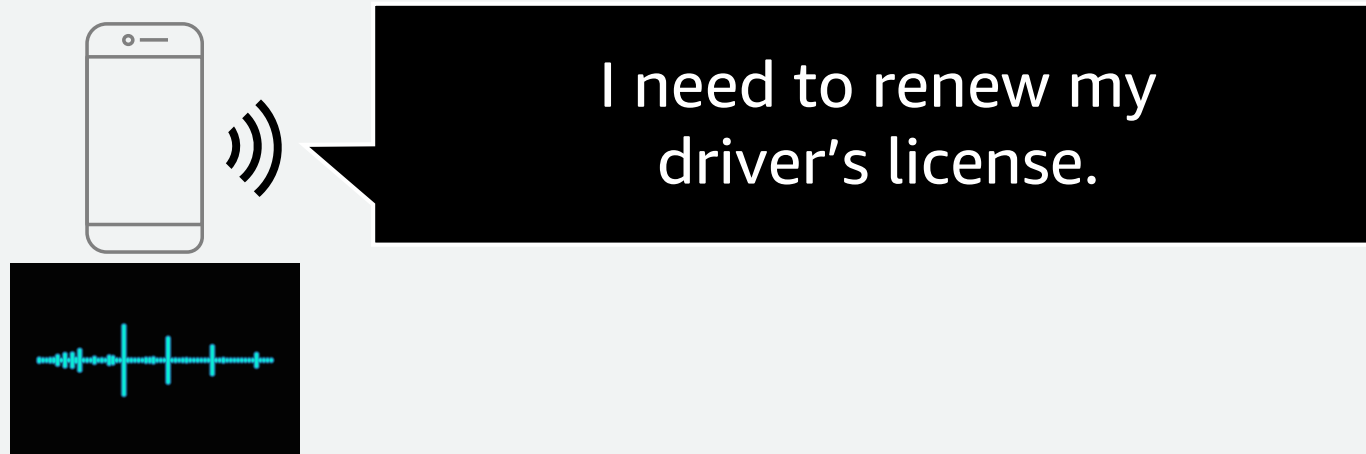
(Voice)

We accept Visa, MasterCard,
Discover and American Express.
Is there anything else we can
help you with?



Tasks

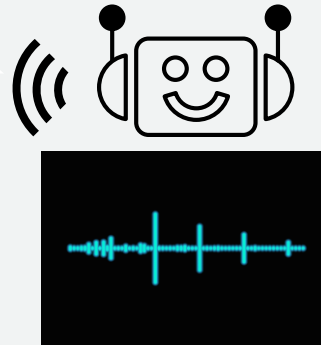
Capture, verify information and fulfill an intent, all without a live agent.



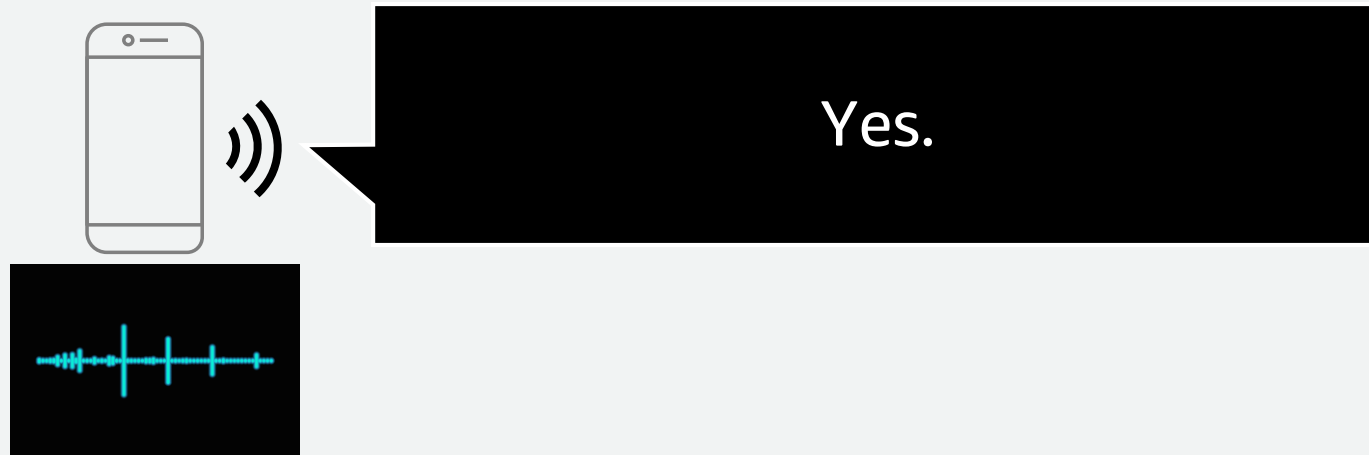
Tasks

Tasks

Do you want me to use the
credit card on file?

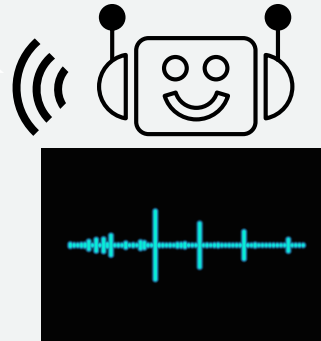


Tasks

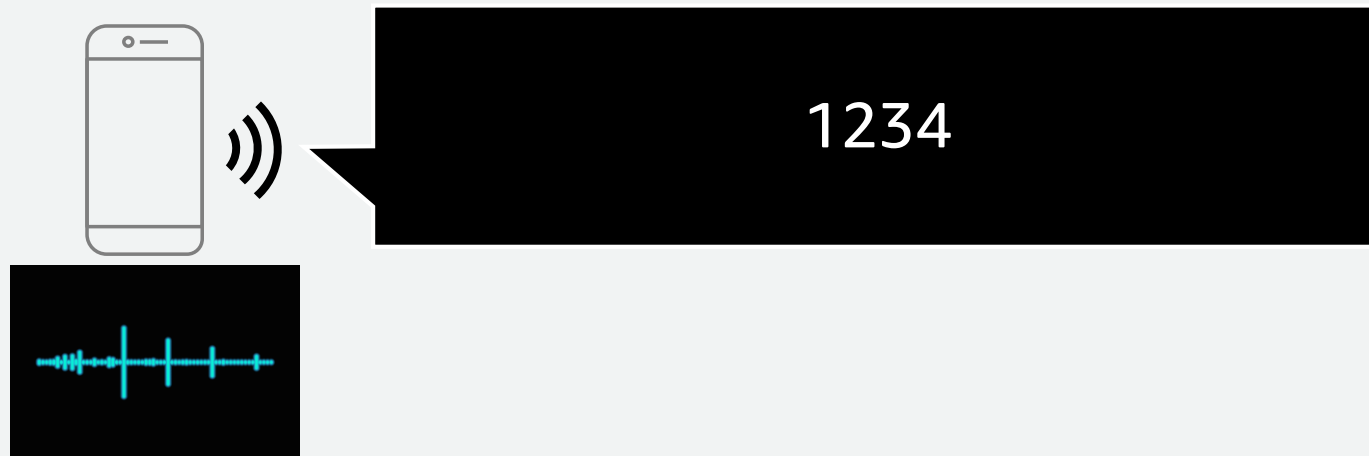


Tasks

Can you verify the last 4 digits of the card number?

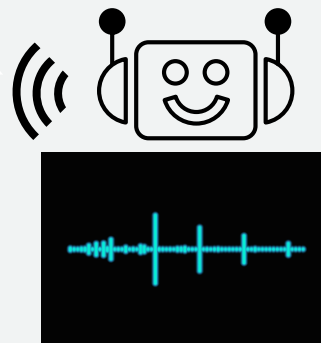


Tasks



Tasks

Ok. Your drivers license has been renewed, and will be mailed to you in 1 to 2 weeks.

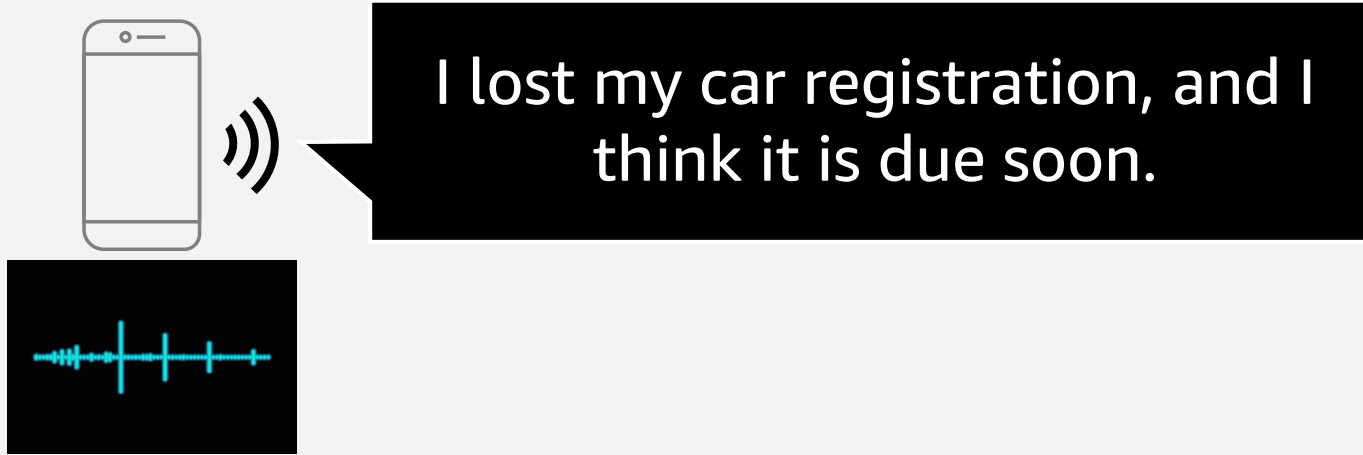


Smart Transfer

Verify information and get the customer to the right agent with the best fit.

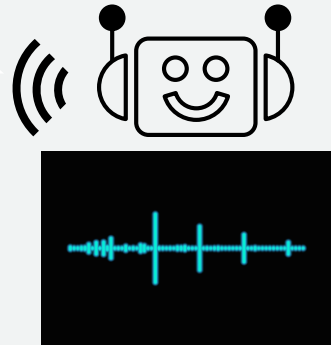


Smart Transfer

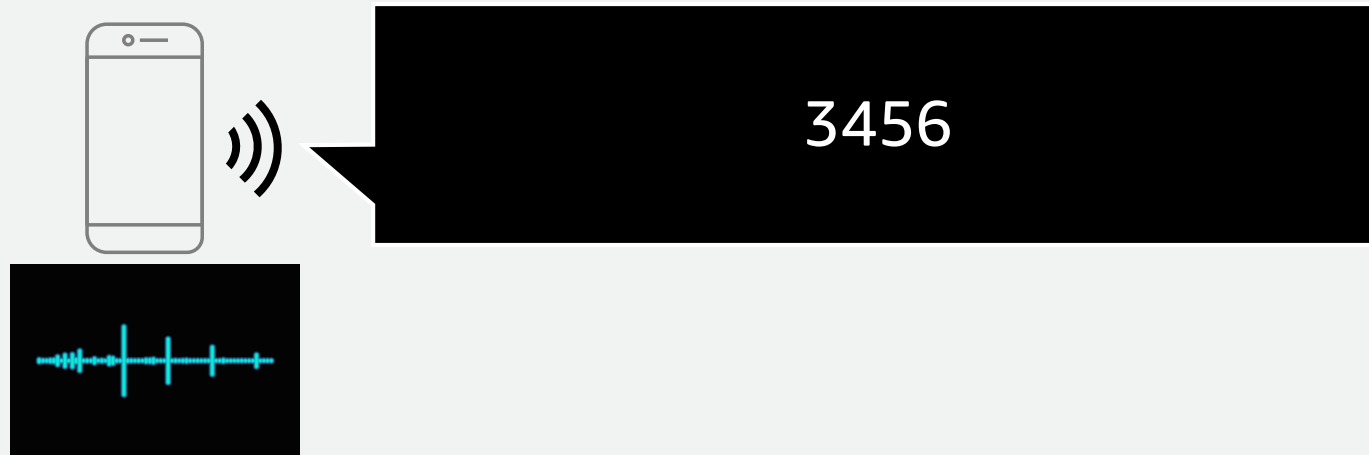


Smart Transfer

What is the last 4 digits of the
vehicle's VIN number?

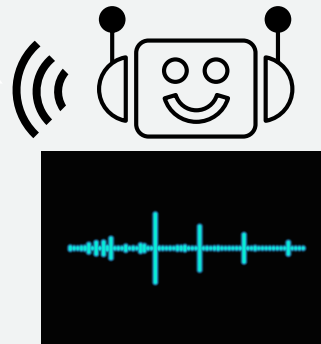


Smart Transfer



Smart Transfer

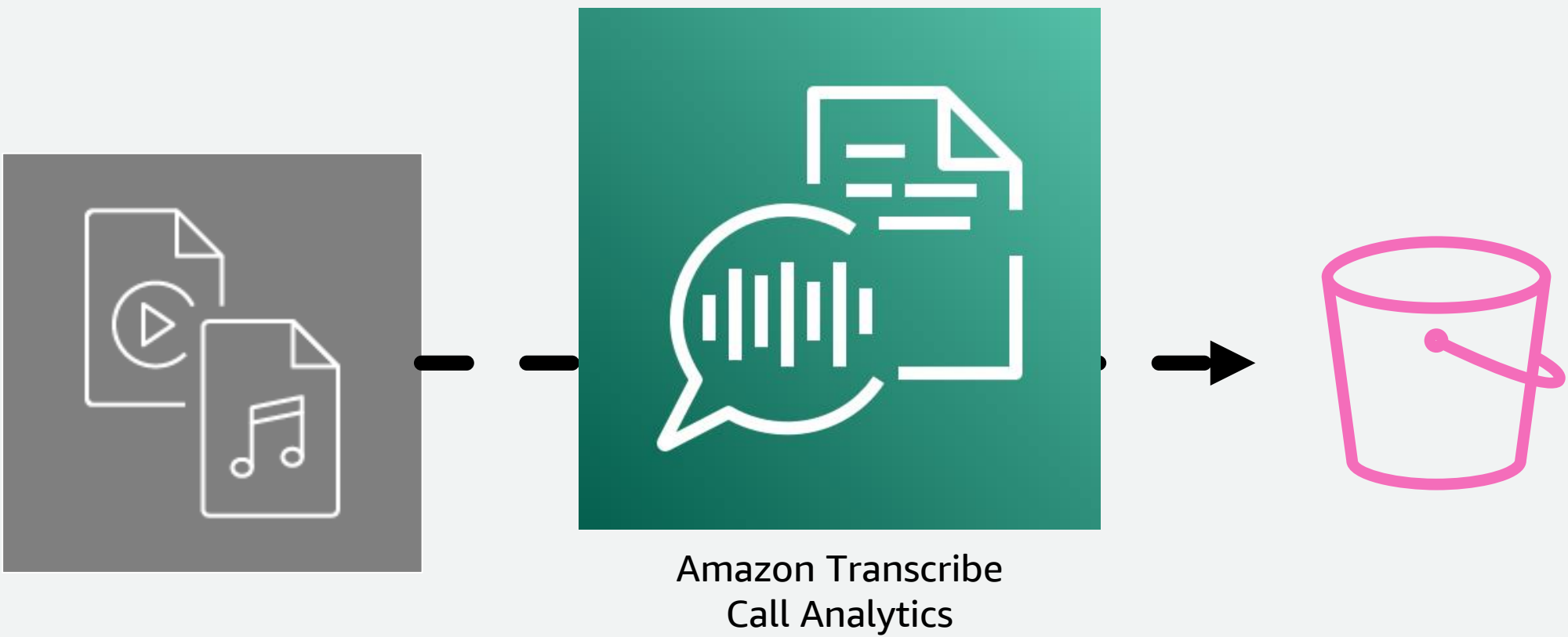
Thanks, I have verified that you are the owner and will transfer you to an agent. Your wait time is less than 2 minutes.



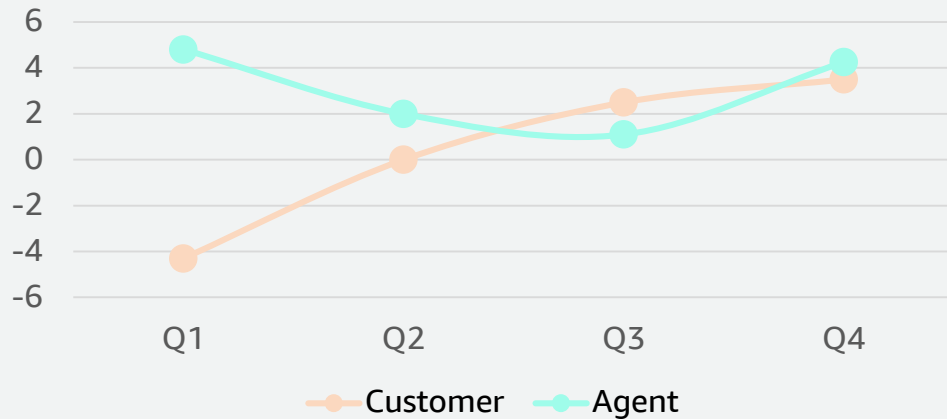
Contact Center Intelligence

Post Call Analytics

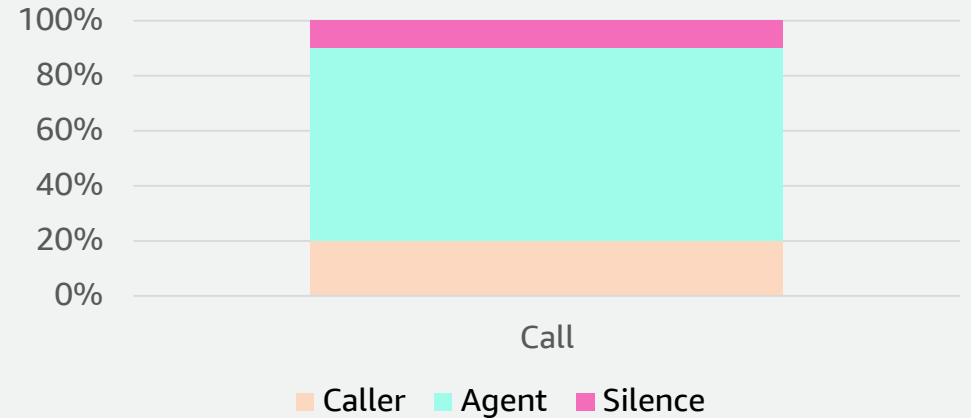




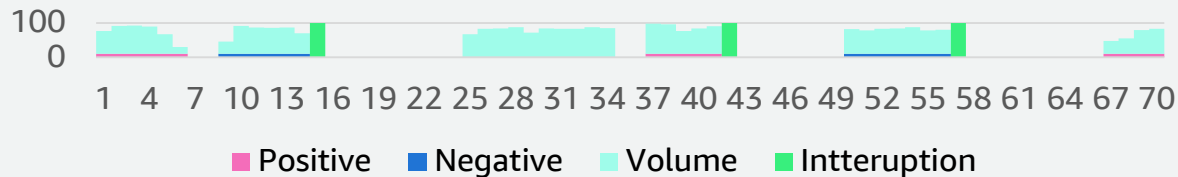
Sentiment by Quarter



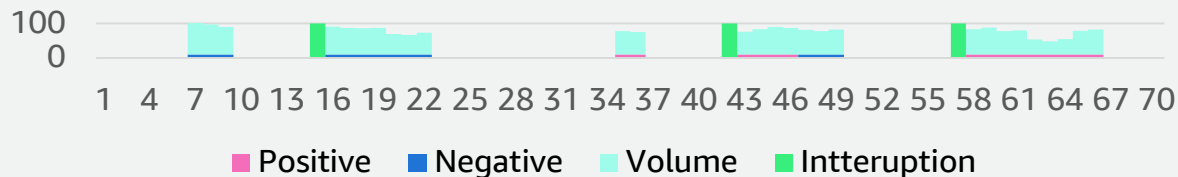
Speaker Time



Agent Volume and Sentiment



Caller Volume and Sentiment



Issue:

[Caller] I dropped my credit card into the water.

Action Items:

[Agent] Ok, I'll have a new one sent to you.

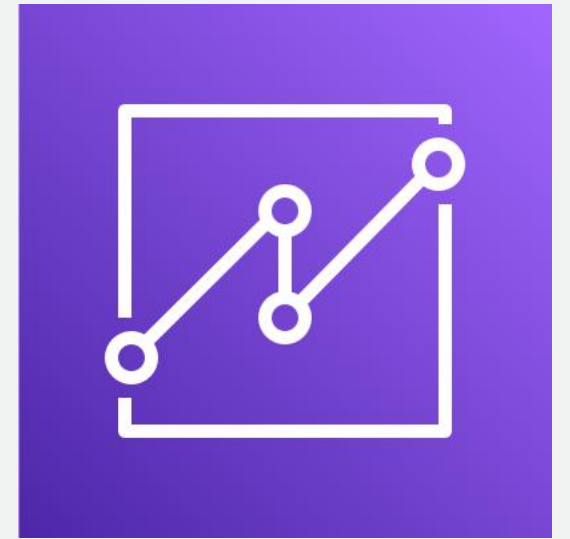
Outcomes:

[Agent] Your card will arrive in 1-2 days.

Integrates with Business Intelligence Tools



Amazon Athena



Amazon QuickSight



Intelligent Document Processing

Go beyond OCR with accurate, versatile information extraction

Accuracy of forms and tables allows customers to reach 80–90% automation levels on documents that previously needed manual processing.

INPUT → OUTPUT

I. TYPE OF MORTGAGE AND TERMS OF LOAN				
Mortgage Applied for:		Agency Case Number		Lender Case Number
<input type="checkbox"/> VA <input type="checkbox"/> FHA		<input checked="" type="checkbox"/> Conventional <input type="checkbox"/> USDA/Rural Housing Service		ABC1234 XYZ6543
Amount	Interest Rate	No. of Months	Amortization Type:	
\$ 552,500	3.5 %	360	<input checked="" type="checkbox"/> Fixed Rate <input type="checkbox"/> GPM <input type="checkbox"/> Other (explain): <input type="checkbox"/> ARM (type):	
II. PROPERTY INFORMATION AND PURPOSE OF LOAN				
Subject Property Address (street, city, state, & ZIP)				No. of Units
123 Any Street, Anytown, USA, 12345				1
Legal Description of Subject Property (attach description if necessary)				Year Built
Single Family Home				2015

Gross Monthly Income	Borrower	Co-Borrower	Total
Base Empl. Income*	\$ 85,000	\$ N/A	\$ 85,000
Overtime	10,000	N/A	10,000

Raw Text

Borrower	Co-Borrower	I. TYPE OF MORTGAGE AND TERMS OF LOAN		Mortgage	VA	Conventional
Other (explain):		Agency Case Number	Lender Case Number	Applied for:	FHA	USDA/Rural
ABC1234	XYZ6543	Housing Service	Amount	Interest Rate	No. of Months	Amortization Type:
Fixed Rate	Other (explain):	\$ 552,500	3.5 %	360	GPM	ARM (type):

Forms

Lender Case Number	VA
XYZ6543	NOT_SELECTED
Conventional	Other (explain):
SELECTED	

Table Recognition

Column 1	Column 2	Column 3	Column 4
Gross Monthly Income	Borrower	Co-Borrower	Total
Base Empl. Income*	\$ 85,000	\$ N/A	\$ 85,000
Overtime	10,000	N/A	10,000



Analyze documents and send key insights to downstream systems and workflows

Redaction of sensitive data

Hi, my name is John Doe. For verification, the last 4 digits of my social are 6789 and my DOB is 01/01.



Hi, my name is [NAME]. For verification, the last 4 digits of my social are [SSN] and my DOB is [DATE_TIME].

Classify type of document



- Appeal
- Medical record
- Disputed invoice
- Provider contract v1
- Provider contract v2

Recognize medical entities or those specific to your business

Document text:

Mr. Smith is a 63-year-old gentleman with coronary artery disease and hypertension. CURRENT MEDICATIONS: taking a dose of LIPITOR 20 mg once daily.

Output:

Category of entity:	MedCondition
Type:	Dx name
Entity:	Hypertension
Confidence:	0.99



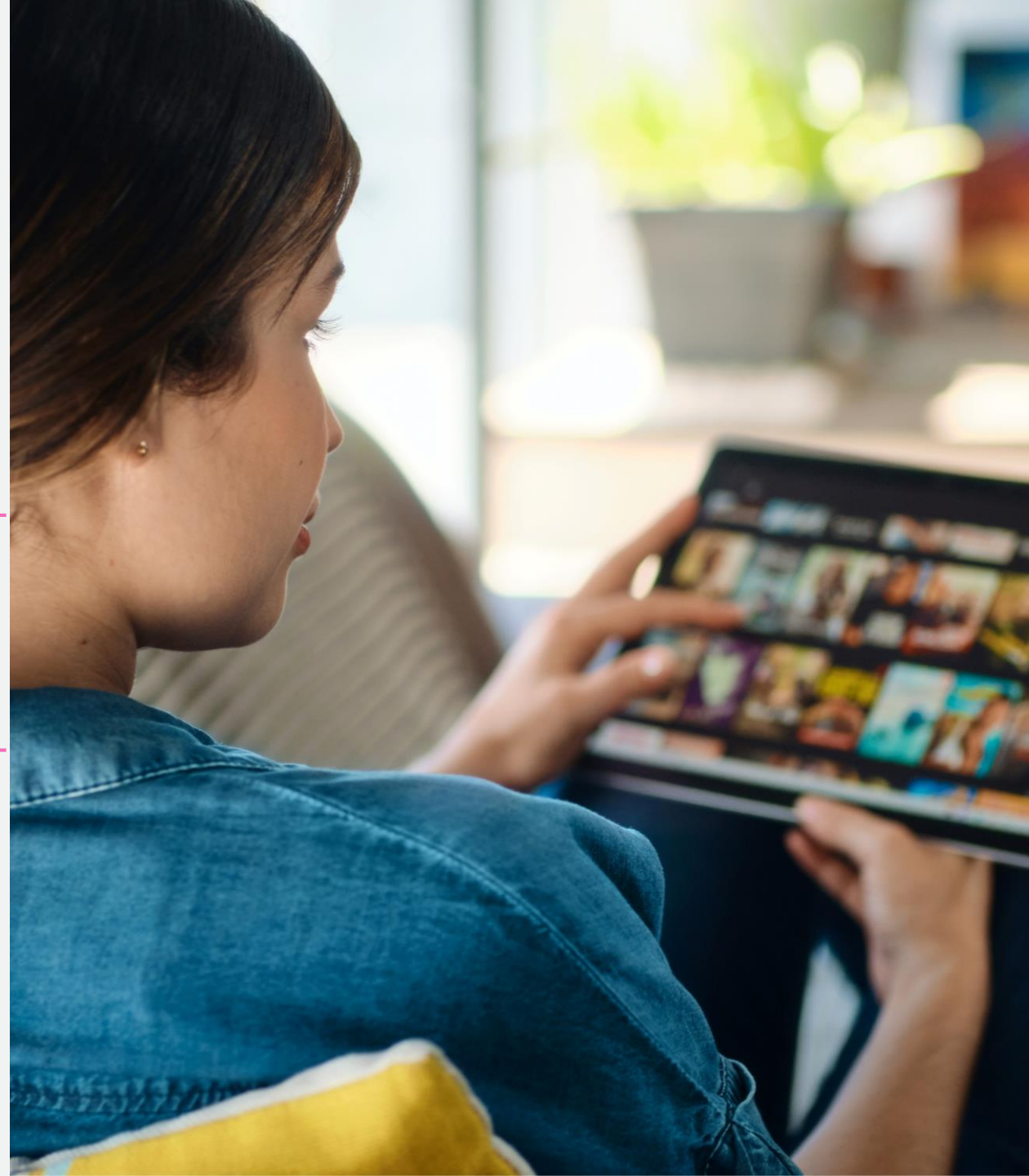
Personalization

Why personalization is so important

Reduce bottlenecks and delays ;
increase citizen engagement

Better student experiences and
improve institutional agility

Increase inherent compliance with
the policies and procedures



ML-Powered Personalization

The benefits of Amazon Personalize



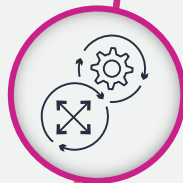
Deliver **high quality recommendations**

Up to **50% better recommendations** for fast changing catalogs



Personalize **every customer touchpoint**

Easy integration into your existing website, app, SMS, and email marketing systems



Reduce time to market



All data is encrypted to be private and secure, and is only used to create recommendations for your customers





Intelligent Search

Intelligent Search

FIND ACCURATE INFORMATION QUICKLY AND EASILY

Traditional
search

Intranet Search

it support desk

Your recent searches ▾ Not finding relevant r

SEARCH IN:

Everything (21)
Wiki (17)
Email List Archive (3)
Show more...

REFINE:

CATEGORIES

Service (1)
Team (1)

CREATOR

admin (1)
abcde (1)
it (1)
corp (1)

Displaying results 1 - 10 of 21

IT_Support_Training_Program.W

18px"%)1 Linux desktop * (% style="f
style="font-size:13.5px"%)**Afternoon
https://w.co.com/bin/view/IT_Support

Com_Support_Wiki.Web

Communication has three differ
Com sign-in flow>>url:https://c
<https://w.co.com/bin/view/Com>

OperationalBestPractices.EventM

as a basic service. It is owned by [https
*Dial into both calls: If you're at your d
<https://w.co.com/bin/view/BestPracti>

Corp_Wiki_Pending.Web

Light~",sans-serif; font-size:9pt; heigh
Videoconference desk issues from Reg
<https://w.co.com/bin/view/Corp/Pend>



Intelligent
search

RESULTS PAGE

Where is the it support desk?

Q

Kendra's suggested answer

1st floor

... our IT help desk, deskside, which are located all around our buildings and open for support at most hours. The one in Seattle is on the 1st floor and is open from 12:30 to 5 p.m. daily.

WEB | <https://w.organization.com/bin/view/ILDRTEST/>

What is Kendra's suggested answer? Info

Frequently asked questions

Where do I get IT help?

What are the IT support hours?

Where can I get IT help corporate campus?

What are frequently asked questions? Info



Top intelligent search use cases



Customer experiences

- Agent Assist with accurate search
- Self-service chatbots
- Website search



Enterprise search

- Intranet search
- Domain-focused search (R&D, Compliance, HR, Legal, etc.)



Embedded search

- Add intelligent search to SaaS applications like CRMs, knowledge management systems, productivity apps, etc.

Amazon Kendra



Natural language
queries

what are less common COVID-19 symptoms ?

1-10 of about 94,600 Sort by Best match

Top suggested answer

Optimal Control Measures to Combat COVID19 Spread in Sri Lanka: A Mathematical Model Considering the Heterogeneity of Cases

Common symptoms of COVID 19 disease have been fever, cough and fatigue. **There are some less common symptoms including sputum production, headache, hemophiliacs, and diarrhea [3]**. According to WHO, COVID 19 has spread for more than 210 countries and independent territories while Italy, Spain, United States and Iran are the hardest hit apart from China where the disease is known to be emerged but now significantly controlled and stable. In numbers, currently more than 30 million people have been infected while there are 200 000 reported deaths worldwide [4].

▼ More suggested answers (2)

Suggested answer (1 of 2)

Long-Term Neurological Threats of COVID-19: A Call to Update the Thinking About the Outcomes of the Coronavirus Pandemic

While the most common symptoms of COVID-19 at the onset of illness include fever, fatigue, dry cough, myalgia, and dyspnea, other **less common symptoms** are **headache, abdominal pain, diarrhea, nausea, and vomiting (10)**. Furthermore, it's been recently reported that most patients also complain of impairment of both olfactory and gustatory perception (11) and those are being considered early markers of COVID-19 infection. Though there is longstanding evidence that human coronaviruses, such as SARS-CoV-2, can spread to the brain from the respiratory tract (5, 12, 13), the occurrence of gastrointestinal **symptoms**

NLU and ML core



Natural language
queries



NLU and
ML core

Better answers

Reading
comprehension

FAQ matching

Document
ranking

Where is the it support desk in kumo?

Kendra's suggested answer

1st floor

... our IT help desk, deskside, which are located all around our buildings and open for support at most hours. The one in Kumo is on the 1st floor and is open from 12:30 to 5 p.m. daily.

WEB | <https://w.amazon.com/bin/view/ILDRTEST/>

What is Kendra's suggested answer? [Info](#)

Frequently asked questions

Where do I get IT help in Kumo?

What are the IT support hours in Dopler?

Where can I get IT help Seattle campus?

What are frequently asked questions? [Info](#)

1-10 of 486 Recommended documents

Sort: Relevancy ▼

AWS Kumo

...this is how we're doing it. Access controls Access to this host is governed by the permissions associated with the AWS-SUPPORT-KUMO hostclass. Permissions to the aws-support-kumo group... [\(More\)](#)

WEB | <https://w.amazon.com/bin/view/kumo-support>

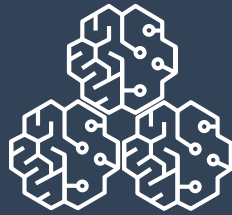
Domain expertise



Natural language
queries



NLU and
ML core



Domain
expertise

Optimized for
14 major domains

IT, Financial Services,
Insurance, Pharma,
Industrial, Energy,
Legal, Media and
Entertainment,
Travel and Hospitality,
Health, HR, News,
Telecommunications,
and Automotive

what is the production increase in lithium carbonate?



1-6 of 6 results

Amazon Kendra suggested answers

Can Tesla Really Produce A \$25,000 Self-Driving Electric Car?

It's just like widely available." Related: The World's Most Expensive Crudes Get Expensive Again
There are 63kgs of **lithium carbonate** in a Tesla 70kWh battery. So that's 18.9 million tonnes if everyone wants to trade in their clunker for a Model Y. Global **lithium carbonate** equivalent **production** last year was **365.000 tonnes, an increase of 32% from the year before. Just 32%?**

Clearly, the **lithium** mining industry simply hasn't even been trying. Salting away Musk solves difficult problems from a "first principle standpoint" which he frequently referred to on stage.

<https://s3.us-west-2.amazonaws.com/.../Can Tesla Really Produce A...?...>



What are Amazon Kendra suggested answers? [Info](#)

Incremental learning



Natural language
queries



NLU and
ML core



Domain
expertise

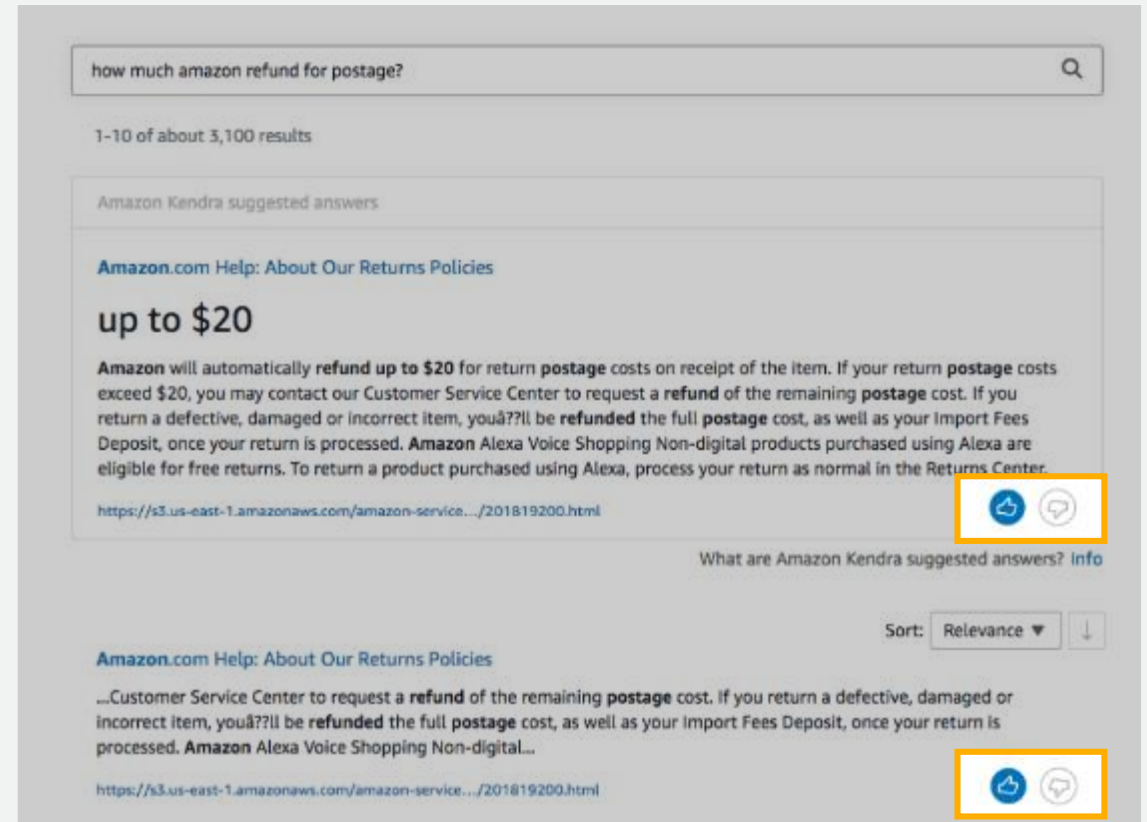


Continuous
improvement

Amazon Kendra
improves
automatically
over time

Captures click-
through and
user feedback

Retrains models
periodically



The AWS AI/ML stack

BROADEST AND MOST COMPLETE SET OF MACHINE LEARNING CAPABILITIES

AI SERVICES

SPECIALIZED

BUSINESS PROCESSES
Amazon Personalize
Amazon Forecast
Amazon Fraud Detector

SEARCH
Amazon Kendra

CONVERSATION
Amazon Lex
Amazon Transcribe Call Analytics
Contact Lens
Voice ID

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

CORE

TEXT
Amazon Translate

Amazon Comprehend

SPEECH
Amazon Polly

Amazon Transcribe

VISION
Amazon Textract

Amazon Rekognition

AWS Panorama

ML SERVICES

SAGEMAKER CANVAS
No-code ML for business analysts

SAGEMAKER STUDIO LAB
Learn ML

SAGEMAKER GROUND TRUTH
Label data

SAGEMAKER STUDIO | RSTUDIO
Prepare data | Store features | Detect bias | Build with notebooks | Train models | Tune parameters | Deploy in production | Explain predictions | Manage & monitor

CI/CD

SAGEMAKER EDGE MANAGER
Manage edge devices

ML FRAMEWORKS & INFRASTRUCTURE

PyTorch, Apache MXNet, TensorFlow

Amazon EC2

CPUs

GPUs

AWS Inferentia

AWS Trainium

Habana Gaudi

FPGA



AI Services

EASILY ADD INTELLIGENCE TO YOUR BUSINESS APPLICATIONS

SPECIALIZED

BUSINESS PROCESSES

Amazon Personalize
Amazon Forecast
Amazon Fraud Detector

INDUSTRIAL

Amazon Monitron
Amazon Lookout for Equipment
Amazon Lookout for Vision

HEALTH

Amazon HealthLake
Amazon Comprehend Medical
Amazon Transcribe Medical

SEARCH

Amazon Kendra

CONVERSATION

Amazon Lex
Amazon Transcribe Call Analytics
Contact Lens
Voice ID

CODE + DEVOPS

Amazon CodeGuru
Amazon CodeWhisperer
Amazon DevOps Guru

CORE

TEXT

Amazon Translate
Amazon Comprehend

SPEECH

Amazon Polly
Amazon Transcribe

VISION

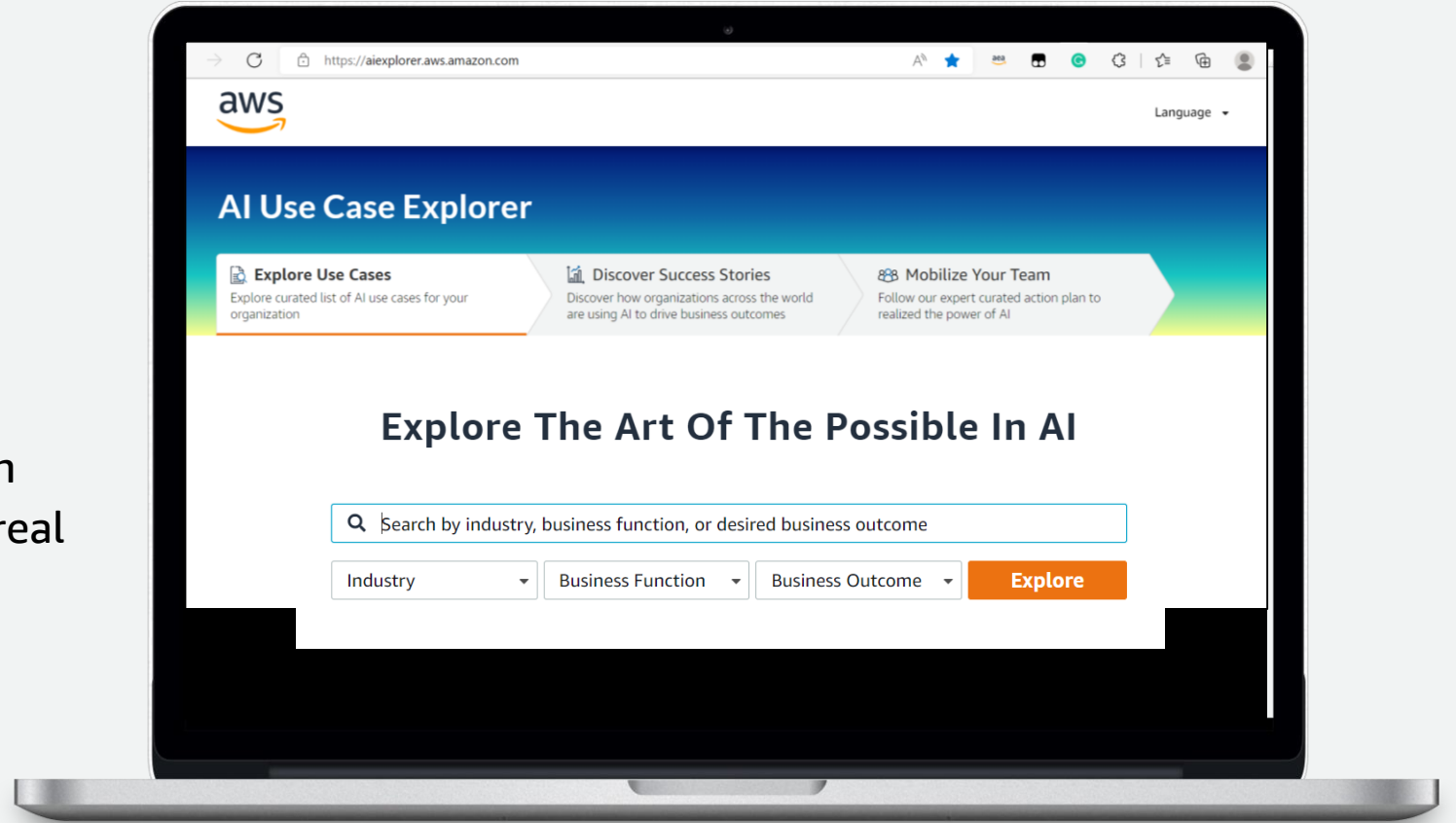
Amazon Textract
Amazon Rekognition
AWS Panorama





AI Use Case Explorer

Easily find the most relevant AI use cases with related content and guidance to make them real

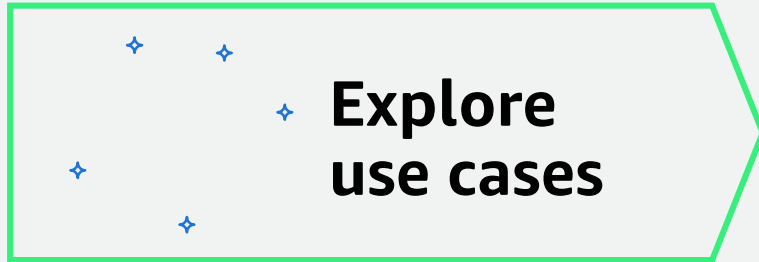


aiexplorer.aws.amazon.com



© 2024, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Explore Main features



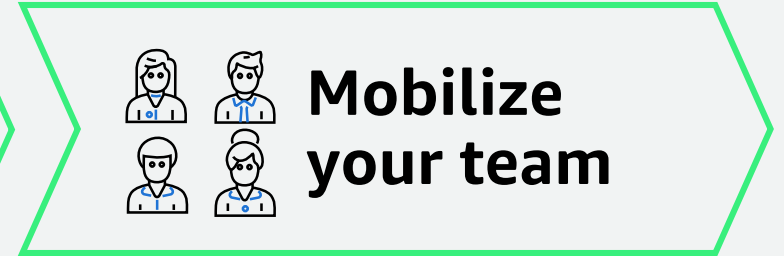
Explore curated list of AI use cases for your organization

100+ use cases and sub use cases



Discover how organizations across the world are using AI to drive business outcomes

400+ customer success stories



Follow our expert-curated action plan to realize the power of AI

50+ resources (ebooks, videos, demos)

aiexplorer.aws.amazon.com



AWS AI/ML Solutions Library - Solutions

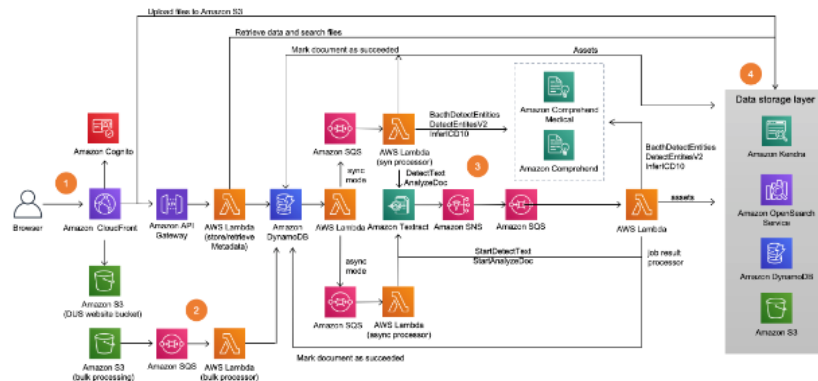
Document Understanding Solution

Overview

Resources & FAQ

AWS Solution overview

The diagram below presents the architecture you can automatically deploy using the solution's implementation guide and accompanying AWS CloudFormation template.



Document Understanding Solution architecture

The [AWS CloudFormation](#) template deploys a static web application hosted in an [Amazon S3](#) bucket and served by an [Amazon CloudFront](#) distribution. Users are authenticated using [Amazon Cognito](#). The web application interacts with the backend using an [Amazon API Gateway](#) API, supported by an [AWS Lambda](#) function. Documents are uploaded using either the web application, or directly to a dedicated Amazon S3 bucket for bulk processing. Document processing is initiated by the API, which initiates a Lambda function to add an entry to an [Amazon DynamoDB](#) table. The table initiates a second Lambda function that supervises the processing.

Document Understanding Solution

Version 1.0.4

Release date: 08/2022

Author: AWS

Estimated deployment time: 30-60 min

Estimated cost 

Source code 

[CloudFormation template](#) 

[View implementation guide](#)

Launch in the AWS Console

Additional resources

[Download implementation guide](#) [Resources and FAQ »](#)

QnABot on AWS

Improving Forecast Accuracy with Machine Learning

Content Localization on AWS

Content Analysis on AWS

Document Understanding Solution

MLOps Workload Orchestrator

Media Insights on AWS

Discovering Hot Topics Using Machine Learning

Maintaining Personalized Experiences with Machine Learning

Streaming Data Solution for Amazon MSK

Streaming Data Solution for Amazon Kinesis

<https://aws.amazon.com/solutions/ai-ml/>



© 2024, Amazon Web Services, Inc. or its affiliates. All rights reserved.

Please complete the session survey by scanning the QR code



Track: Data and Analytics
Session: AI/ML for data and analytics





Thank you!

Aditya Challa

aditchal@amazon.com

[linkedin.com/in/thinkadi](https://www.linkedin.com/in/thinkadi)