INNOVATE

AI/ML EDITION

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Easily build custom computer vision models using Amazon Rekognition

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Agenda

1. Applications of computer vision
2. Building a computer vision model
3. Building models in a self-managed way
4. Introduction to Amazon Rekognition Custom Labels
5. Deep dive and demo
6. Recap and other resources

Applications of computer vision

Computer vision use cases across industries

TRANSPORTATION

Self driving cars, pedestrian detection and tracking, parking occupancy detection, traffic flow analysis, road condition detection

HEALTHCARE

Medical image analysis - X ray, MRI cancer detection, digital pathology, movement analysis

MANUFACTURING

Defect detection, reading text and barcodes, product assembly, PPE kit detection, predictive maintenance

AGRICULTURE

Crop and yield monitoring, insect detection, livestock health monitoring, plant disease detection

RETAIL

Self checkout, inventory tracking, customer tracking and analytics, footfall tracking

Building a computer vision model

Building a computer vision model

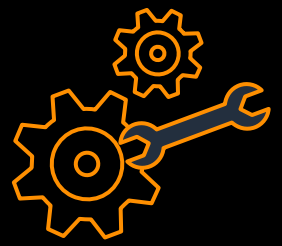
Dataset – The cats vs dogs classification
Problem Type: Classification

Dataset : dataset multiple images of cats and dogs, the goal is to build a model that given an image classifies it as either a cat or a dog.

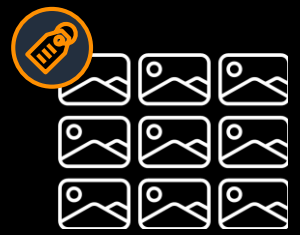



Building from scratch requires expertise & resources

Do-it-yourself



Deep Machine Learning expertise (hard to find)



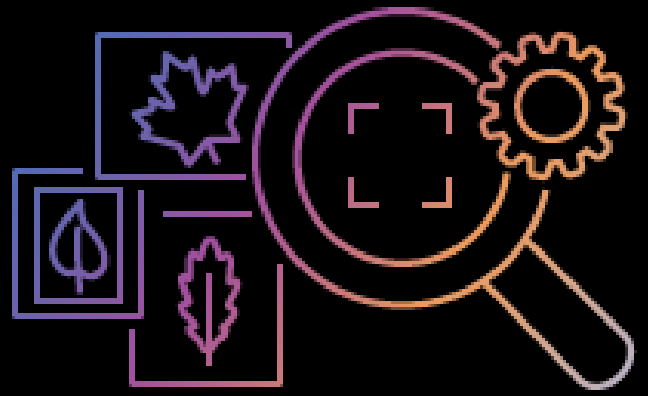
Tens of thousands of labeled images (expensive and time consuming)

Several weeks to months to complete

Building our own model

- Define your building environment
- Create labelled data
- Choose a training algorithm
- Optimize hyperparameters
- Manage infrastructure
- Experiment with multiple approaches
- Possess specialized computer vision knowledge

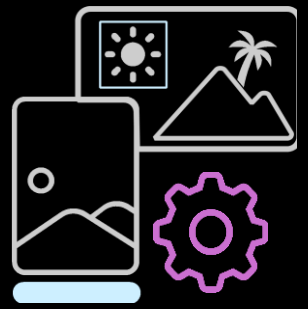
What is Amazon Rekognition Custom Labels?



Customized image analysis
to easily detect objects and scenes
you define as most relevant
to your domain

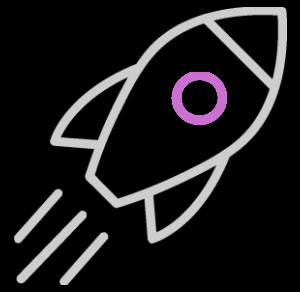
Amazon Rekognition Custom Labels

Customized image analysis to easily detect objects and scenes you define as most relevant to your domain



Guided experience to create labeled images

Train and evaluate with no coding and no ML experience



Easy-to-use fully managed API

What can Custom Labels do?

“Premade foods”

“Produce”

“Mountains, Dusk”

“Boy, Cat”

Single label classification
“Which class of objects does this picture represent?”

Multi-label classification
“Which combination of classes are represented in this image?”

Object detection
“What object is present, and where is it?”

How are customers using it?

Products and machine parts

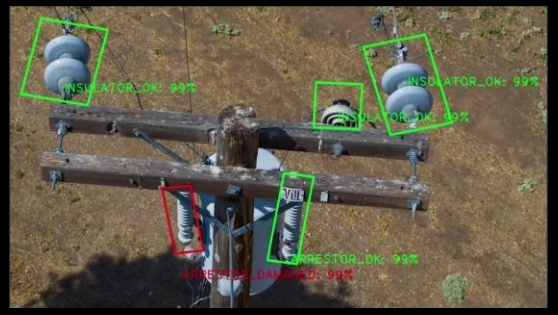
Icons, logos, and symbols

Animated characters

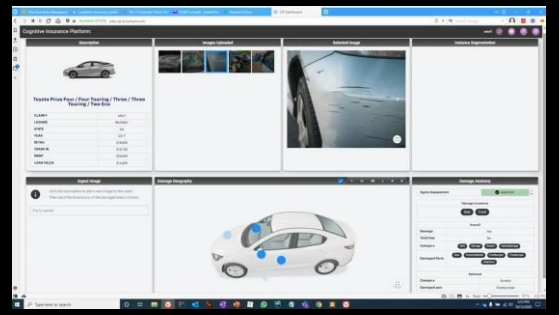
Biological analysis

Inventory management

Document classification

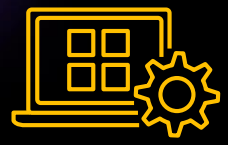


Damage detection



Insurance automation

Benefits of Amazon Rekognition Custom Labels



Customized to your business needs

Less training data
Tens to hundreds of images instead of tens of thousands

No ML expertise required

Custom image analysis in hours
Customize and use model in hours instead of several weeks or months

Business users create ML models
Intuitive UI, zero lines of code

Fully managed by AWS

aws

Steps to create a custom labels model

Step 1
Collect images
Collect images that contain the objects and scenes you want to find

Step 2
Create training dataset
Upload and label images from your computer or Amazon S3, or import an Amazon SageMaker Ground Truth .manifest file for already labeled images

Step 3
Create test dataset
Create a dataset to evaluate your model's performance, select an existing dataset, or split your training dataset for testing

Step 4
Train model
Train your custom model using your training and testing datasets; the best ML techniques will automatically be selected

Step 5
Evaluate
Evaluate your model performance on test dataset; improve your model by adding images to training dataset

Step 6
Use model
Use your custom model to analyze images with a simple API call

Demo building cats vs dogs

Options for creating a dataset

- Label data by hand in the Amazon Rekognition Custom Labels Console
  - Add images by dragging and dropping them into your dataset gallery view.
  - You're limited to uploading 30 images at one time.
- Import images from Amazon S3 bucket
  - Use images from an existing S3 bucket by entering the S3 folder location.
  - Automatically add labels based on your folder names.
- Import images labeled by Amazon SageMaker Ground Truth
  - Provide the location of your .manifest file.
  - Also supports other .manifest files not created in Ground Truth, as long as they are formatted properly.

Creating a test dataset

1

Use Auto-splitting

Utilize Amazon Rekognition Custom Labels' built in auto-splitting feature to perform an 80/20 training/testing split on your dataset.

2

Create a New Testing Dataset

Follow the same steps as you did when creating the training dataset, but with different images.

Evaluation - F1 Score, Precision, and Recall

It is important to note that Amazon Rekognition Custom Labels does not return “accuracy”

- It instead displays F1 score
  - F1 score is calculated as the average of precision and recall

- Models with high precision will report a low number of false positives
  - You want your home security system to be very precise; when in doubt assume ‘no’
  - If it is unsure, it will chose not to apply any label

- Models with high recall will report a low number of false negatives
  - You want your COVID-19 test to have high recall; when in doubt assume ‘yes’
  - If it is unsure, it will chose not to apply too many labels

Tips for improving your model:

Increase Accuracy

- Balance your dataset better
- Increase resolution of training images
- Increase number of training images
- Try classification model versus detection model
- Ensure bounding boxes are drawn precisely

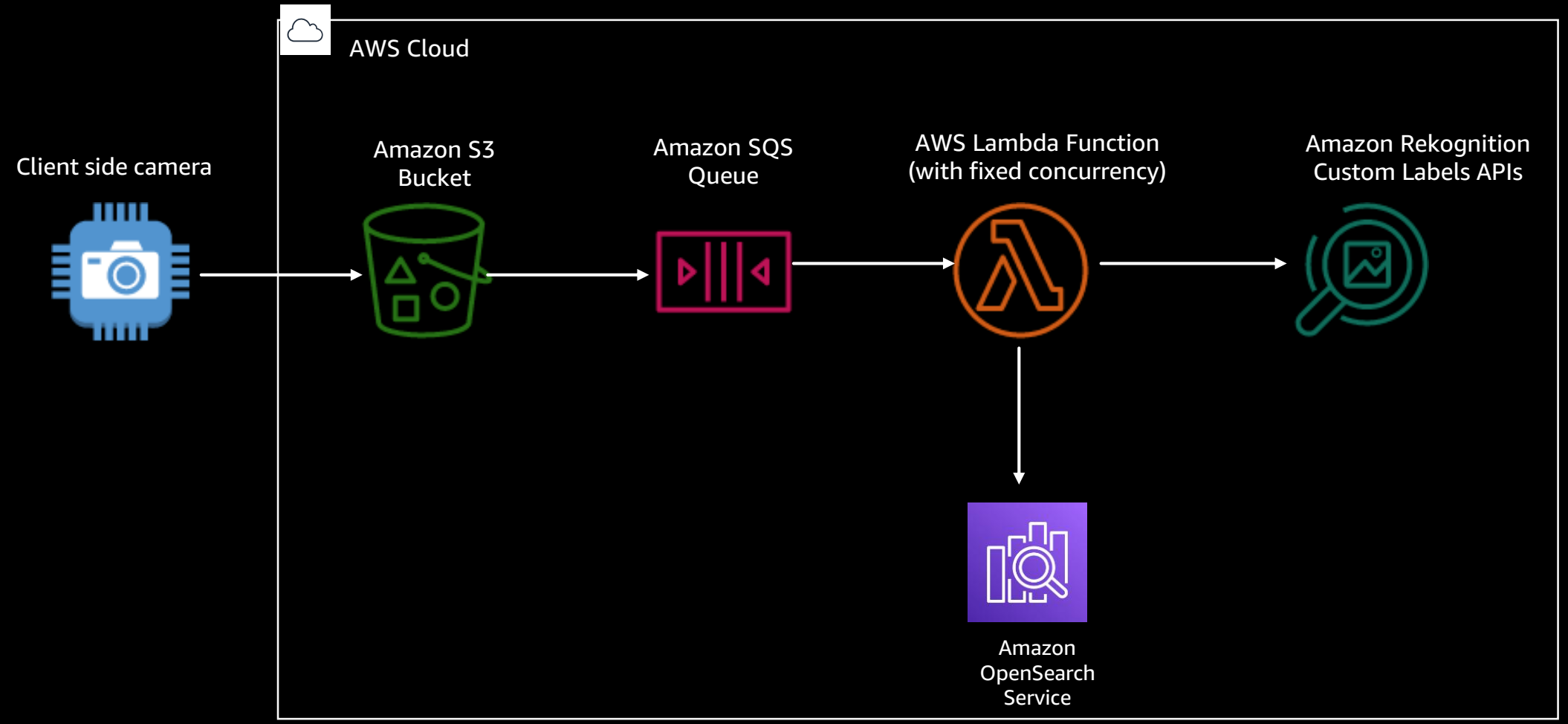
Increase throughput

- Shrink the size of your images
- Use classification model instead of detection model
- Consider using raw bytes instead of S3

Decrease Cost

- Don’t reinvent the wheel (if Rekognition labels already does something, use that instead)
- Consider batching images if you cannot use one full inference unit
- Increase throughput of model to require less inference units

Rekognition Custom Labels API Architecture



Other resources

1. Amazon Rekognition Custom Labels workshop link
2. Amazon Rekognition Custom Labels Demo tool link

Visit the AI & Machine Learning resource hub for more resources

Dive deeper into these resources, get inspired and learn how you can use AI and machine learning to accelerate your business outcomes.

- The machine learning journey e-book
- 7 leading machine learning use cases e-book
- A strategic playbook for data, analytics, and machine learning e-book
  Accelerate machine learning innovation with the right cloud services & infrastructure e-book
- Choosing the right compute infrastructure for machine learning e-book
- Improving service and reducing costs in contact centers e-book
- Why ML is essential in your fight against online fraud e-book
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Thank you!

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