



Leveraging AI for high scale indexing of visual media

David Pearson

Technical Business Development

Amazon AI Services

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three things...

1. Intro to Amazon AI and Rekognition
2. What can you do with an indexed media library?
3. How easy is it to build a high scale media indexing pipeline?





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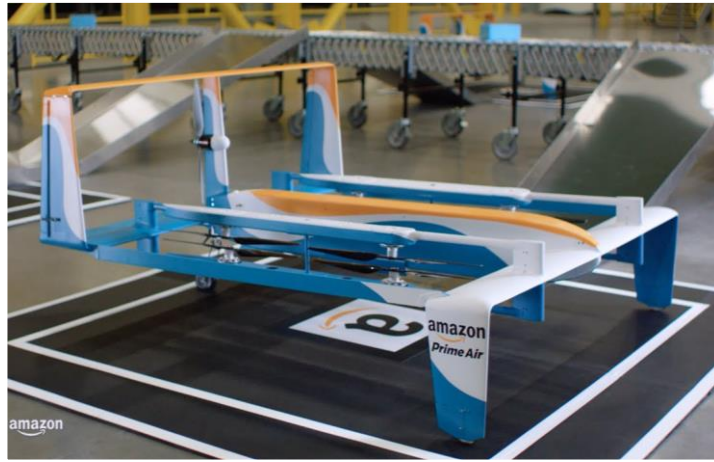
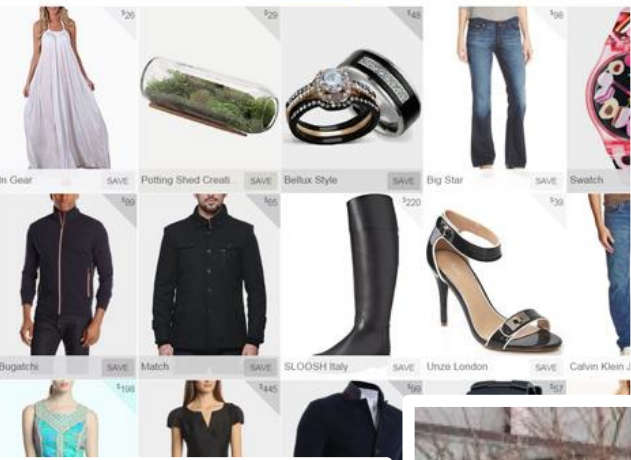
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Check the status of your orders or change the email address and password you have on file with us. Please note that you **do not** need an account to use the store. The first time you place an order, you will be given the opportunity to create an account.

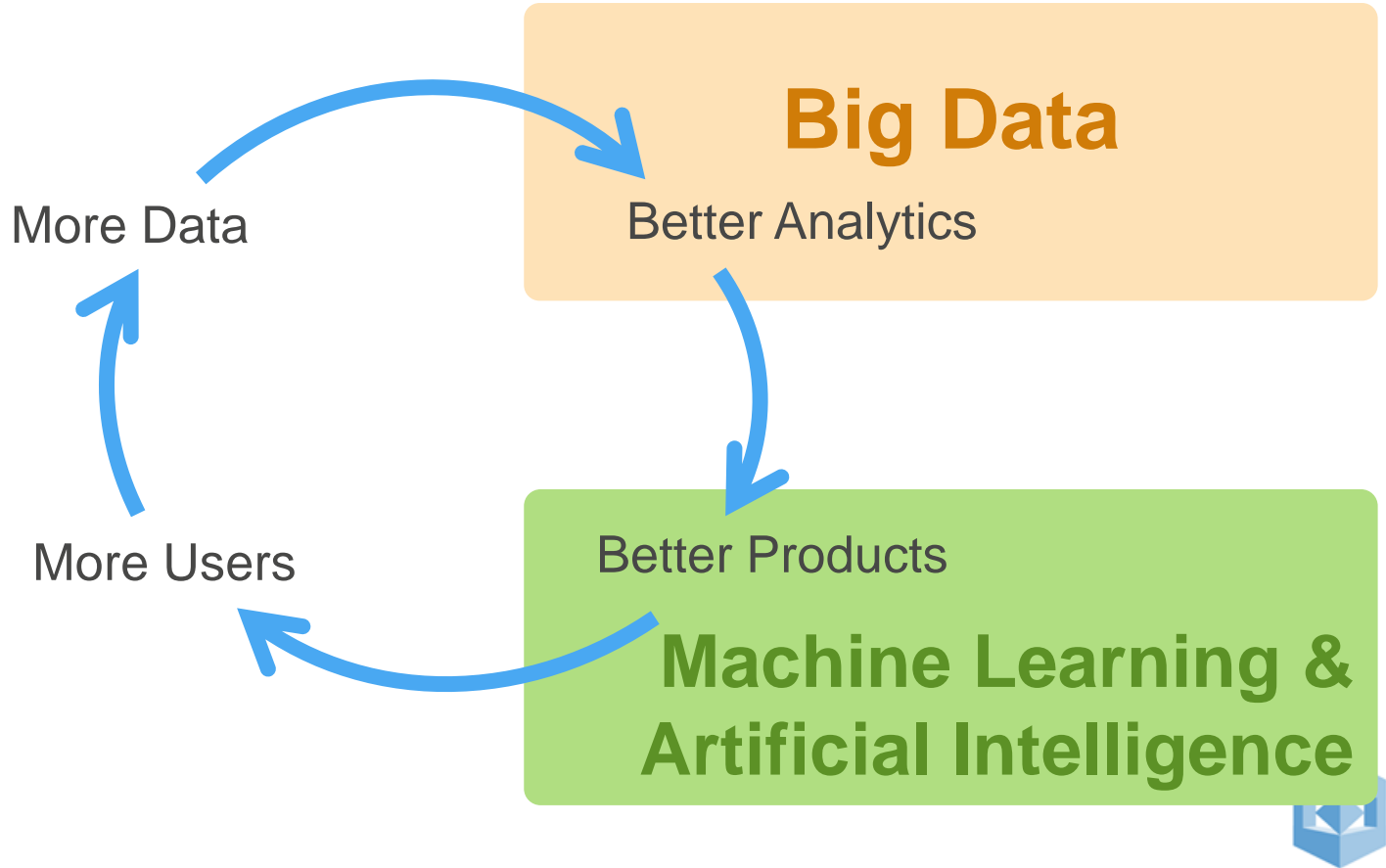
Artificial Intelligence At Amazon (1995)

Beautiful things, updated daily

ALL WOMEN MEN YOUR SAVES



A Flywheel For Data





Amazon AI

Intelligent Services Powered By Deep Learning

Amazon
Rekognition

Amazon
Polly

Amazon
Lex

AI Services

Amazon
Machine Learning

Amazon
EMR

Spark &
Spark ML

AI Platforms

Apache
MXNet

TensorFlow

Caffe

Torch

Theano

CNTK

Keras

AI Engines



Amazon Rekognition

Deep learning-based image recognition service
Search, verify, and organize millions of images



Object and Scene
Detection



Facial
Analysis



Face
Comparison



Facial
Recognition

Integrated with S3, Lambda, Polly, Lex

Thousands of Objects and Scenes

DetectLabels

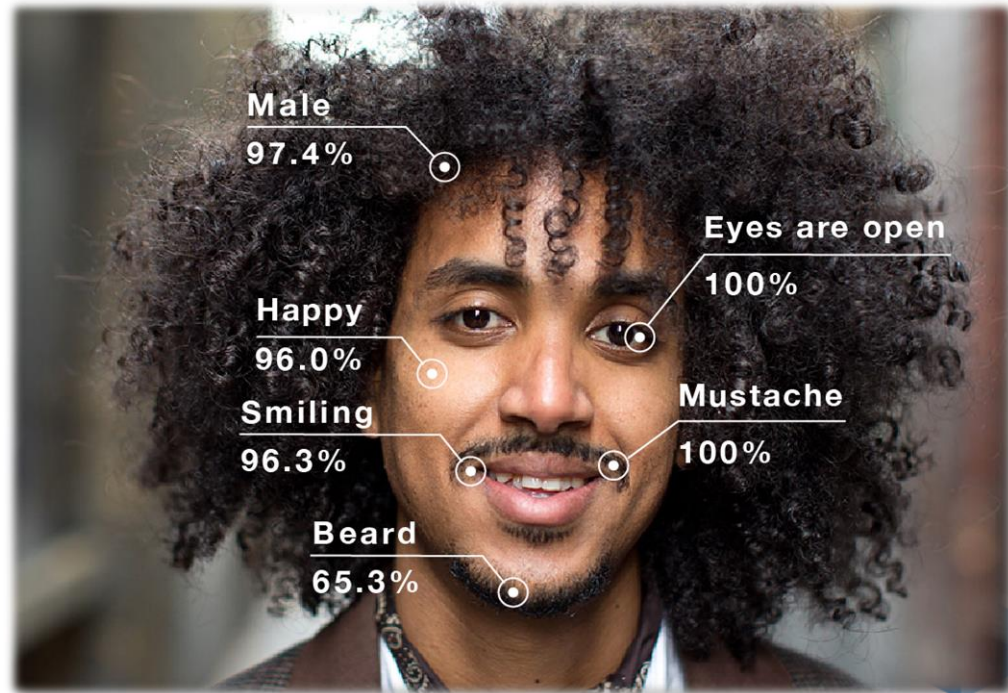


```
"Labels": [  
  {  
    "Confidence": 91.4747314453125,  
    "Name": "City"  
  },  
  {  
    "Confidence": 91.4747314453125,  
    "Name": "Downtown"  
  },  
  {  
    "Confidence": 91.4747314453125,  
    "Name": "Metropolis"  
  },  
  {  
    "Confidence": 91.4747314453125,  
    "Name": "Urban"  
  },  
  {  
    "Confidence": 56.20011520385742,  
    "Name": "Building"  
  },  
  {  
    "Confidence": 56.20011520385742,  
    "Name": "High Rise"  
  },  
  {  
    "Confidence": 55.654693603515625,  
    "Name": "Dock"  
  },  
  {  
    "Confidence": 55.654693603515625,  
    "Name": "Pier"  
  },  
  {  
    "Confidence": 52.41661071777344,  
    "Name": "Dawn"  
  },  
  {  
    "Confidence": 52.41661071777344,  
    "Name": "Dusk"  
  },  
]
```

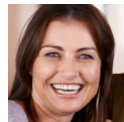

Facial Analysis

Locate faces within images and analyze face attributes to detect emotion, pose, facial landmarks, and features

- Avoid faces when cropping images and overlaying ads
- Capture user demographics and sentiment
- Recommend the best photos
- Improve online dating match recommendations
- Dynamic, personalized ads

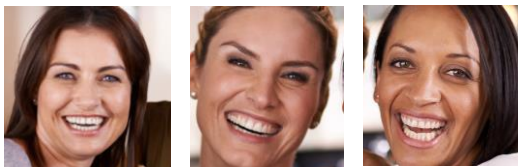


Amazon Rekognition API



```
[  
  {  
    "BoundingBox": {  
      "Height": 0.3449999988079071,  
      "Left": 0.09666666388511658,  
      "Top": 0.27166667580604553,  
      "Width": 0.23000000417232513  
    },  
    "Confidence": 100,  
    "Emotions": [  
      {"Confidence": 99.1335220336914,  
       "Type": "HAPPY" },  
      {"Confidence": 3.3275485038757324,  
       "Type": "CALM"},  
      {"Confidence": 0.31517744064331055,  
       "Type": "SAD"}  
    ],  
    "Eyeglasses": {"Confidence": 99.8050537109375,  
                   "Value": false},  
    "EyesOpen": {"Confidence": 99.99979400634766,  
                 "Value": true},  
    "Gender": {"Confidence": 100,  
              "Value": "Female"}  
  }  
]
```

DetectFaces

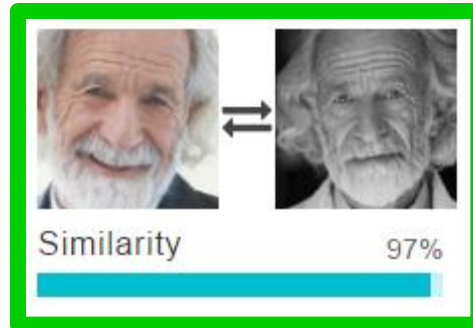


Face Comparison

CompareFaces

Measure the likelihood that faces in two images are of the same person

- Add face verification to applications and devices
- Extend physical security controls
- Verify users for online registration, exams, etc



Facial Recognition

Identify people in images by finding the closest match for an input face image against a collection of stored face vectors

- Add friend tagging to social and messaging apps
- Assist public safety officers find missing persons
- Log employee access to sensitive locations
- Recognize celebrities in historical image archives



Amazon Rekognition API

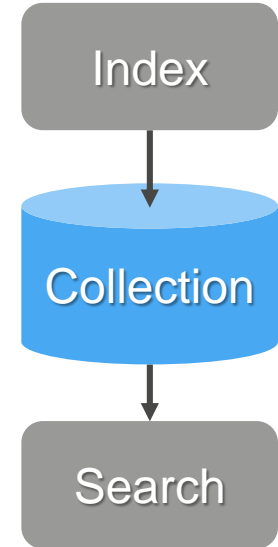
Facial Recognition

index and search faces in a collection



IndexFaces

SearchFacesByImage



Amazon Rekognition API



IndexFaces

```
{  
  f7a3a278-2a59-5102-a549-a12ab1a8cae8,  
  02e56305-1579-5b39-ba57-9afb0fd8782d,  
  4c55926e-69b3-5c80-8c9b-78ea01d30690  
}
```

Face



transformed

Face ID & vector<float>

f7a3a278-2a59-5102-a549-a12ab1a8cae8
&
vector001

02e56305-1579-5b39-ba57-9afb0fd8782d
&
vector002

4c55926e-69b3-5c80-8c9b-78ea01d30690
&
vector003

stored

Collection

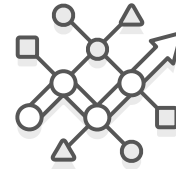


Amazon Rekognition API

Face



SearchFacesbyImage



Nearest neighbor
search

Collection

```
{...  
FaceID: 4c55926e-69b3-5c80-8c9b-78ea01d30690  
Similarity: 97  
...}
```



Use Case: Find Images of Friends

REFERENCE IMAGE



SEARCH FACES BY IMAGE



FACE COLLECTION



1. Recognition searches the face collection for matches to the reference image and returns an array of face metadata for potential face matches, ordered by similarity

PERSONAL DETAILS TABLE

#0123	#0123
5426	128762
78426	45871
286546	26751
3861	945



END USER

4. End user sees similar photos



PHOTO APP

3. The photo app displays search results to the end user



S3

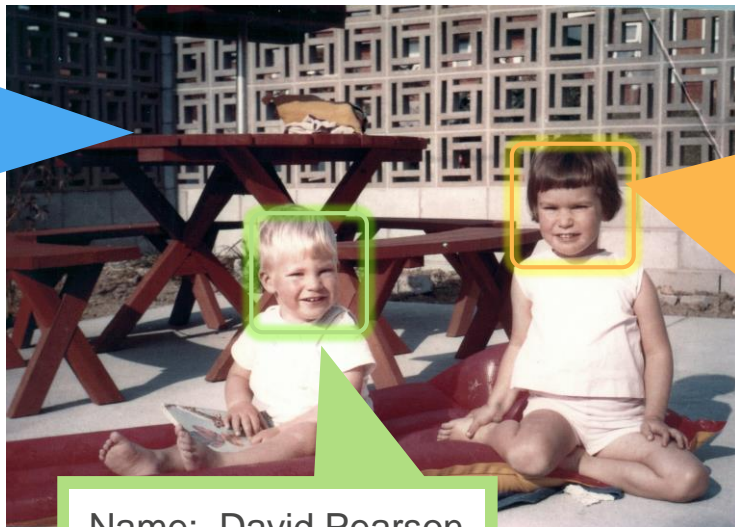
2. If source images are required, they are retrieved from S3



Media Files

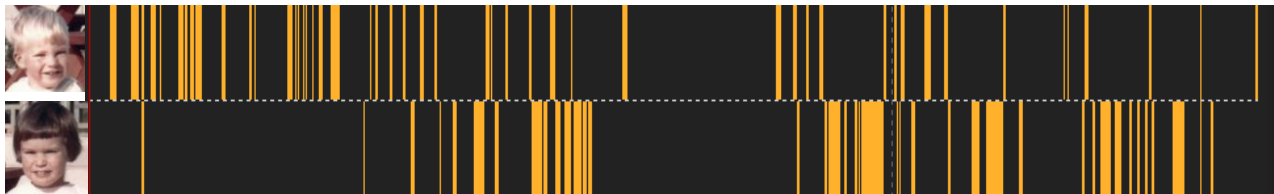
HD Media Index

People	99.1%
Person	99.1%
Human	99%
Brick	83.6%
Playground	76.8%
Leisure Activities	56.2%



Name: David Pearson

appears to be female	100%
age range	4 - 9 years old
smiling	87.2%
appears to be happy	66.3%
not wearing eyeglasses	97.3%
not wearing sunglasses	99.9%
eyes are closed	93%
mouth is closed	98.8%
does not have a mustache	99.9%
does not have a beard	99.9%



G-SPAN

Identify who is on camera at what time for each of 8 networks so that recorded video streams can be indexed and searched

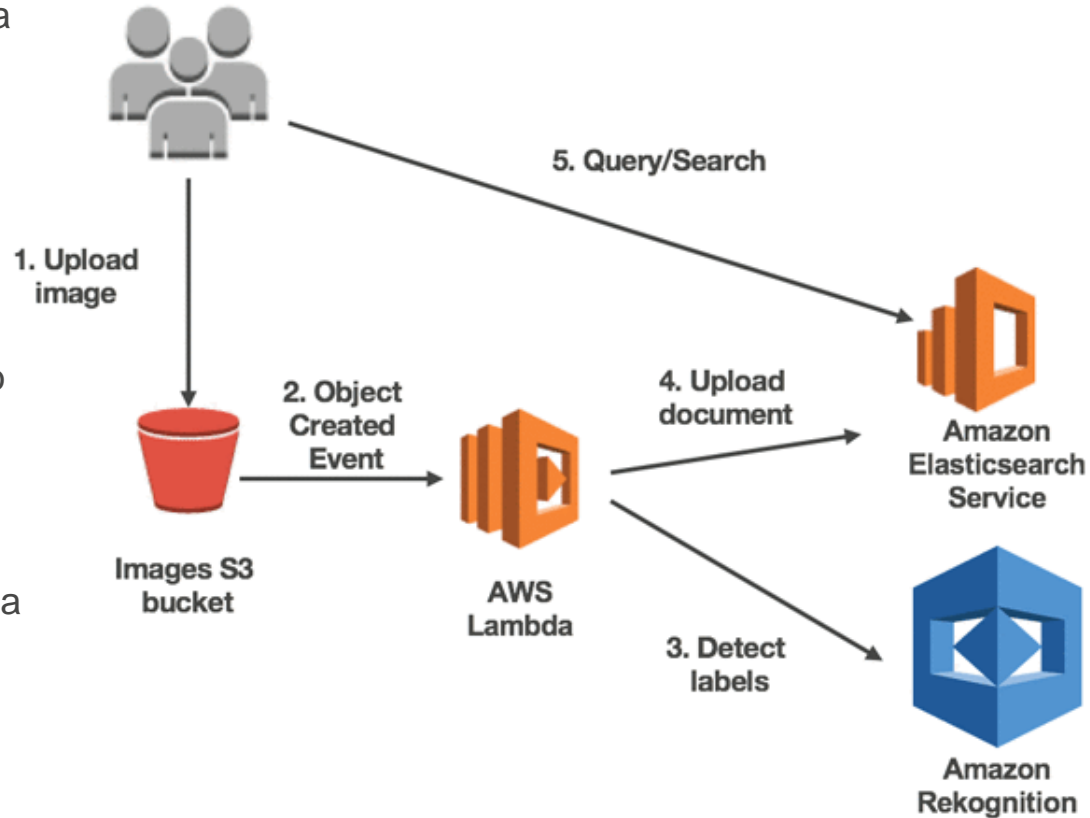
Video frame-sampling facial recognition solution using Amazon Rekognition:

- Indexed 97,000 people into a face collection in 1 day
- Sample frames every 6 secs and test for image variance
- Upload images to S3 and call Rekognition to find best facial match
- Store time stamp and faceID metadata

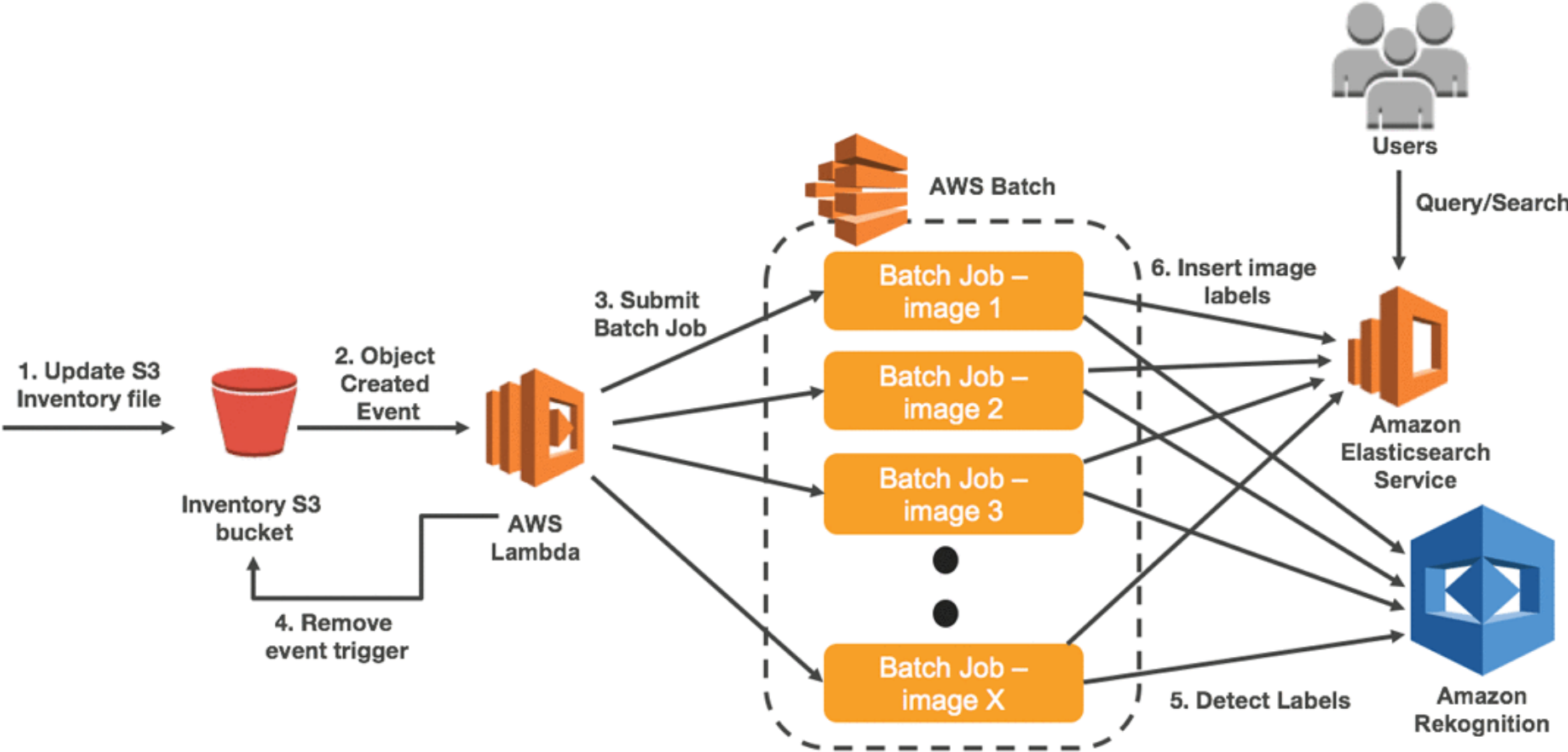


Real Time Media Processing

1. The user uploads an image to the media bucket,
2. The images bucket is configured to invoke a Lambda function when a new media file is uploaded or deleted
3. The Lambda function calls Rekognition to detect the labels for the image.
4. Lambda saves the Rekognition labels to an Amazon ES domain index. If the image already exists, the function updates the labels in the Amazon ES domain index. If the image was deleted from the images bucket then the Lambda function removes all entries for that image in the Amazon ES domain index.
5. Users can look up the labels for an image in the Elasticsearch index.



Batch Processing a Media Archive



Developer Resources and more...

<https://aws.amazon.com/blogs/ai/>

<https://aws.amazon.com/rekognition>

Amazon Rekognition

Deep learning-based image recognition

Search, verify, and organize millions of images

TRY AMAZON REKOGNITION

Product Details

Pricing

Getting Started

FAQs

Developers

Customers





Thank you!

David Pearson

pearsond@amazon.com