



DEV  
DAY

# Machine Learning on AWS

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# A Long History of ML at Amazon



Personalized  
recommendations



Fulfillment  
automation and  
inventory  
management



Drones



Voice driven  
interactions



Inventing entirely  
new customer  
experiences

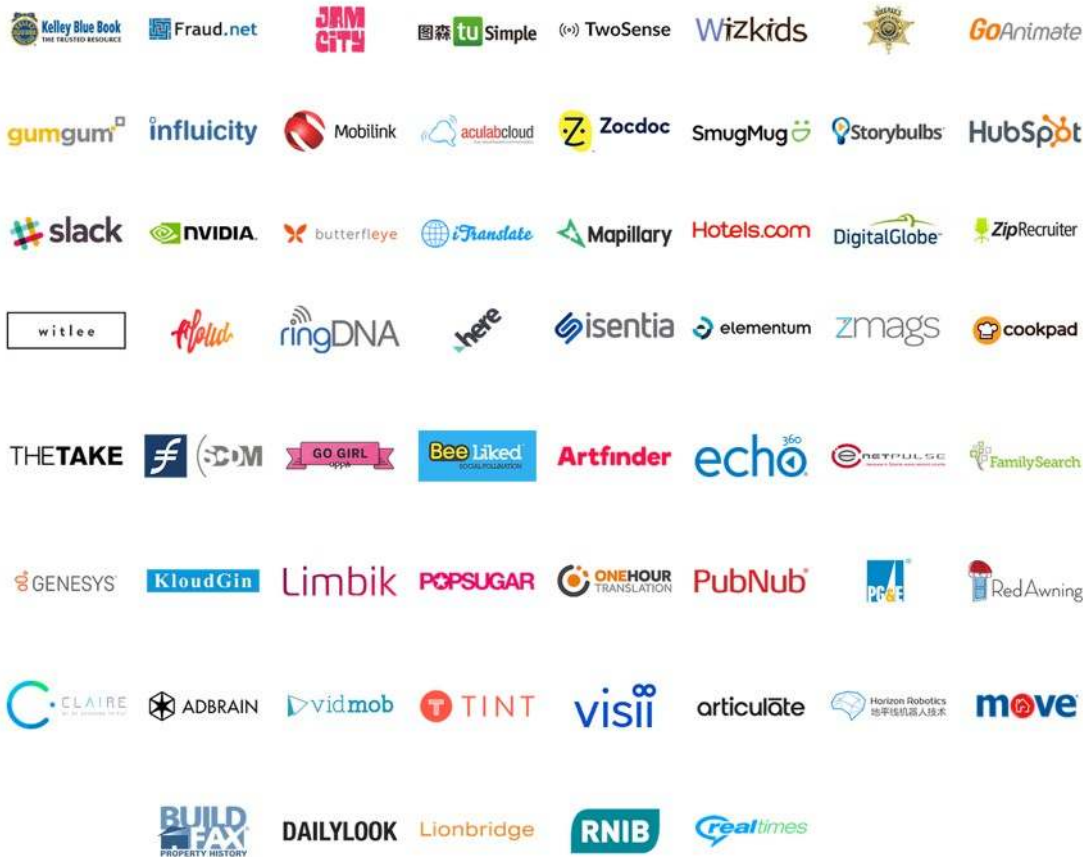
# Our mission

Put Machine Learning in the hands  
of every developer and data scientist

# More ML is built on AWS than anywhere else



# More ML is built on AWS than anywhere else



# AWS ML Stack

## **Application Services**

API-driven services: Vision, Language & Speech Services, Chatbots

## **Platform Services**

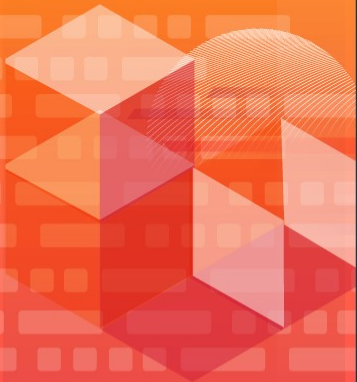
Deploy machine learning models with high-performance machine learning algorithms, broad framework support, and one-click training, tuning, and inference.

## **Frameworks & Infrastructure**

Develop sophisticated models with any framework, create managed, auto-scaling clusters of GPUs for large scale training, or run prediction on trained models.



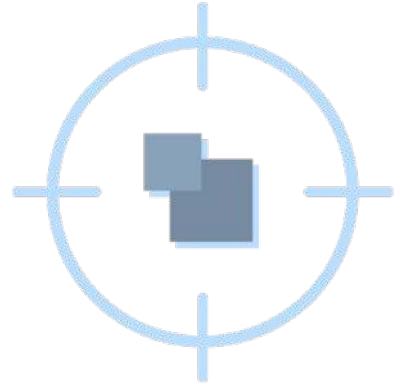
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# Application Services

# Amazon Rekognition

Deep Learning-based image analysis service





# Object & Scene Detection




Culinary	99,8 %
Food	99,8 %
Human	99,5 %
Person	99,5 %
Indoors	65,9 %
Room	56,6 %
Chef	56,1 %

# Facial Analysis





looks like a face	99.8%
appears to be female	100%
age range	23 - 38 years old
smiling	99.4%
appears to be happy	93.2%
wearing eyeglasses	99.9%
wearing sunglasses	97.6%

# Crowd Detection – up to 100 faces




Choose a sample image



Use your own image

Image must be .jpeg or .png format and no larger than 5MB. Your image isn't stored.



 **Upload**

or drag and drop

**Go**

Done with the demo?  
[Learn more](#)

▼ Results



looks like a face	99.9 %
appears to be male	99.9 %
age range	26 - 43 years old
smiling	98.5 %
appears to be happy	99.7 %
not wearing glasses	99.9 %

[Show more](#)

# Facial Search



=



Similarity

97%



≠



≠



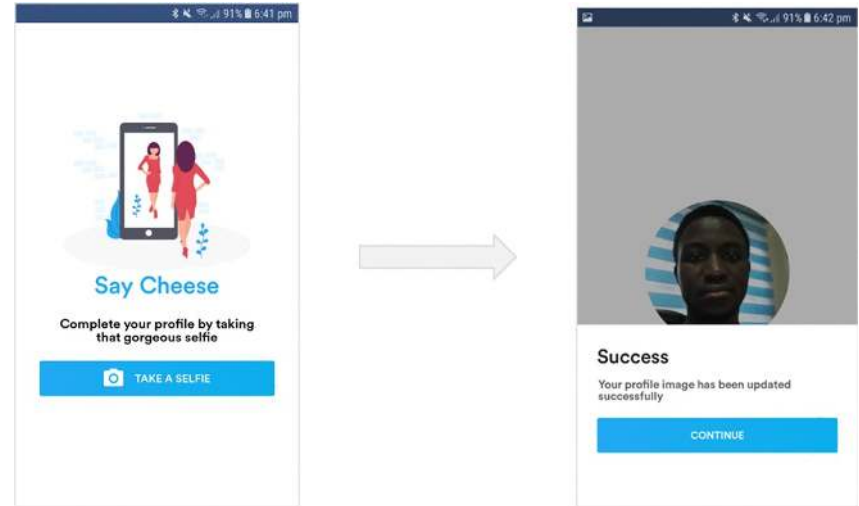
# Aella Credit



Aella Credit is a financial services company based in West Africa that provides **instant loans to individuals** by using biometric and employer data.

In emerging markets, identity verification and validation is a major challenge for people who don't have easy access to retail banking services.

Aella Credit uses **Amazon Rekognition**, for biometric identity verification on their mobile application.



<https://aws.amazon.com/blogs/machine-learning/aella-credit-empowers-underbanked-individuals-by-using-amazon-rekognition-for-identity-verification/>

# Marinus Analytics

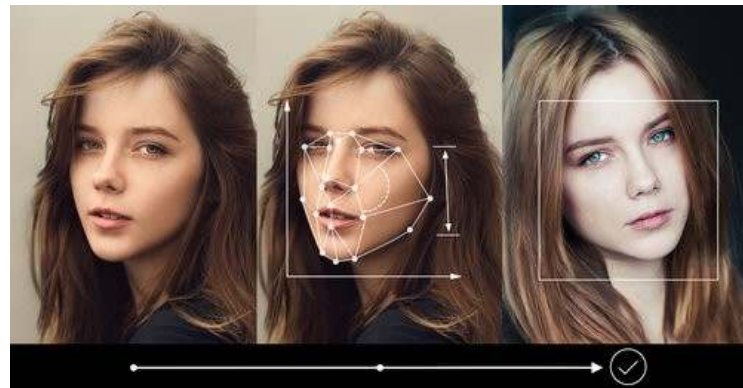


Marinus Analytics provides law enforcement with tools founded in artificial intelligence.

Traffic Jam, is a suite of tools for use by law enforcement agencies on sex trafficking investigations.

Before using **Amazon Rekognition**, their only recourse was manual processing; this was time-intensive or not possible.

Now, investigators are able to take effective action by searching through **millions of records in seconds** to find victims.



<http://www.marinusanalytics.com/articles/2017/10/17/amazon-rekognition-helps-marinus-analytics-fight-human-trafficking>



# Image Moderation



## ▼ Results

<b>Suggestive</b>	<b>83.5%</b>
Female Swimwear Or Underwear	83.5%

Explicit Nudity

Nudity

Graphic Male Nudity

Graphic Female Nudity

Sexual Activity

Partial Nudity

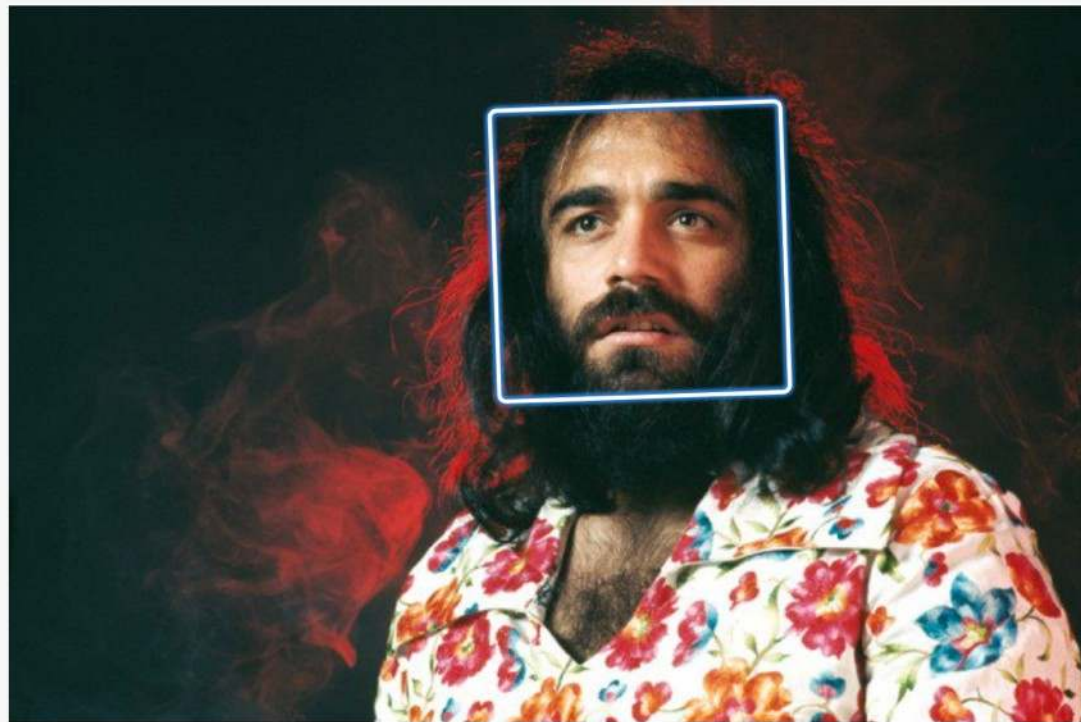
Suggestive

Female Swimwear or Underwear

Male Swimwear or Underwear

Revealing Clothes

# Celebrity Recognition



Done with the demo?

[Learn more](#)

## ▼ Results



**Demis Roussos**

[Learn More](#)

Match confidence

99 %

► Request

► Response



# Text in Image



## ▼ Results

US English only

| 5T6E652 |

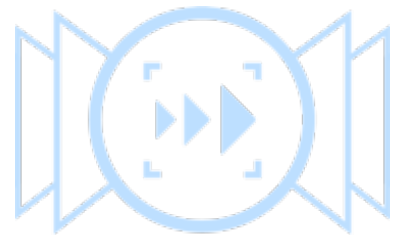
## ► Request

## ▼ Response

```
{
  "TextDetections": [
    {
      "Confidence": 96.38984680175781,
      "DetectedText": "5T6E652",
      "Geometry": {
        "BoundingBox": {
          "Height": 0.05606506019830704,
          "Left": 0.38905566930770874,
          "Top": 0.7383729219436646,
          "Width": 0.10844030976295471
        },
        "Polygon": [
          {
            "X": 0.38905566930770874,
            "Y": 0.7383729219436646
          },
          {
            "X": 0.49749597907066345,
            "Y": 0.7726403474807739
          },
          {
            "X": 0.4896218776702881,
            "Y": 0.8287054300308228
          },
          {
            "X": 0.38905566930770874,
            "Y": 0.7383729219436646
          }
        ]
      }
    }
  ]
}
```

# Amazon Rekognition Video

Deep Learning-based video analysis service



# Video Analysis



## THE ROYAL WEDDING



## ARRIVALS

**Elton John**  
Singer**David Furnish**  
Elton John's husband**David Beckham**  
Former footballer**Victoria Beckham**  
Businesswoman**Princess Beatrice**  
Royal Family**Princess Eugenie**  
Royal Family**Prince Seeiso Bereng**  
Royal Family of Lesotho**Princess Mabereng Seeiso**  
Royal Family of Lesotho

## PROFILES

**David Beckham** Former footballer

David Robert Joseph Beckham, OBE is an English former professional footballer. He played for Manchester United, Preston North End, Real Madrid, Milan, LA Galaxy.

Now playing...

Sky News used **Amazon Rekognition** to perform **real-time identification of guests** as they enter St. George's Chapel

# Amazon Polly

Deep Learning-based text-to-speech service



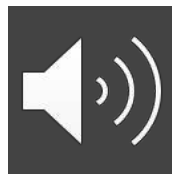
# Amazon Polly: Text In, Life-like Speech Out

“Salut, je  
m’appelle Léa. Je  
suis la nouvelle  
voix française de  
Polly.”



Amazon Polly

57 voices across 28  
languages.



# A Focus On Voice Quality & Pronunciation

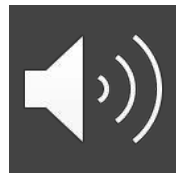
Support for Speech Synthesis Markup Language (SSML) Version 1.0

<https://www.w3.org/TR/speech-synthesis>

<speaking xml:lang="en-US">

The price of this book is <prosody rate="60%">45€</prosody>

</speaking>



# Breathing



<https://aws.amazon.com/blogs/machine-learning/amazon-polly-releases-new-ssml-breath-feature/>

<amazon:auto-breaths>



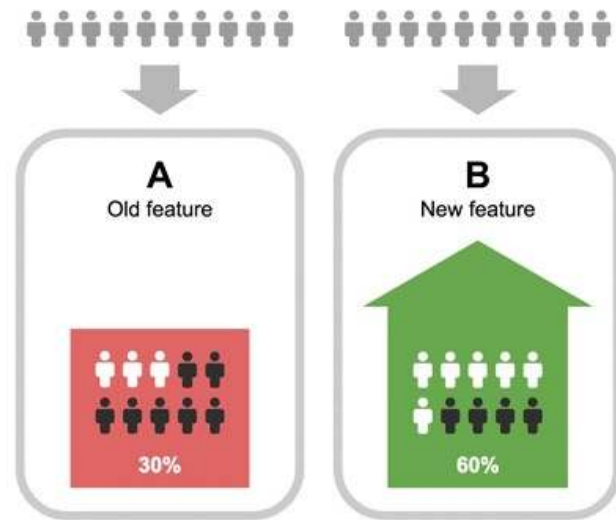
# Duolingo



Duolingo is the most popular language-learning platform and the most downloaded education app in the world, with more than **170 million users**.

They have run six A/B tests, testing an **Amazon Polly** voice against a voice from other TTS providers.

For all of these experiments, the winning condition was the Amazon Polly voice



<https://aws.amazon.com/blogs/machine-learning/powering-language-learning-on-duolingo-with-amazon-polly/>

# Amazon Translate

Neural Machine Translation Service



FREE TIER

# Amazon Translate

Natural and fluent language translation



Real-time  
translation



Batch analysis



Automatic language  
recognition



Low cost

# Languages

Arabic	Chinese (Simplified)	Chinese (Traditional)	Czech	Danish
Dutch	English	Finnish	French	German
Hebrew	Indonesian	Italian	Japanese	Korean
Polish	Portuguese	Russian	Spanish	Swedish
Turkish				

21 languages, 417 language pairs

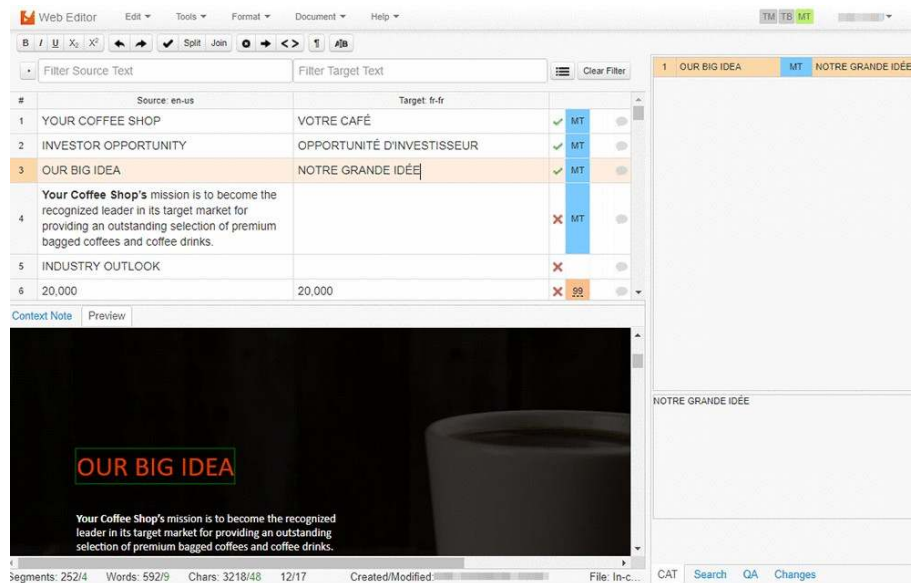
# Memsource



Memsource was founded in 2010 and has become a leader in **cloud-based translation technology**.

Memsource and **Amazon Translate** are connected via the Amazon Translate API.

Results are available in **real-time** from within the Memsource translation workbenches, Memsource Web Editor, and Desktop Editor.



<https://aws.amazon.com/blogs/machine-learning/amazon-translate-now-available-in-the-memsource-translation-management-system/>

# Amazon Transcribe

Automatic speech recognition service



# Amazon Transcribe

Automatic conversion of speech into accurate, grammatically correct text



8 languages



Intelligent punctuation  
and formatting



Timestamp  
generation



Support for  
telephony audio



Recognize multiple  
speakers



Custom  
vocabulary

US English  
US Spanish  
Australian English  
British English  
French  
Canadian French  
Italian  
Brazilian  
Portuguese

# ringDNA

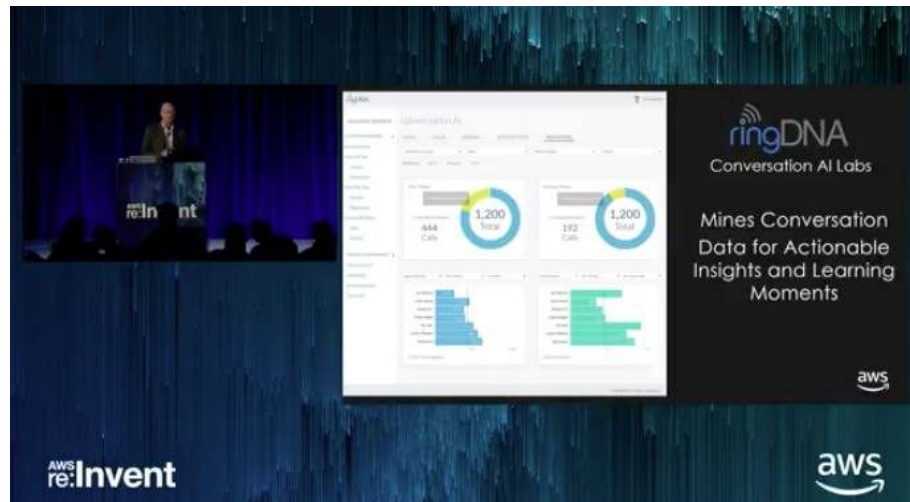


RingDNA is an end-to-end communications platform for sales teams. Hundreds of enterprise organizations use RingDNA to increase productivity, engage in smarter sales conversations, gain predictive insights and improve their win rate.

## Speech to Text

"A critical component of RingDNA's Conversation AI requires best of breed speech-to-text to deliver transcriptions of every phone call. RingDNA is excited about **Amazon Transcribe** since it provides high-quality speech recognition at scale, helping us to better transcribe every call to text"

Howard Brown, CEO & Founder, RingDNA

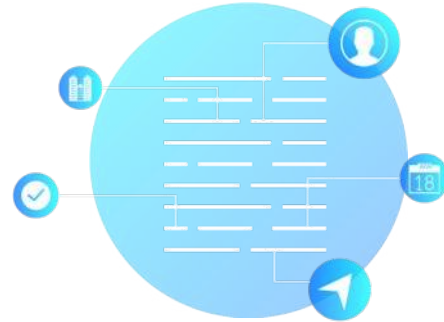


[https://www.youtube.com/watch?v=1ZJ\\_f1bDdog](https://www.youtube.com/watch?v=1ZJ_f1bDdog)



# Amazon Comprehend

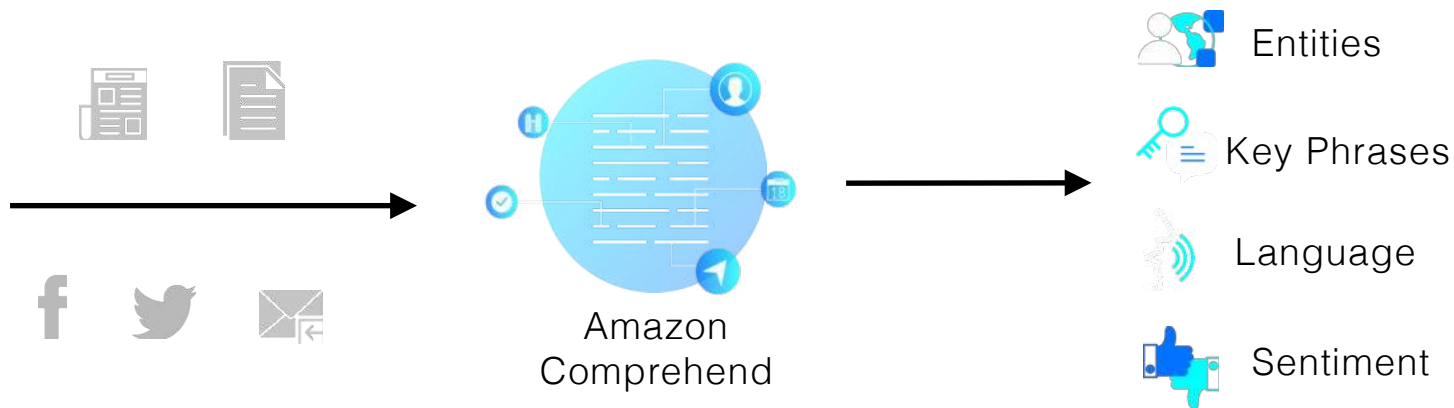
## Natural Language Processing



FREE TIER

# Fully managed natural language processing

Discover valuable insights from text



# ClearView Social



**CLEAR  
VIEW  
SOCIAL**

ClearView Social enables a company's employees to share approved content on LinkedIn, Twitter, and other social networks.

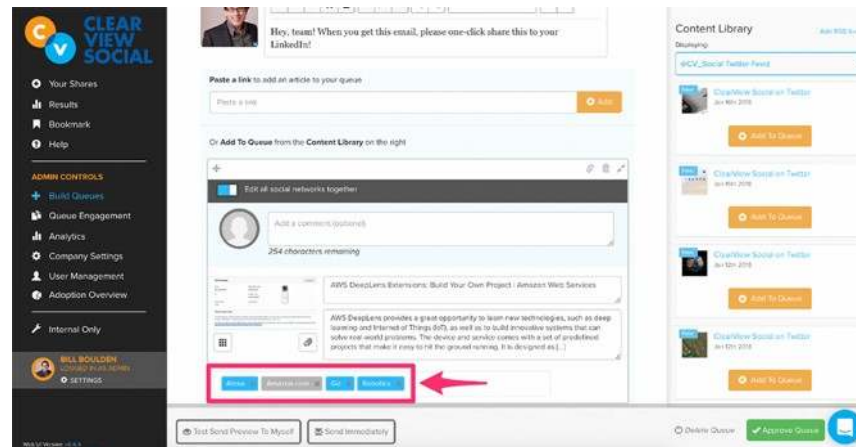
To eliminate the reliance on manual tagging, ClearView Social turned to **Amazon Comprehend** to find **insights** and **relationships** in text.

## Natural Language Processing

"We use **Amazon Comprehend** to read an article and extract topics, which are automatically tagged using machine learning. This automatic tagging helps customers easily estimate the market value of their engagement according to the current bid prices from the Google AdWords

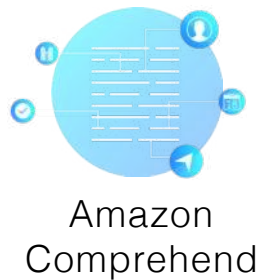
API"

Bill Boulden, CTO, ClearView Social



<https://aws.amazon.com/blogs/machine-learning/clearview-social-uses-amazon-comprehend-to-measure-the-impact-of-social-sharing/>

# Topic modeling



STORM



WORLD  
SERIES



STOCK  
MARKET



WASHINGTON



AUSTRALIA HEALTH



CRISIS



MACHINE  
LEARNING



# Amazon Textract (preview)

OCR++ service to easily extract text and data from virtually any document

Polychronidou et al. BMC Bioinformatics 2018, 19(Suppl 14):114

Page 76 of 176

**Table 5** Comparison of clustering accuracy between TM-score and the various 3D descriptors (optimal number of clusters) for the 137 protein structures

Method	Num. clusters	Rand index
TM-score	8	89.7%
FPFH	9	89.3%
3DSC	9	89.5%
RSD	7	92.0%
VFH	8	85.3%
Combined silhouette weights	7	<b>92.2%</b>
Combined equal weights	7	90.2%

The highest accuracy is highlighted

method. Then, the proteins were clustered using the *k*-medoids method with the optimal number of clusters.

The performance of the various clusterings was evaluated using two types of measures. The first is the average silhouette width itself, which is a measure of the cluster compactness and separation. In general, clustering is based on the assumption that the underlying data form compact clusters of similar characteristics. Larger average silhouette width means that the result of a clustering algorithm consists of compact clusters which are well separated from each other, i.e. probably close to the actual data distribution. A small average silhouette width means, e.g. that one of the clusters discovered by the clustering algorithm could be separated in two clusters, or that some of the discovered clusters could be merged together. The

OCR++

Amazon Textract

Method

Method	Num. clusters	Rand index
TM-score	8	89.7%
FPFH	9	89.3%
3DSC	9	89.5%
RSD	7	92.0%
VFH	8	85.3%
Combined silhouette weights	7	92.2%
Combined equal weights	7	90.2%

Aurora

GENERAL CLAIM SUBMISSION FORM

**SECTION 1 - PLAN MEMBER INFORMATION**

DATE OF BIRTH	12-12-1234	EMAIL ADDRESS	Elvis.Presley@yahoo.com
FIRST NAME	Elvis	PHONE NUMBER	901-555-0187
SURNAME	Presley	COMMON NAME	TCB Limited
ADDRESS	3755 Elvis Presley Blvd.		
CITY	Graceland, Memphis	PROVINCE	TN
POSTAL CODE	38116		

**SECTION 2 - MANDATORY DECLARATION**

Is your insurance a group policy? (Please indicate "Yes" or "No") YES ☐ NO ☐

If "Yes", please provide insurance company's name: \_\_\_\_\_

Do you want this claim coordinated? YES ☐ NO ☐

Is treatment due to a motor vehicle accident? YES ☐ NO ☐

Is treatment required due to a work related injury? YES ☐ NO ☐

If "Yes", please provide date of injury (YYMMDD): \_\_\_\_\_

If "Yes", please provide date of injury (YYMMDD): \_\_\_\_\_

If "Yes", please provide date of injury (YYMMDD): \_\_\_\_\_

**SECTION 3 - CLAIM DETAILS**

PATIENT'S NAME	DATE OF BIRTH	PROFESSIONAL SUPPLIER'S NAME	DATE OF CLAIM	TYPE OF EXPENSE	TOTAL AMOUNT CHARGED FOR VISIT - OVER
DOB	NO.	YES	NO	DAY	

OCR++

NAME Presley, Elvis Aaron

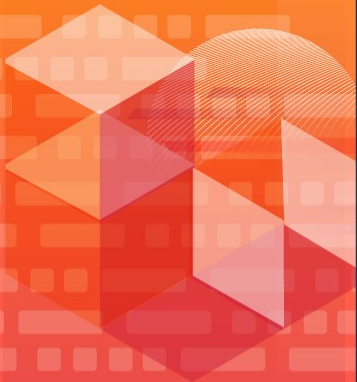
ADDRESS Graceland, Memphis, TN

ID 12-12-1234

COMPANY TCB Limited



**DEV  
DAY**



Platform Services

# Amazon SageMaker

Easily build, train, and deploy Machine Learning models



Collect and prepare  
training data



Choose and  
optimize your ML  
algorithm



Set up and manage  
environments for  
training



Train and tune model  
(trial and error)



Deploy model  
in production



Scale and manage  
the production  
environment

# Amazon SageMaker



Pre-built  
notebooks for  
common  
problems



Built-in, high-  
performance  
algorithms

## ALGORITHMS

K-Means Clustering  
Principal Component Analysis  
Neural Topic Modelling  
Factorization Machines  
Linear Learner

XGBoost  
Latent Dirichlet Allocation  
Image Classification  
Seq2Seq,  
And more!

## FRAMEWORKS

Apache MXNet,  
Chainer  
TensorFlow, PyTorch

Caffe2, CNTK,  
Torch



Set up and manage  
environments for  
training



Train and tune  
model (trial and  
error)



Deploy model  
in production



Scale and manage the  
production environment

## Build



# Amazon SageMaker



Pre-built  
notebooks for  
common  
problems



Built-in, high-  
performance  
algorithms

Build



One-click  
training



Hyperparameter  
optimization

Train



Deploy model  
in production



Scale and manage  
the production  
environment

# Amazon SageMaker



Pre-built  
notebooks for  
common  
problems



Built-in, high-  
performance  
algorithms



One-click  
training



Hyperparameter  
optimization



One-click  
deployment



Fully managed  
hosting with auto-  
scaling

Build

Train

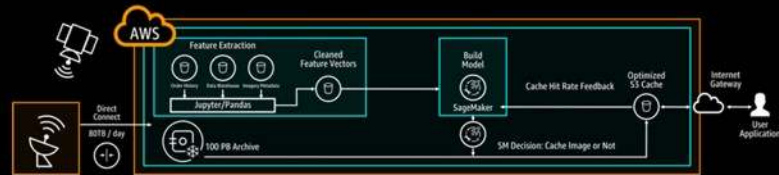
Deploy

FREE TIER

- Operating **Earth imaging satellites** and providing **image analysis** services.
- Over **100 PB of imagery**.
- Extensive use of Machine Learning on **SageMaker** to extract information from images.
- Working with the AWS ML Lab, built a predictive model reducing cloud storage costs by **50%**.



## USING AMAZON SAGEMAKER TO CUT CLOUD STORAGE COSTS IN HALF





# DEV DAY

## Thank you!

<https://ml.aws>

<https://aws.amazon.com/blogs/machine-learning>

<https://medium.com/@julsimon>

<https://youtube.com/juliensimonfr>

**Julien Simon**

Principal Technical Evangelist, AI and Machine Learning

@julsimon