

MLE301

# Automate your document pipeline with intelligent document processing

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# Introduction



**Prem Ranga**  
Sr. Solutions Architect, AWS

- Specialized in machine learning (ML) and artificial intelligence (AI)
- Passionate about the intersection of robotics and ML
- Autonomous vehicles researcher
- Built Alexa-controlled beer pours in Houston and other AWS offices
- Love writing – published 11 AWS ML blogs and a research paper, and am co-authoring a book on natural language processing (NLP)

# Agenda

Common challenges with document management

Why cloud-based ML is important

How AWS ML services can help

Introduction to intelligent document processing

Solution demo

Get started

# Document management challenges

## Tons of documents



## Varied formats

Invoices, receipts, contracts, and many more



## Diverse content

Tables, paragraphs, logos, handwriting, and different languages



## Documents solve different problems

Text may be required for many reasons

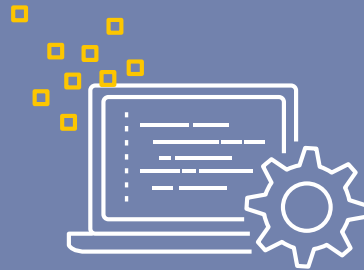
- ✓ Uncovering insights
- ✓ Data lakes
- ✓ Operational data needs
- ✓ Chatbots
- ✓ Knowledge management

# Why cloud-based ML is important

Manual



Rule-based optical  
character recognition



Infrastructure challenges





**You shall know a word by the  
company it keeps.**

**John Rupert Firth**

English linguist, 1890–1960

Source: <https://quotepark.com/quotes/1871433-john-rupert-firth-you-shall-know-a-word-by-the-company-it-keeps/>



# How AWS ML can help

Process millions of documents in minutes with pay-as-you-go pricing and no ML skills required

## Amazon Textract



Sample document

### Employment Application

**Application Information**  
Full Name: Jane Doe  
Phone Number: 555-0100  
Home Address: 123 Any Street, Any Town, USA  
Mailing Address: same as above

**Previous Employment History**

Start Date	End Date	Employer Name	Position Held	Reason for leaving
1/15/2009	8/30/2011	Any Company	Assistant baker	relocated
7/1/2011	8/10/2013	Example Corp.	Baker	better opp.
8/15/2013	Present	AnyCompany	head baker	N/A, current

Your document must be in JPEG, PNG or PDF format.  
It must be smaller than 5 MB, and have fewer than 10 pages.  
The limits for uploading a document in the console are different than the API.  
For more information, see the Amazon Textract limits. [help](#)

Reset document

## Amazon Comprehend



Insights

Entities | Key phrases | Language | PII | Sentiment | Syntax

**Analyzed text**

Hello Zhang Wei. Your AnyCompany Financial Services, LLC credit card account 1111-0000-1111-0000 has a minimum payment of \$24.55 that is due by July 31st. Based on your autopay settings, we will withdraw your payment on the due date from your bank account XXXXXX1111 with the routing number XXXXXX0000.

Your latest statement was mailed to 100 Main Street, Anytown, WA 98121.  
After your payment is received, you will receive a confirmation text message at 206-555-0100.  
If you have questions about your bill, AnyCompany Customer Service is available by phone at 206-555-0199 or email at support@anycompany.com.

**Results**

Entity	Type	Confidence
Zhang Wei	Person	0.99+
AnyCompany Financial Services, LLC	Organization	0.99+

## Amazon A2I (to add optional human review loop)



Review the key-value pairs listed on the right and correct them if they don't match the following document.

### Employment Application

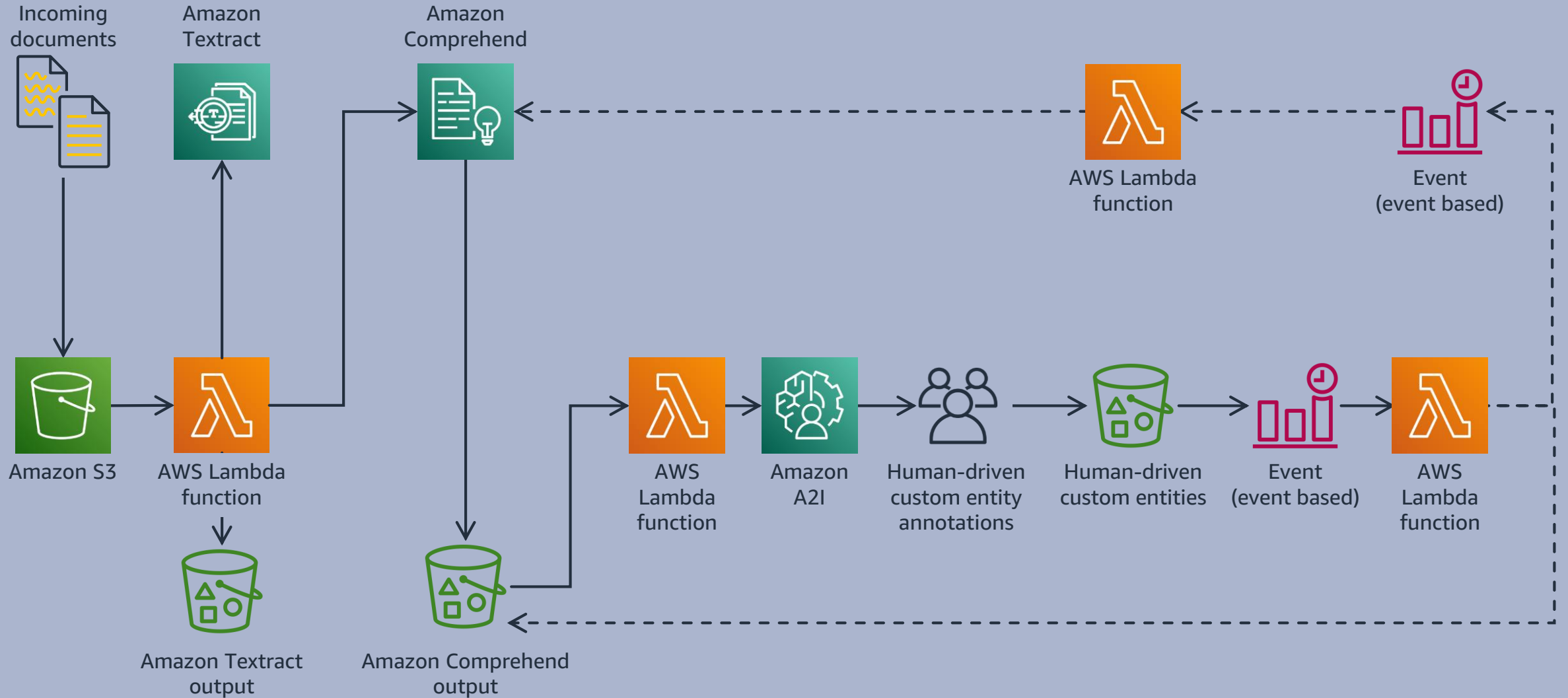
**Application Information**  
Full Name: Jane Doe  
Phone number: 550-0100  
Home address: 123 Any Street, Any Town, USA  
Mailing address: 123 Any Street, Any Town, USA  
134 Main Street, Any Town, USA

**Key-value pairs to review**

Key-value pair	Yes	No
Key-value pair: Home address: 123 Any Street, Any Town, USA	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Key-value pair: Full Name: Jane Doe	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Key-value pair: Phone number: 550-0100	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Key-value pair: Mailing address: 134 Main Street, Any Town, USA	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Sample

# Intelligent document processing on AWS



# API usage examples

## Amazon Textract Request

```
import boto3
client = boto3.client('textract')
response = client.analyze_document(
    Document={
        'Bytes': b'bytes',
        'S3Object': {
            'Bucket': 'string',
            'Name': 'string',
            'Version': 'string' }
    },
    FeatureTypes=[ 'TABLES'|'FORMS' ]
)

response = client.get_document_analysis(
    JobId='string',
    MaxResults=123,
    NextToken='string' )
```

## Amazon Textract Response

```
{'DocumentMetadata':
  { 'Pages': 123 },
  'Blocks': [ { 'BlockType':
    'KEY_VALUE_SET'|'PAGE'|'LINE'|'WORD'|'TABLE'|'CELL'|'SELECTION_ELEMENT',
    'Confidence': ...,
    'Text': 'string',
    'TextType': 'HANDWRITING'|'PRINTED',
    'RowIndex': 123,....

'DocumentMetadata':
  { 'Pages': 123 },
  'JobStatus':
    'IN_PROGRESS'|'SUCCEEDED'|'FAILED'|'PARTIAL_SUCCESS', 'NextToken': 'string',
  'Blocks': [ { 'BlockType':
    'KEY_VALUE_SET'|'PAGE'|'LINE'|'WORD'|'TABLE'|'CELL'|'SELECTION_ELEMENT',
    'Confidence': ...,
    'Text': 'string', 'TextType':
    'HANDWRITING'|'PRINTED', 'RowIndex':
    123,....
```

## Amazon Comprehend Request

```
import boto3
client = boto3.client('comprehend')
response = client.detect_entities(
    Text='string',
    LanguageCode='en'|'es'|'fr'|'de'|'it'|'pt',
    EndpointArn='string' )

response = client.detect_sentiment(
    Text='string',
    LanguageCode='en'|'es'|'fr'|'de'|'it'|'pt' )
```

## Amazon Comprehend Response

```
{
  "Entities": [
    {
      "Score": 0.9993637800216675,
      "Type": "PERSON",
      "Text": "Zhang Wei",
      "BeginOffset": 6,
      "EndOffset": 15
    },....

  "Sentiment": {
    "Sentiment": "NEUTRAL",
    "SentimentScore": {
      "Positive": 0.0005869901506230235,
      "Negative": 0.016147520393133163,
      "Neutral": 0.9832557439804077,
      "Mixed": 0.00000969591928878799
    }
  }
}
```

# Solution demo

The code and instructions to run this demo are available at: <https://bit.ly/2PumWva>



# Get started



Sample code to get started today: <https://github.com/aws-samples/amazon-textract-code-samples>



Pricing information—you pay only for what you use: <https://calculator.aws/#/>



Additional blog resources: <https://aws.amazon.com/blogs/machine-learning/building-an-end-to-end-intelligent-document-processing-solution-using-aws/>



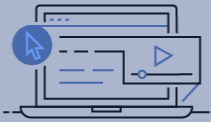
Additional training: <https://youtu.be/IWxSR07Y5u8>

# Learn ML with AWS Training and Certification

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# Thank you!

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