

# Democratization of AI with Cognitive Services

Adnan Masood, PhD.  
UST Global





# Adnan Masood

Adnan Masood, Ph.D. is an Artificial Intelligence and Machine Learning researcher, software architect, and Microsoft MVP (Most Valuable Professional) for Data Platform. As Chief Architect of AI and Machine Learning at UST Global, he collaborates with Stanford Artificial Intelligence Lab, and MIT AI Lab for building enterprise solutions.

Author of Amazon bestseller in programming languages, "**Functional Programming with F#**", Dr. Masood teaches Data Science at Park University, and has taught Windows Communication Foundation (WCF) courses at the University of California, San Diego. He is a regular speaker to various academic and technology conferences (WICT, DevIntersection, IEEE-HST, IASA, and DevConnections), local code camps, and user groups. He also volunteers as STEM (Science Technology, Engineering and Math) robotics coach for elementary and middle school students.

A strong believer in giving back to the community, Dr. Masood is a co-founder and president of the Pasadena .NET Developers group, co-organizer of Tampa Bay Data Science Group, and Irvine Programmer meetup. His recent talk at Women in Technology Conference (WICT) Denver highlighted the importance of diversity in STEM and technology areas, and was featured by variety of news outlets.



# Microsoft AI Services

With Azure AI services you can build next-gen of smart applications where your data lives, in the intelligent cloud, on-premises and on the intelligent edge. AI services include from pre-built APIs, such as Cognitive Services & Conversational AI with Bot tools, to building custom models with Azure Machine Learning for any scenario.

## Microsoft Cognitive Toolkit / Deep Learning

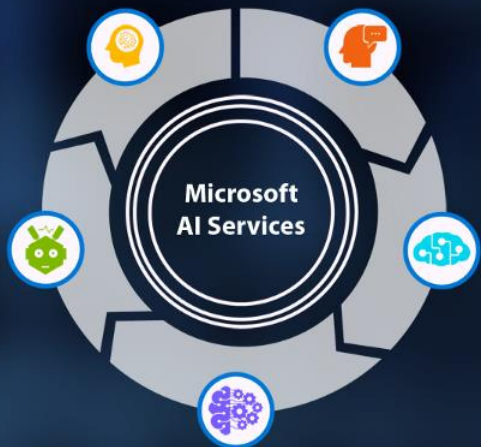
A free, open-source, commercial-grade toolkit that trains deep learning algorithms to learn like human brain.

- Empowers you to harness the intelligence within massive datasets
- Provides uncompromised scale, speed, and accuracy with commercial-grade quality
- Compatibility with languages you use like C++ and Python

## Azure Bot Framework

Build, connect, deploy, and manage intelligent bots to interact naturally with your users on websites, and other apps.

- Integrated environment that is purpose-built for bot development with the Microsoft Bot Framework
- Give your bot intelligence with Cognitive Services
- Integration across multiple channels – Website, App, Email, Skype, Slack, Cortana, Facebook Messenger and more



## Azure Machine Learning

A fully-managed cloud service that enables you to easily build, deploy and share predictive analytics solutions.

- Container based AI deployment from cloud to edge
- Python pip-installable extensions for Azure ML – Build & deploy highly accurate ML & deep learning models
- Package pre-built models like predictive maintenance, image classification & speech processing and deploy to IoT devices

## Intelligent Applications

Experience the intelligence built into Microsoft products and services you use every day – from Office to Skype to Calendar

- Intelligent Search – Makes it easier to find what you're looking for
- Microsoft Translator - translate real time via text, voice and video across experiences like Skype
- AI in Office 365 - Connect to relevant information, and surface new insights

## Cognitive Services

APIs and services that allow systems to speak, hear, see, understand and interpret human needs

- APIs for speech, vision, language, search, and knowledge
- Customised to your organisation's availability, security and compliance requirements
- Works across devices and platforms such as iOS, Android, and Windows

Ask us for an Envisioning Session on Microsoft AI Services.

Source **WinWire** via **@BrianJohnson\_01**

# Pre-Built AI



## Vision

Computer vision  
Face  
Emotion  
Content Moderator  
Video  
Video Indexer



## Speech

Text analytics  
Spell check  
Web language model  
Linguistic analysis (NLP)  
Translator



## Language

Speaker recognition  
Speech  
Speech to text  
Text to custom speech



## Knowledge

Web search  
Image search  
Video search  
News search  
Autosuggest



## Search

Academic knowledge  
Entity linking service  
Knowledge exploration  
QnA maker

The background of the entire slide is a photograph of the Golden Gate Bridge in San Francisco. The bridge's red-orange towers and suspension cables are visible against a cloudy sky. In the foreground, a paved road curves to the left, and a person in a yellow jacket stands with their back to the camera, looking through binoculars at the bridge. A metal crowd control barrier is positioned between the person and the bridge.

# UBER

“Thousands of partners sign in to our platform every hour. The response time from the Face API is incredible, enabling us to verify our drivers without slowing them down.”

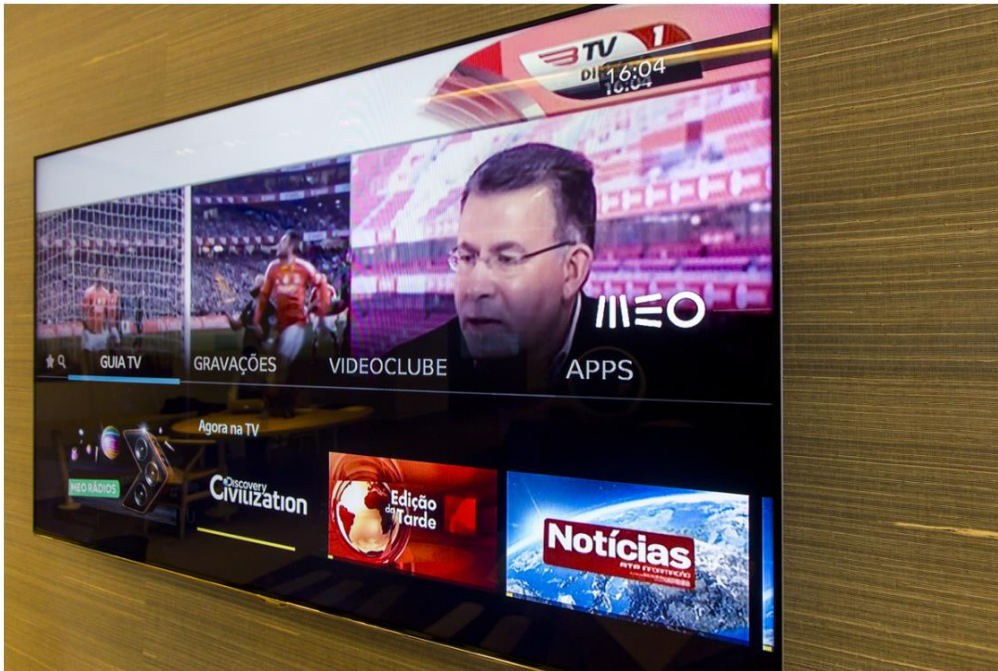
Dima Kovalev, Product Manager, Uber

Face API

[Read Case Study Here](#)



## A better TV Experience

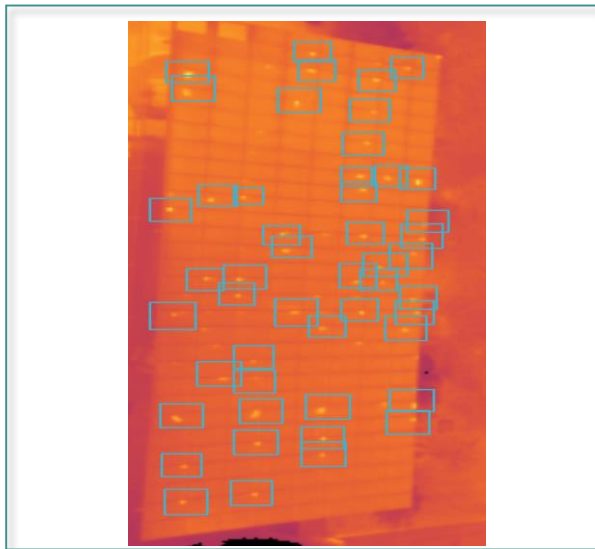


*"The results are very impressive. The Microsoft Cognitive Services Recommendations API has helped us take a big step in improving our user experience and building more loyalty to our services"*

*With Cortana Intelligence Suite capabilities and Azure Machine Learning APIs, we are looking forward to additional integrations that will give us the flexibility to use data in different ways so we can continue to build new services for our customers."*

**Joana Pina Pereira,**  
Head of TV Business Department  
MEO at Portugal Telecom

# Three real projects



# Open CV and Tensorflow



<b>Secretary of State</b> <b>Application to Register a Foreign Limited Liability Company (LLC)</b>		<b>LLC-5</b>									
<p><b>IMPORTANT</b> — Read instructions before completing this form.                  Must be submitted with a current Certificate of Good Standing issued by the government agency where the LLC was formed. See instructions.  <b>Filing Fee</b> — \$70.00  <b>Copy Fees</b> — First page \$1.00; each attachment page \$0.50;                  Certification Fee — \$5.00                  Note: Registered LLCs in California may have to pay minimum \$800 tax to the California Franchise Tax Board each year. For more information, go to <a href="https://www.ftb.ca.gov">https://www.ftb.ca.gov</a>.</p>											
		<b>This Space For Office Use Only</b>									
<b>1a. LLC Name</b> (Enter the exact name of the LLC as listed on your attached Certificate of Good Standing.) Bristol Praders, LLC											
<b>1b. California Alternate Name, if Required</b> (See Instructions — Only enter an alternate name if the LLC name in 1a is not available in California.)											
<b>2. LLC History</b> (See Instructions — Ensure that the formation date and jurisdiction match the attached Certificate of Good Standing.) <b>a. Date LLC was formed in home jurisdiction (MM/DD/YYYY)</b> Is <b>jurisdiction</b> (State, foreign country or place where this LLC is formed.) 3 / 22 / 2017 Delaware											
<b>c. Authority Statement</b> (Do not alter Authority Statement) This LLC currently has powers and privileges to conduct business in the state, foreign country or place entered in item 2b.											
<b>3. Business Addresses</b> (Enter the complete business addresses. Items 3a and 3b cannot be a P.O. Box or "in care of" an individual or entity.) <b>a. Street Address of Principal Executive Office - Do not enter a P.O. Box</b> City (no abbreviations) State Zip Code 400 Montgomery Street, Suite 400 San Francisco CA 94104 <b>b. Street Address of Principal Office in California, if any - Do not enter a P.O. Box</b> City (no abbreviations) State Zip Code CA CA 94104 <b>c. Mailing Address of Principal Executive Office, if different than item 3a</b> City (no abbreviations) State Zip Code											
<b>4. Service of Process</b> (Must provide either Individual OR Corporation) <b>INDIVIDUAL</b> — Complete items 4a and 4b only. Must include agent's full name and California street address. <table border="1"> <tr> <td><b>a. California Agent's First Name</b> (If agent is not a corporation)</td> <td><b>First Name</b></td> <td><b>Last Name</b></td> <td><b>Suffix</b></td> </tr> <tr> <td>Jeffrey</td> <td>S.</td> <td>Kott</td> <td></td> </tr> </table> <b>b. Street Address of agent if not a corporation - Do not enter a P.O. Box</b> City (no abbreviations) State Zip Code 400 Montgomery Street, Suite 400 San Francisco CA 94104 <b>CORPORATION</b> — Complete item 4c only. Only include the name of the registered agent Corporation. <b>c. California Registered Corporate Agent's Name</b> (If agent is a corporation) — Do not complete item 4a or 4b.				<b>a. California Agent's First Name</b> (If agent is not a corporation)	<b>First Name</b>	<b>Last Name</b>	<b>Suffix</b>	Jeffrey	S.	Kott	
<b>a. California Agent's First Name</b> (If agent is not a corporation)	<b>First Name</b>	<b>Last Name</b>	<b>Suffix</b>								
Jeffrey	S.	Kott									
<b>5. Read and Sign Below</b> (See Instructions. Title not required.) I am authorized to sign on behalf of the <u>Greign LLC</u> . <table border="0"> <tr> <td style="text-align: center;">                       Signature                 </td> <td style="text-align: center;">                     Todd McLeay                      Type or Print Name                 </td> </tr> </table>				 Signature	Todd McLeay Type or Print Name						
 Signature	Todd McLeay Type or Print Name										
LLC-A (REV 01/09/17)		2017 California Secretary of State <a href="http://www.sos.ca.gov/business">www.sos.ca.gov/business</a>									

a. Street Address of Principal Executive Office - Do not enter a P.O. Box 400 Montgomery Street, Suite 400	City (no abbreviations) San Francisco	State CA	Zip Code 94104
b. Street Address of Principal Office in California, if any - Do not enter a P.O. Box	City (no abbreviations)	State CA	Zip Code
c. Mailing Address of Principal Executive Office, if different than item 3a	City (no abbreviations)	State	Zip Code

State  
**CA**

City (no abbreviations)  
San Francisco

Zip Code  
**94104**

**b. Jurisdiction** (State, foreign country or place where this LLC is formed.)  
Delaware



# ***Bottom of the Basket Fraud and Theft Analysis***



## **Business Problem**

The space between the top of the cart and the bottom of the cart is responsible for millions of dollars worth of merchandise that is unpaid.  
How do we stop this pragmatically?

## **Key Business Value:**

Reducing Fraud is adding millions back to the bottom line without doing much. By having a camera that scans the bottom of the cart, cashiers can make sure that all products are scanned and accounted for.

## **Technologies Used:**

Computer vision, Object Detection, and Machine learning.



[\(4\) Build 2017: Workplace Safety](#) x [DevInterSection2018.pptx](#) x +  
<https://www.youtube.com/watch?v=pL-c00M2CnI>

Premium Search

15 KITCHEN 2 CAM 1b BASEMENT LOBBY CAM 04 EAST HING N  
 14.9 REFINERY WEST CAM 05 SUITE 26 BALLROOM CAM 16 16TH F  
 13 01-01-03

0:09 / 2:02

Build 2017: Workplace Safety Demonstration  
 159,773 views

793 33 SHARE SAVE ...

Up next AUTOPLAY

Funny Workplace Safety Training Video  
 Channel 1 Creative Media

# Why Microsoft Cognitive Services?

Easy

Roll your own with REST APIs

Simple to add: just a few lines of code required

Flexible

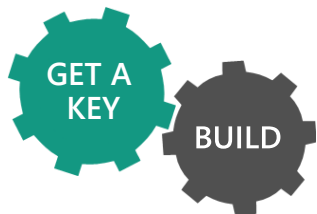
Integrate into the language and platform of your choice

Breadth of offerings helps you find the right API for your app

Tested

Built by experts in their field from Microsoft Research, Bing, and Azure Machine Learning

Quality documentation, sample code, and community support



GitHub



msdn



# Microsoft Cognitive Services

Give your apps  
a human side



## Vision

Computer Vision | Content Moderator | Emotion | Face | Video | Video Indexer | Custom Vision Service



## Speech

Bing Speech | Custom Speech Service | Speaker Recognition



## Language

Bing Spell Check | Language Understanding | Linguistic Analysis | Text Analytics | Translator Text & Speech | Web Language Model



## Knowledge

Academic Knowledge | Entity Linking | Knowledge Exploration | Recommendations | QnA Maker | Custom Decision Service



## Search

Bing Autosuggest | Bing Image Search | Bing News Search | Bing Video Search | Bing Web Search | Bing Custom Search



## Labs

Project Prague | Project Cuzco | Project Johannesburg | Project Nanjing | Project Abu Dhabi | Project Wollongong

# Cognitive Services

[microsoft.com/cognitive](https://microsoft.com/cognitive)

 Vision

Computer Vision

Emotion

Face

Video

 Speech

Custom Recognition

Speaker Recognition

Speech

Translator

 Language

Bing Spell Check

Linguistic Analysis

Language Understanding

Text Analytics

WebLM

 Knowledge

Academic Knowledge

Entity Linking

Knowledge Exploration

Recommendations

 Search

Bing Web Search

Bing Image Search

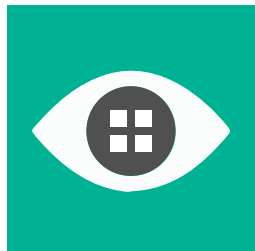
Bing Video Search

Bing News Search

Bing Autosuggest



# Vision



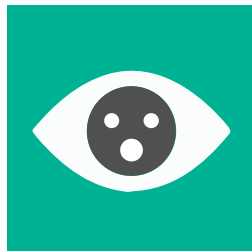
## Computer Vision API

Distill actionable information from images



## Face API

Detect, identify, analyze, organize, and tag faces in photos



## Emotion API

Personalize experiences with emotion recognition



## Video API

Analyze, edit, and process videos within your app



# Speech



## Bing Speech API

Convert speech to text and back again, and understand its intent



## Speaker Recognition API

Give your app the ability to know who's talking



## Custom Recognition Intelligent Service

Fine-tune speech recognition for anyone, anywhere

# Language



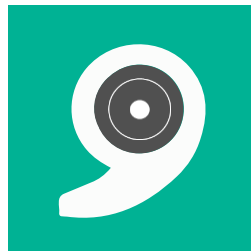
## Bing Spell Check API

Detect and correct spelling mistakes within your app



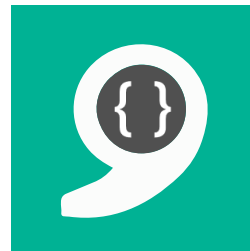
## Web Language Model API

Leverage the power of language models trained on web-scale data



## Linguistic Analysis API

Easily parse complex text with language analysis



## Language Understanding Intelligent Service (LUIS)

Teach your apps to understand commands from your users



## Text Analytics API

Detect sentiment, key phrases, topics, and language from your text



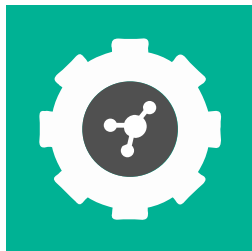


# Knowledge



## Academic Knowledge API

Explore relationships  
among academic  
papers, journals, and  
authors



## Knowledge Exploration Service

Add interactive search  
over structured data to  
your project



## Entity Linking Service

Contextually extend  
knowledge of people,  
locations, and events



## Recommendations API

Provide personalized  
product  
recommendations for  
your customers



# Search



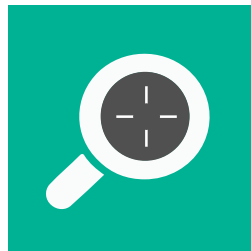
## Bing Web Search API

Connect powerful search to your apps



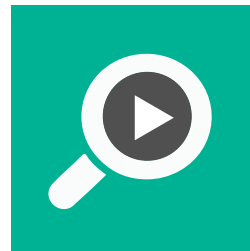
## Bing Autosuggest API

Give your app intelligent autosuggest options for searches



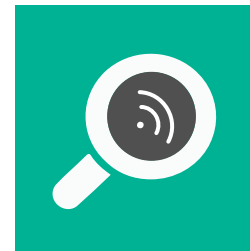
## Bing Image Search API

Bring advanced image and metadata search to your app



## Bing Video Search API

Trending videos, detailed metadata, and rich results

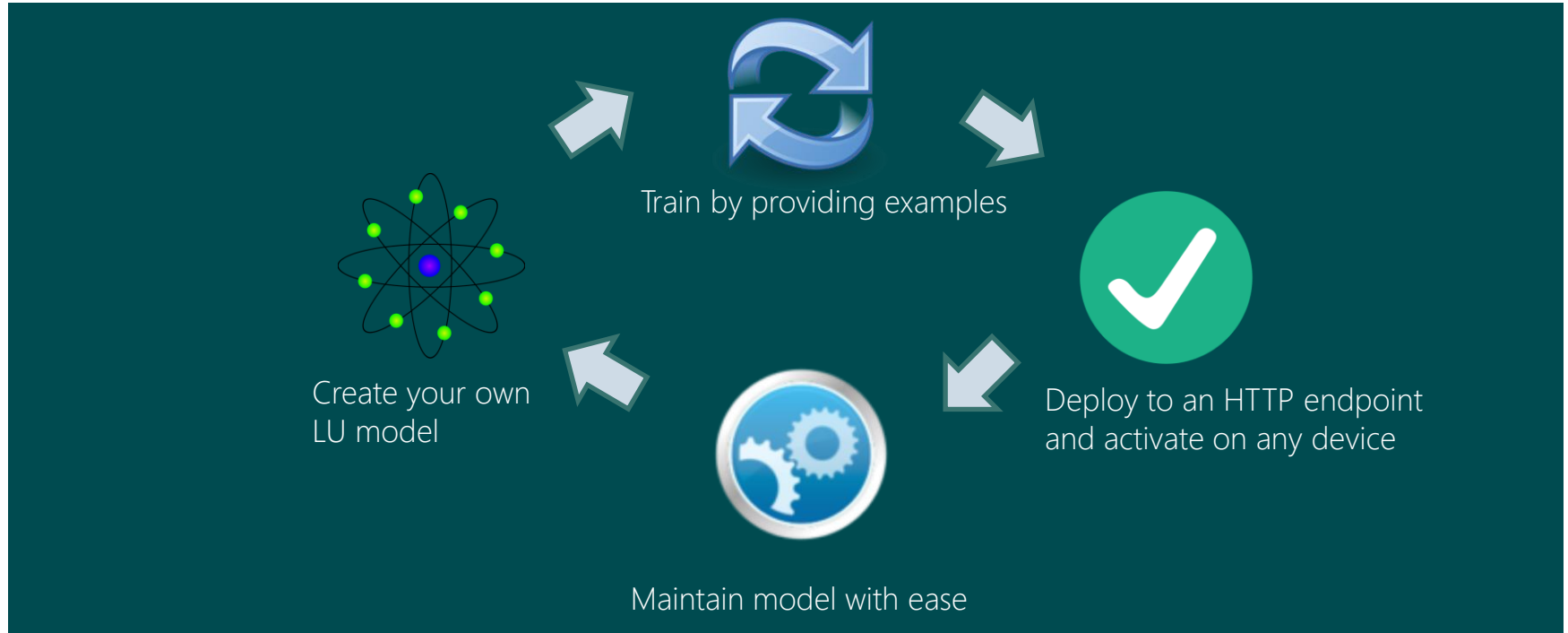


## Bing News Search API

Link your users to robust and timely news searches

# Introducing Language Understanding Intelligence Service (LUIS)

A Microsoft Cognitive Service that provides developers with an easy way to create language models to allow applications to understand user commands.

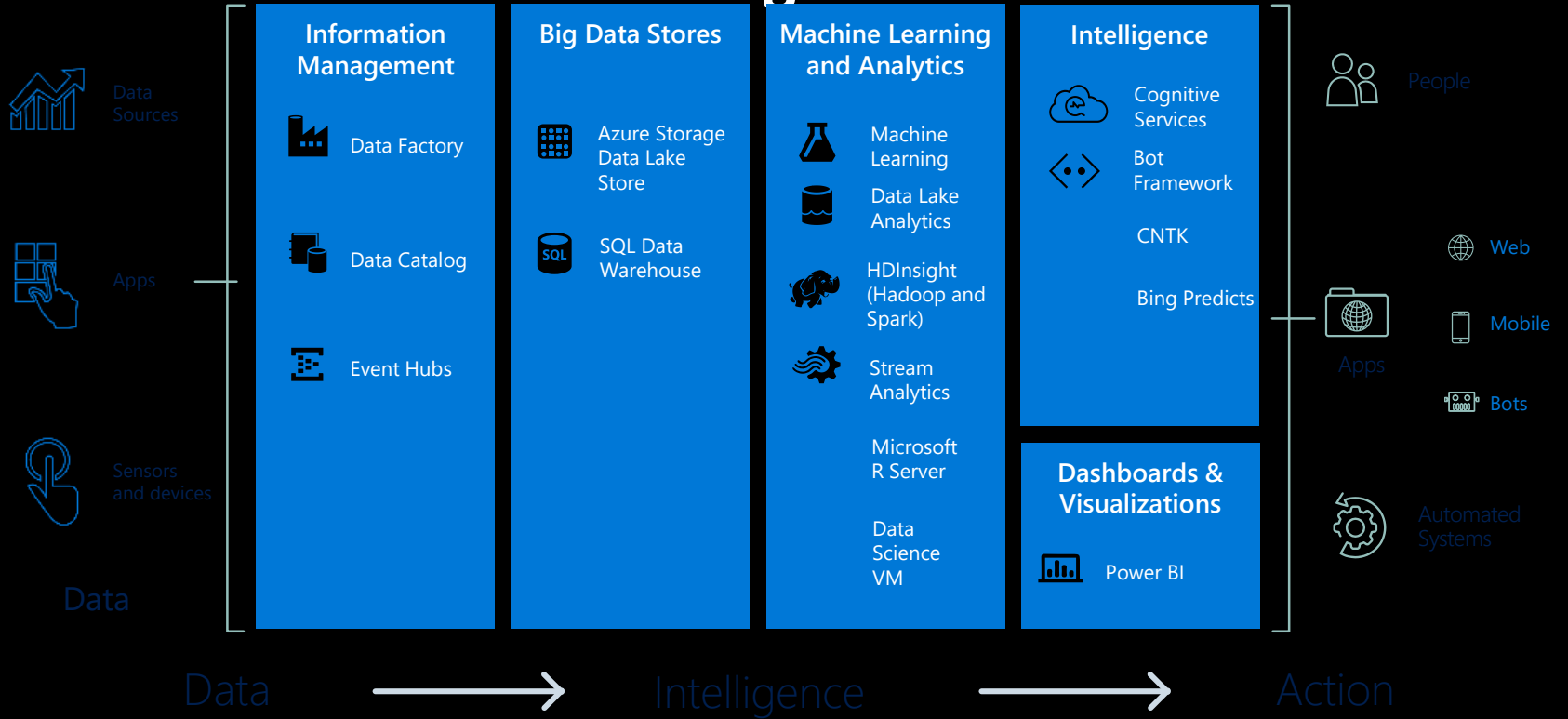


# Moving to Production & Scaling

# Application patterns



# Transform data into intelligent action with Cortana Intelligence





# Analyze Image – Example




## Type of Image:

Clip Art Type 0 Non-clipart  
Line Drawing Type 0 Non-Line Drawing  
Black & White Image False

## Content of Image:

Categories [{"name": "people\_swimming", "score": 0.099609375 }]  
Adult Content False  
Adult Score 0.18533889949321747  
Faces [{"age": 27, "gender": "Male", "faceRectangle": {"left": 472, "top": 258, "width": 199, "height": 199}}]

## Image Colors:

Dominant Color Background White  
Dominant Color Foreground Grey  
Dominant Colors White  
Accent Color 



# Analyze Image – Example

## Content of Image:



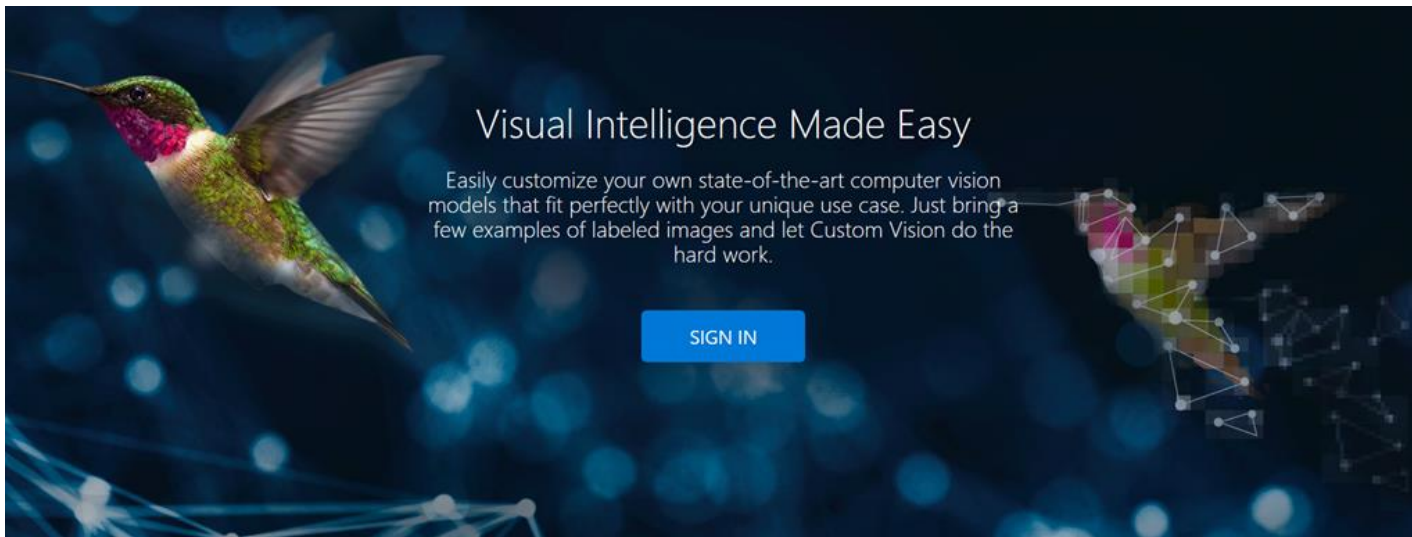
### Categories

```
v0: [{ "name": "animal", "score": 0.9765625 }]
V1: [{ "name": "grass", "confidence": 0.999992847442627 },
      { "name": "outdoor", "confidence": 0.9999072551727295 },
      { "name": "cow", "confidence": 0.99954754114151 },
      { "name": "field", "confidence": 0.9976195693016052 },
      { "name": "brown", "confidence": 0.988935649394989 },
      { "name": "animal", "confidence": 0.97904372215271 },
      { "name": "standing", "confidence": 0.9632768630981445 },
      { "name": "mammal", "confidence": 0.9366017580032349,
        "hint": "animal" },
      { "name": "wire", "confidence": 0.8946959376335144 },
      { "name": "green", "confidence": 0.8844101428985596 },
      { "name": "pasture", "confidence": 0.8332059383392334 },
      { "name": "bovine", "confidence": 0.5618471503257751,
        "hint": "animal" },
      { "name": "grassy", "confidence": 0.48627158999443054 },
      { "name": "lush", "confidence": 0.1874018907546997 },
      { "name": "staring", "confidence": 0.165890634059906 }]
```

### Describe

- 0.975 "a brown cow standing on top of a lush green field"
- 0.974 "a cow standing on top of a lush green field"
- 0.965 "a large brown cow standing on top of a lush green field"

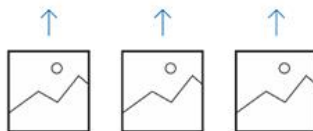




# Visual Intelligence Made Easy

Easily customize your own state-of-the-art computer vision models that fit perfectly with your unique use case. Just bring a few examples of labeled images and let Custom Vision do the hard work.

SIGN IN



## Upload Images

Bring your own labeled images, or use Custom Vision to quickly add tags to any unlabeled images.



## Train

Use your labeled images to teach Custom Vision the concepts you care about.

89%



93%



91%



## Evaluate

Use simple REST API calls to quickly tag images with your new custom computer vision model.

# Call to action

- Get started for free at <https://www.microsoft.com/cognitive-services>
- New unified documentation portal: <https://docs.microsoft.com/en-us/azure/cognitive-services/>
- Re-visit Build session recordings on [Channel 9](#).
- Continue your education at [Microsoft Virtual Academy](#) online.

# Conclusion



# Questions?

*Please use EventsXD to fill out a session evaluation.*

# Thank you!