

CV on Azure

Alibek Jakupov (Expertime)

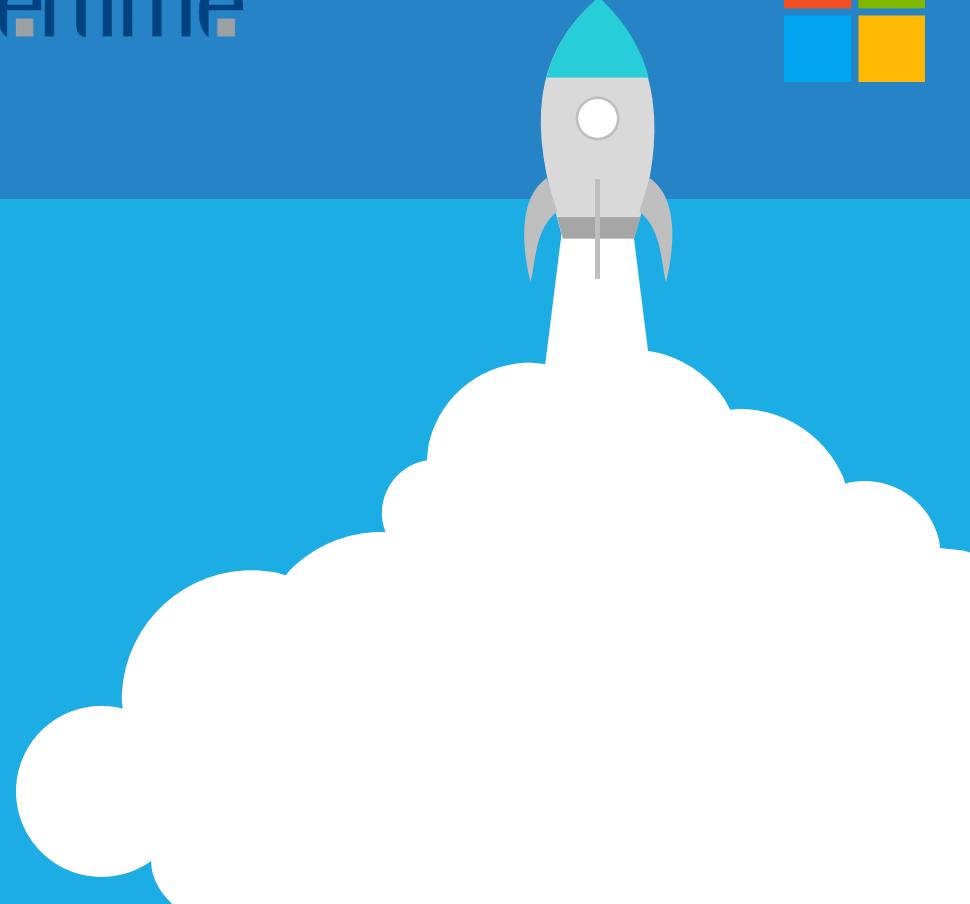
- Data Scientist
- Microsoft MVP

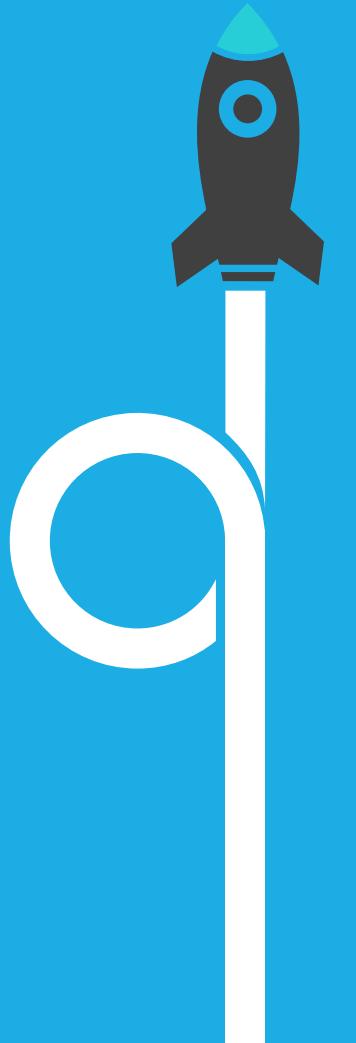
Serge Retkowsky (Microsoft)

- AI & Advanced Analytics Technical Specialist
- GBB

Saswata Sengupta (Microsoft)

- Cloud Data and AI Technology Leader
- Customer Advocate





Outline

01

Part One

Azure Vision API

02

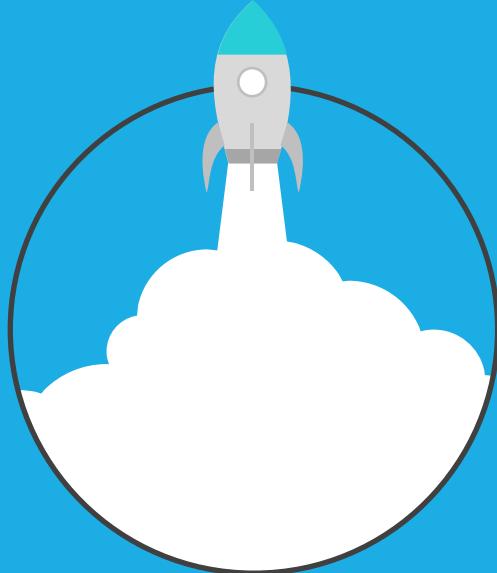
Part Two

Azure Custom Vision

03

Part Three

Azure Machine Learning



Presentation

Expertime and its client use cases

CURRICULUM VITAE



Alibek JAKUPOV
Data Scientist

2018

Master Smart Systems,
EISTI

2016

Bachelor Computer
Science, IITU

Skill

Programming Languages: Python, R, Java, C#

Cloud: Azure Machine Learning, Databricks, Azure Cognitive Services, Azure Web Apps, Azure Functions

Nominations: Microsoft Most Valuable Professional (AI)

Certifications: Microsoft Certified Solutions Associate, Azure Data Scientist Associate

Languages : French, English, Russian, Kazakh

Important Experience

Alltricks

Product classification based on the description and computer vision

Conformat

Analyzing the contaminants in the white room using Computer Vision

Bic

Product classification from Back-to-school lists

Scientific Publications:

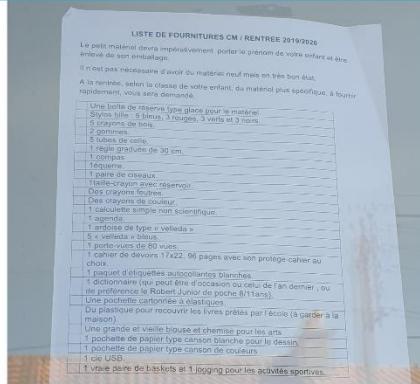
- MacNabbs: Knowledge Extraction from Unstructured Data using Semantic Analysis and User Activity Logging (11.2019)
- Comparative analysis of GIS in sight of view of renewable energy sources monitoring (03.2016)
- Virtual Physics Experiment in High Educational Institutions (08.2015)

180
collaborateurs

“Digital innovation and consulting
on Microsoft Cloud, Open Source,
Data & IA solutions”

20 M€ (p)
chiffre d'affaires





City	School	Class	UserRequest	ProductCode	Quantity	ProductName
CALAIS	Ecole primaire CM1	Liste de stylos bille 5 b		8308621	1	bic cristal stylos bille ast x4
CALAIS	Ecole primaire CM1	Liste de 5 crayons de bois		919261	3	bic kids learner crayon à papier x2
CALAIS	Ecole primaire CM1	Liste de 2 gommes		926272	2	bic précision gomme x1
CALAIS	Ecole primaire CM1	Liste de 5 tubes de colle		950641	1	bic bâtons de colle décors 8 g x6
CALAIS	Ecole primaire CM1	Liste de 1 règle graduée		330172	1	trousse formes assorties polyester color exacompta
CALAIS	Ecole primaire CM1	Liste de 1 compas		935708	1	bic compas avec crayon à papier x1
CALAIS	Ecole primaire CM1	Liste de 1 équerre		300008	1	kit de traçage 1 règle de 30 cm 1 équerre 60° 21 cm 1
CALAIS	Ecole primaire CM1	Liste de 1 aise de ciseau		926278	1	bic comfort ciseaux 13 cm x1
CALAIS	Ecole primaire CM1	Liste de 1 a enda	null		1	non disponible
CALAIS	Ecole primaire CM1	Liste de 1 ardoise de type		841360	1	bic velleda ardoise effaçable lotx1

Back-to-school

Read a photo of the back-to-school list and extract all the text lines from it using Azure OCR.

Find the correspondence for each line in the catalogue using nlp multi-class classifier and create a shopping cart

Text classification + OCR

Product classification

ID product	Designation	Photo	Original	Recommandation selon Texte	Recommandation selon Image	...	
1022160	Bonnet de vélo coupe vent Craft			<ul style="list-style-type: none">MontresMontresVTTnon communiqué	<ul style="list-style-type: none">Bonnerie - Manchettes - Jambières (100%)Bonnet de Sport (100%)non communiqué (93%)Homme (99%)	<ul style="list-style-type: none">Bonnerie - Manchettes - Jambières (97%)Casquette Vintage (route, courrier) (28%)Outdoor (8%)Homme (63%)	<ul style="list-style-type: none">Autre

Connect to the e-commerce site and get all the products uploaded by the partners to the marketplace.

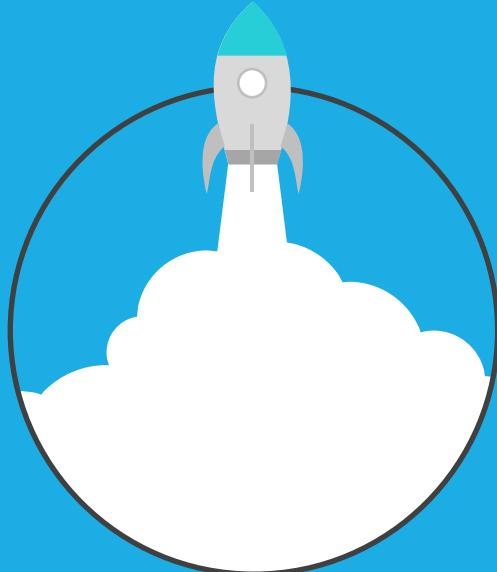
Using NLP and CV detect all the cases when partner puts an item under wrong category.

Text classification + CV



Conformat : KaliSafe

- KaliSafe® is the first software to help control dressing at the entrance of sensitive areas. Based on AI, and patented, it will provide you with the necessary advice to reduce the risks related to dressing.



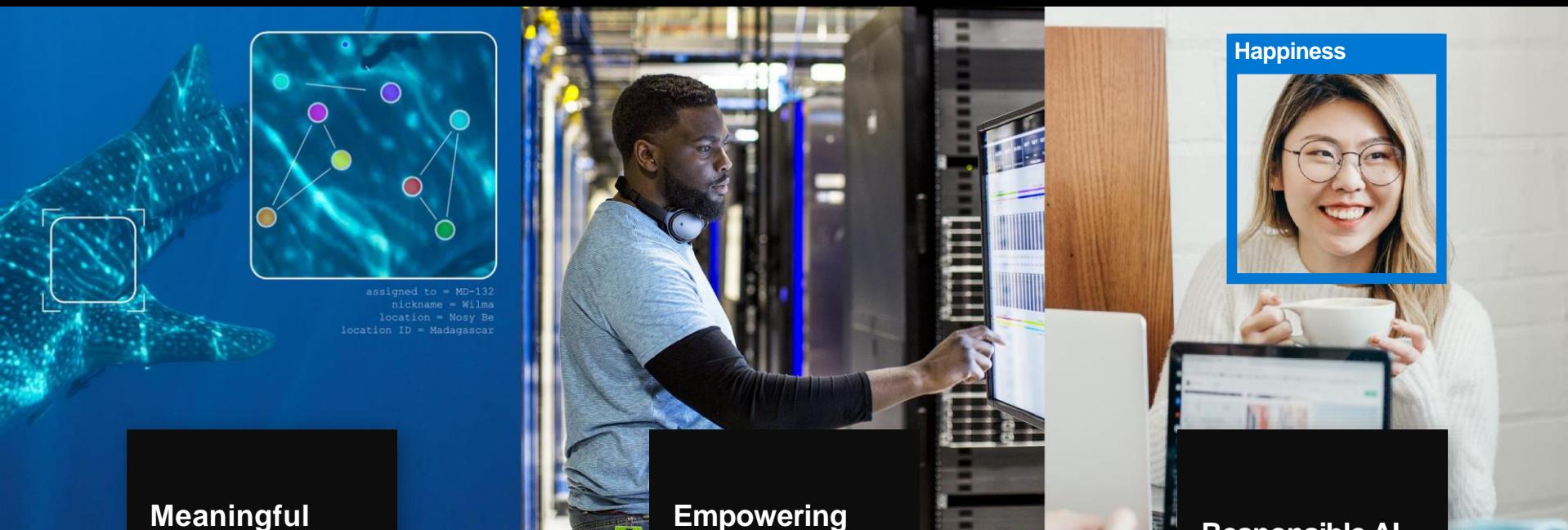
Part One

Azure Cognitive Services

Azure AI Cognitive services



Microsoft's AI Approach



Meaningful
Innovation

Empowering
People

Happiness



Responsible AI

Democratizing AI for every employee

<https://azurecharts.com/overview>

Azure Services Overview

Overview of Azure services. Linked directly to Azure Service 360° for service summary information.

FOCUS: ALL SERVICES

AI + Machine Learning	Analytics	Compute	Databases	Development	Identity + Security	IoT + MR	Integration	Management + Governance	Media	Migration	Networking	Storage
Batch AI	Analysis Services	App Service	Blockchain Service	App Configuration	Azure Active Directory	Azure Maps	API Management	Automation	Azure CDN	Azure Migrate	Application Gateway	Avere vFXT
Bot Service	Data Catalog	App Service (Linux)	Cosmos DB	Azure DevOps	Azure AD B2C	Azure Sphere	Azure API for FHIR	Azure Advisor	Media Services	Data Box	Azure Bastion	Azure NetApp Files
Cognitive Search	Data Explorer	Azure Batch	Database for MariaDB	Azure Spring Cloud	Azure AD DS	Digital Twins	Event Grid	Azure Arc	DB Migration Service	Azure DNS	Azure Storage	
Cognitive Services	Data Factory	Azure Functions	Database for MySQL	DevTest Labs	Azure Key Vault	IoT Central	Logic Apps	Azure Backup	Site Recovery	Azure Firewall	Data Lake Storage	
Machine Learning	Data Lake Analytics	Azure VMware Solutions	Database for PostgreSQL	Lab Services	Azure Sentinel	IoT Edge	Notification Hubs	Azure Blueprints		Azure Front Door	Data Share	
Microsoft Genomics	Databricks	Cloud Services	Redis Cache	SignalR Service	DDoS Protection	IoT Hub	Service Bus	Azure Lighthouse		ExpressRoute	Managed Disks	
Open Datasets	Event Hubs	Container Instances	SQL Database	Visual Studio App Center	Dedicated HSM	Remote Rendering		Azure Monitor		Load Balancer	StorSimple	
	HDInsight	Container Registry	SQL Server Stretch DB		Information Protection	Spatial Anchors		Azure Policy		Network Watcher		
	Power BI Embedded	CycleCloud			Security Center	Time Series Insights		Azure Portal		Private Link		

AI & ML on Azure

Domain specific pretrained models
To simplify solution development



Vision



Speech



Language



Search

Familiar Data Science tools
To simplify model development



Visual Studio Code



Azure Notebooks



Jupyter



Command line

Popular frameworks
To build advanced deep learning solutions



PyTorch



TensorFlow



Scikit-Learn



ONNX

Productive services
To empower data science and development teams



Azure Databricks



Azure Machine Learning



Machine Learning VMs

Powerful infrastructure
To accelerate deep learning



CPU



GPU



FPGA

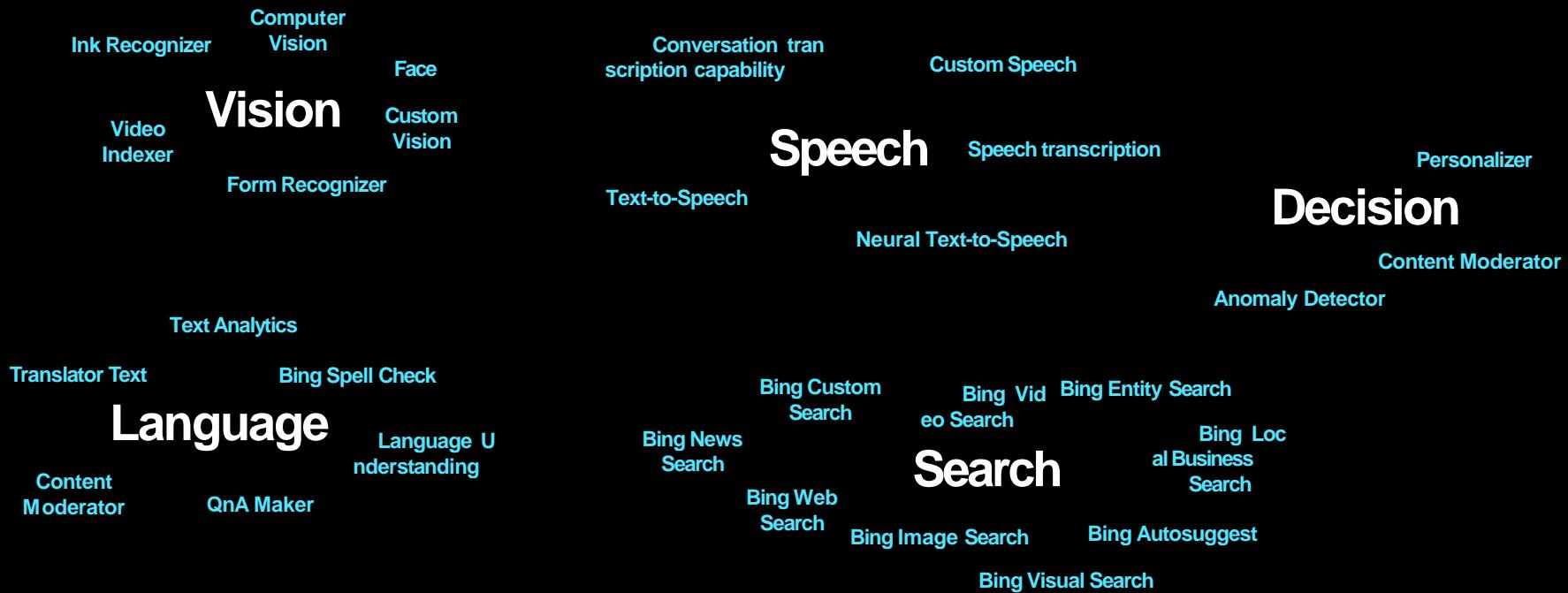


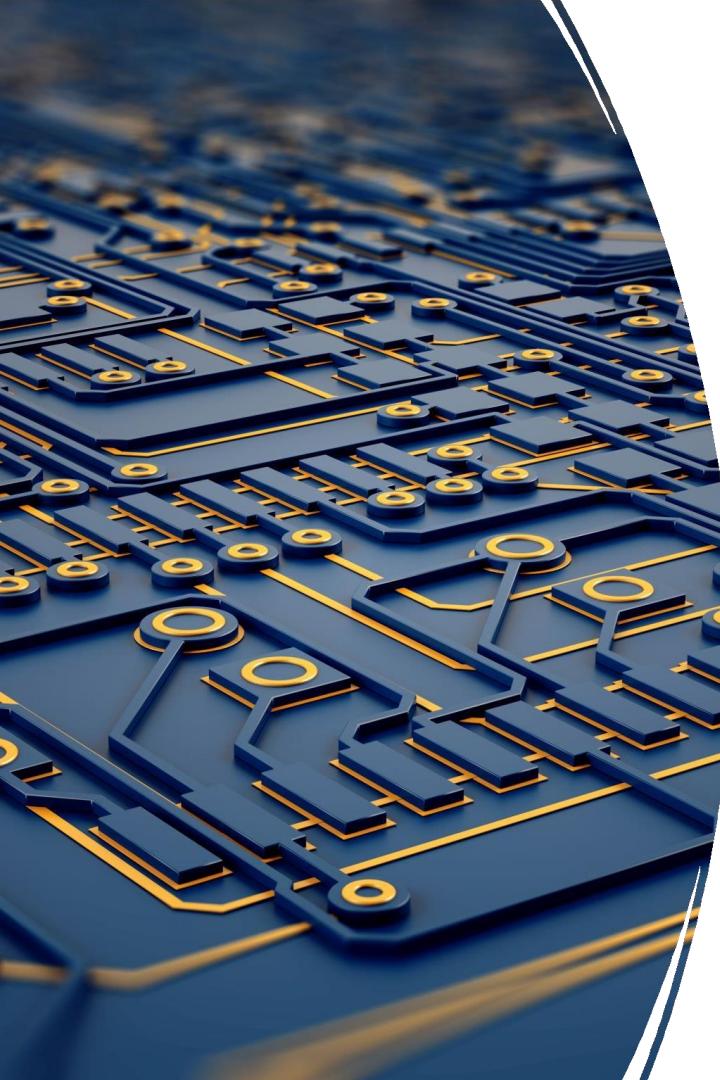
From the Intelligent Cloud to the Intelligent Edge



Azure Cognitive Services

The most comprehensive pre-trained AI





What is Computer Vision?

Main Types of Computer Vision Algorithms

IMAGE CLASSIFICATION

What are my images
about?



OBJECT DETECTION

Locate rectangular areas
containing known objects
in an image



Image Classification Common Scenarios



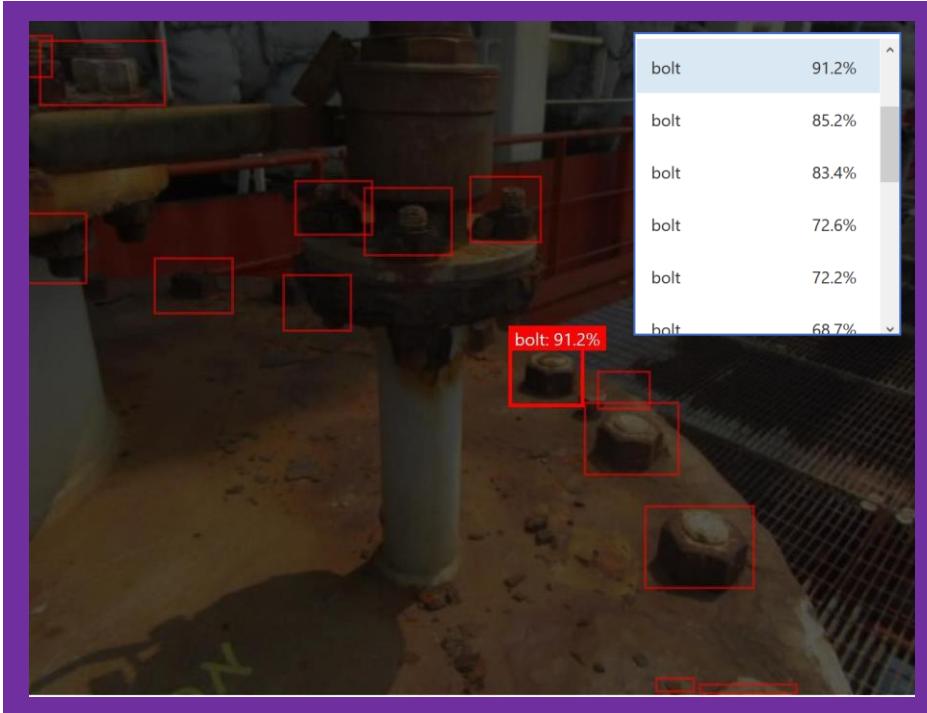
- Automated sorting
- Similar themed image search
- Context & situation detection

Scaffold 95.0%

Guardrail 89.3%

Water 60.7%

Object Detection Common Scenarios



- Object counting
- Locate an object or a group of objects
- Size / measurements

Some computer vision references

In IoT Computer Vision is about converting Cameras into Sensors

Retail



Industrial



Smart spaces



Shell invests in safety with Azure, AI, and machine vision to better protect customers and service champions

In the energy industry, Shell manages everything from wells to retail gas stations—44,000 of them. The company works hard to ensure the safety of service champions and customers at its retail sites. Shell is piloting a new cloud-based, deep learning solution built on Microsoft Azure. The solution uses closed-circuit camera footage and Internet of Things technology to automatically identify safety hazards and alert service champions so they can quickly respond and eliminate potential problems.



Products and Services

Microsoft Azure
Azure Databricks
Azure IoT Edge
Azure IoT Hub

Organization Size

86,000 employees

Industry

Mining, Oil and Gas

Country

The Netherlands



Bühler's mission is to improve food quality and safety

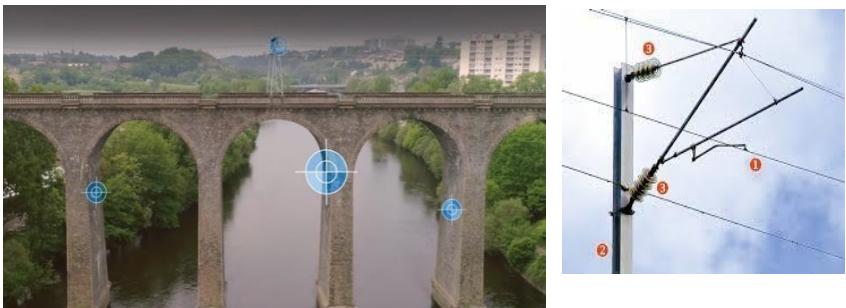
Bühler's LumoVision solution is a data-driven optical grain sorter that is connected to Azure for data analysis. It uses powerful cameras and ultraviolet lighting to hunt for hidden infections, sorting good corn from bad corn.



▷ [Watch](#)



Rail company digitizes business



[Click to learn more](#)



Products and Services

Microsoft IoT Hub
Microsoft IoT Edge
Microsoft Power BI

Organization Size

270,000 employees

Industry

Travel & Transportation

Country

France

réalise des relevés **topographiques** avec des **drones** et des **robots**.





Vision

From faces to feelings, allow your apps to understand images and video

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



Face



```
},
"smile": 1.0,
"headPose": {
  "pitch": 0.0,
  "roll": 3.2,
  "yaw": 11.4
},
"gender": "male",
"age": 30.0,
"facialHair": {
  "moustache": 0.4,
  "beard": 0.4,
  "sideburns": 0.4
},
"glasses": "NoGlasses",
"makeup": {
  "eyeMakeup": false,
  "lipMakeup": false
},
"emotion": {
  "anger": 0.0,
  "contempt": 0.0,
  "disgust": 0.0,
  "fear": 0.0
}
```

Face

Face detection

Detect faces and their attributes within an image

Face verification

Check if two faces belong to the same person

Similar face searching

Find similar faces within a set of images

Face grouping

Organize many faces into groups

Face identification

Search which person a face belongs to



Emotion

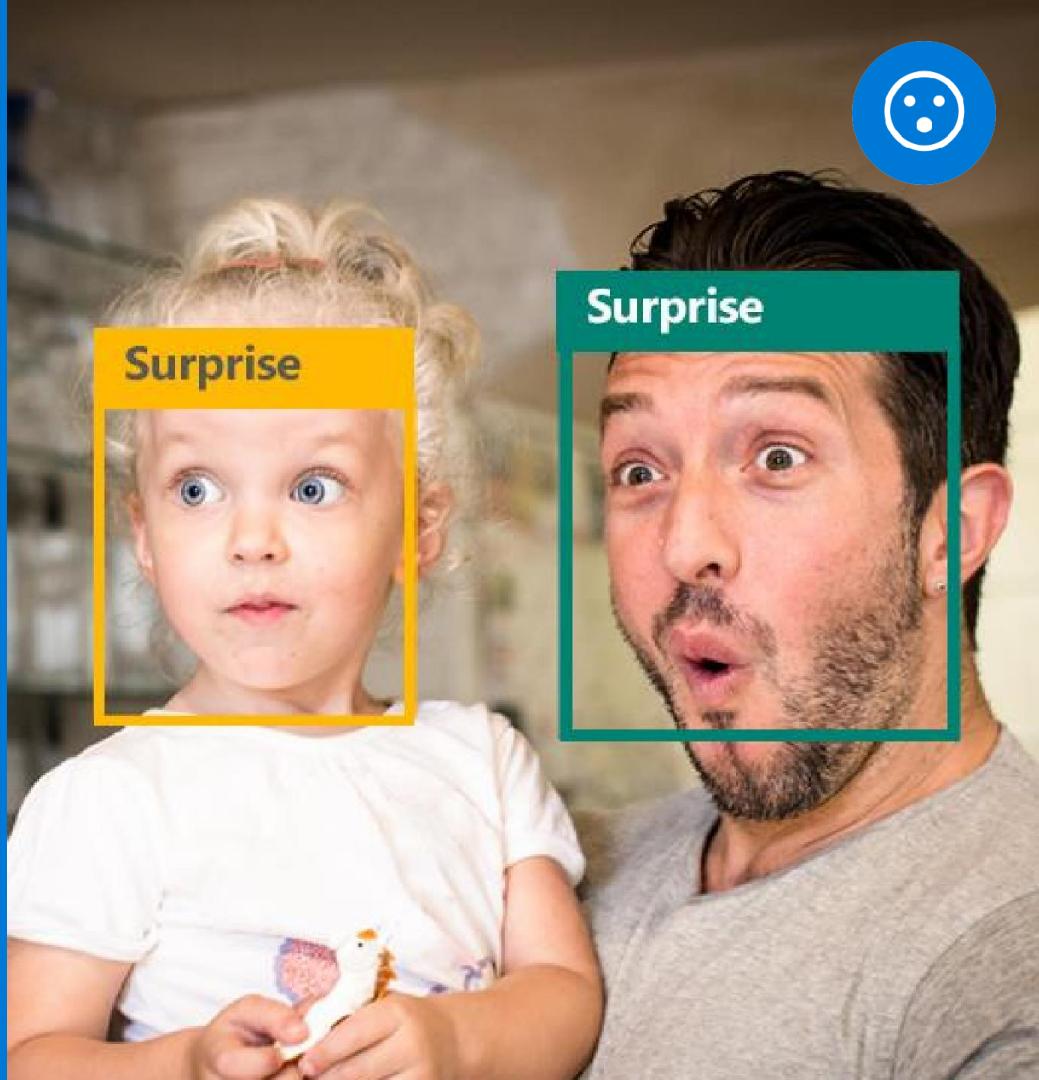


Face detection

```
"faceRectangle": {"width": 193,  
                 "height": 193,  
                 "left": 326,  
                 "top": 204} ...
```

Emotion scores

```
"scores": { "anger": 5.182241e-8,  
            "contempt": 0.0000242813,  
            "disgust": 5.621025e-7,  
            "fear": 0.00115027453,  
            "happiness": 1.06114619e-8,  
            "neutral": 0.003540177,  
            "sadness": 9.30888746e-7,  
            "surprise": 0.9952837}
```



Computer Vision

Analyze an image

Understand content within an image

OCR

Detect and recognize words within an image

Generate thumbnail

Scale and crop images, while retaining key content

Recognize celebrities

Thanks to domain-specific models, ability to recognize 200K celebrities from business, politics, sports, and entertainment around the world



Form Recognizer

Form Recognizer uses advanced machine learning technology to quickly and more accurately extract text and data from business's forms and documents. With container support, this service can run on-premises and in the cloud. Automate information extraction quickly and tailor to specific content, with only 5 samples, and no manual labeling.

Item #	Description	Qty	Unit Price	Discount	Price
20547	Invoice 3-456-2 Data 1	30	\$ 1.00	\$	30.00
20548	Invoice 3-456-2 Data 2	40	4.00	3.00	152.00
20549	Invoice 3-456-2 Data 3	30	6.00	7.00	172.00
20570	Invoice 3-456-2 Data 4	40	7.00		280.00
20571	Invoice 3-456-2 Data 5	30	4.00		40.00
20572	Invoice 3-456-2 Data 6	5	8.00		40.00
20573	Invoice 3-456-2 Data 7	70	6.00		420.00
20574	Invoice 3-456-2 Data 8	25	4.00		100.00
20575	Invoice 3-456-2 Data 9	5	7.00	\$	35.00

```
Bill To: Contoso, Ltd
Phone: 432-555-0189
Invoice #: 3-456-2
Invoice Date: 4/14/2019
Email: contoso@example.com
Invoice For: Project 2
Invoice Subtotal: 2,014.00
Tax Rate: 8.75%
Sales Tax: 176.23
Other: 0
```



Content Moderator

Machine-assisted moderation of text and images, augmented with human review tools

Image moderation

Machine-learning based classifiers, custom blacklists, and Optical Character Recognition (OCR)

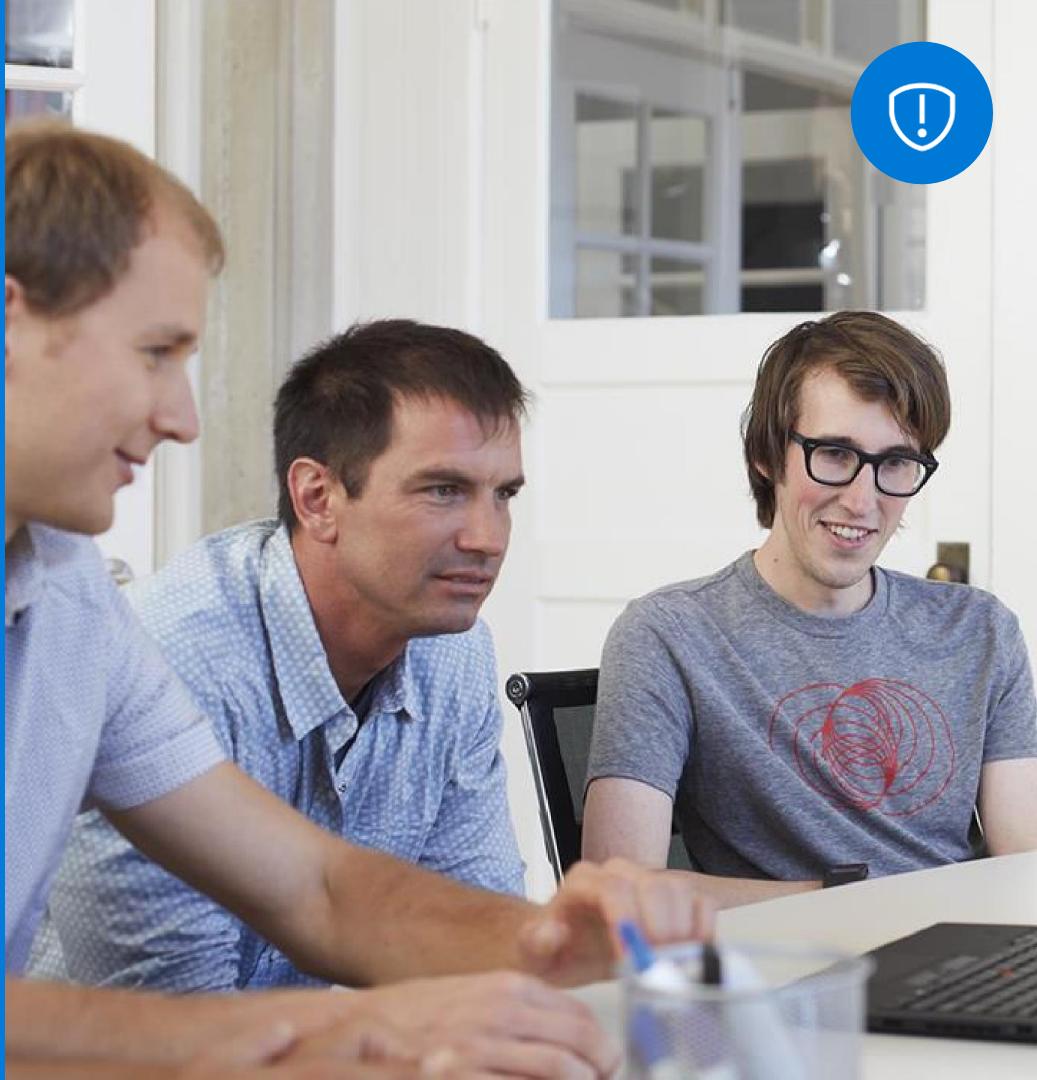
Text moderation

Helps you detect potential profanity in more than 100 languages and match text against your custom lists automatically.

Identification of possible Personally Identifiable Information (PII)

Video moderation (in Azure Media Services)

Scoring of possible adult content in videos.
Video moderation is currently deployed in preview on Azure Media Services



A close-up photograph of a camera lens, showing its metallic ring and glass elements. The background is blurred with a bokeh effect, featuring soft purple and blue hues.

Video Indexer

Video Indexer

Unlock video insights

Upload your video and go

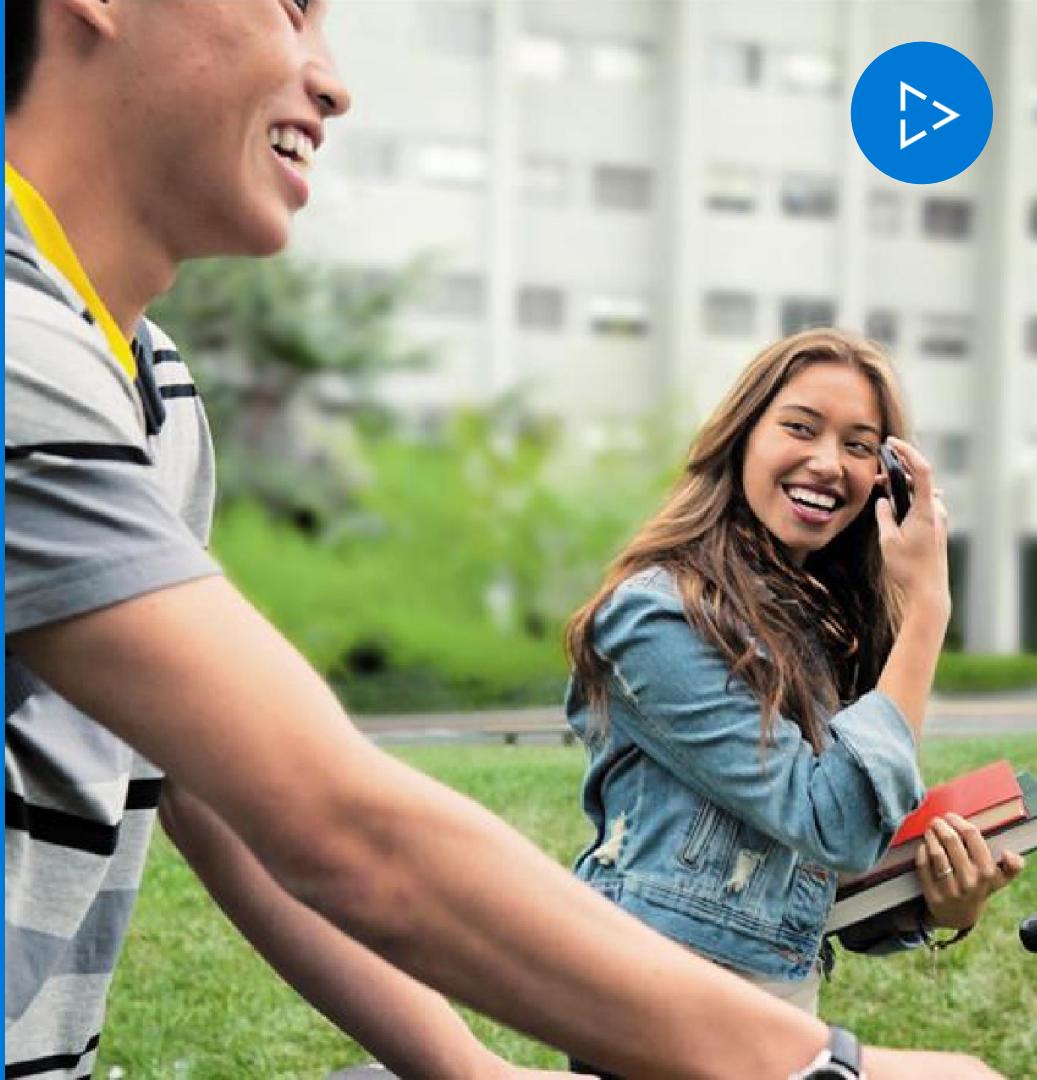
Start turning your video into insights right away.

Make your content more discoverable

Enhance content discovery experiences such as search results by detecting spoken words, faces, characters, and emotions

Improve engagement with your video

Metadata extracted by Video Indexer can be used to build powerful engagement experiences with recommendations, highlight clips, and interactive videos



Video Indexer – www.videoindexer.ai/



Azure Media Services | Video Indexer

+ Create new account

Account
seretkow-5dc864

WUS2

Search inside your videos

Find the exact moments you're looking for by text, by person, or even by object.

Find topics

Find people

Search for text, keywords, or visual content

Search for people and celebrities

Search

Show more filters ▾

Library Projects

Upload Refresh

1. Introduction

Created by Serge Retkowsk...

Teams

Created by Serge Retkowsk...

READY 2019

Created by Serge Retkowsk...

Connects // 2016

Cognitive Services

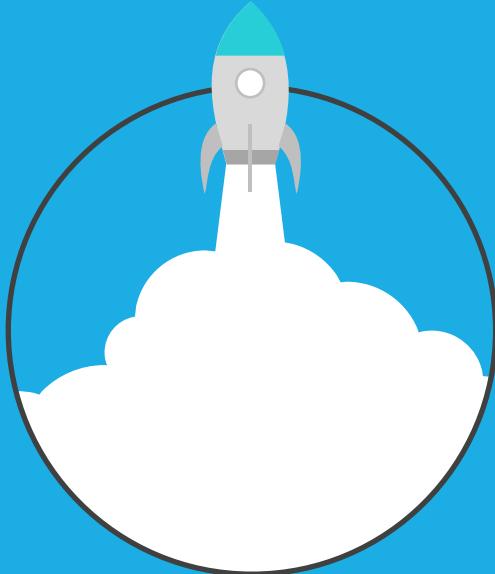
Matt Winkler GPM, Microsoft Data Group

Get started with Microsoft Cogniti...

THE MULE Official Trailer (2018) Cl...

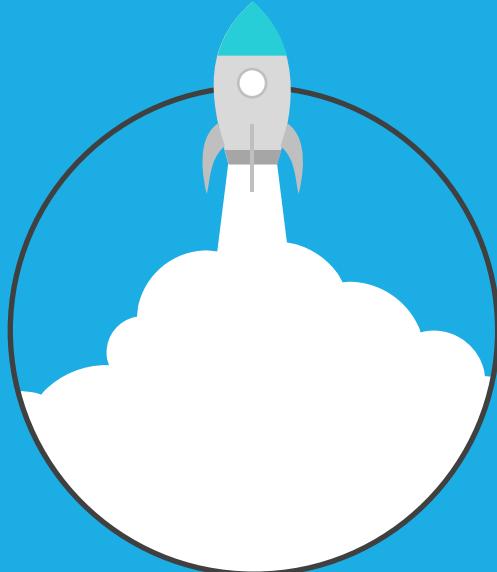
Created by Serge Retkowsk...

Created by Serge Retkowsk...



Hands-on Lab

Go to <https://github.com/ajakupov/Lab-CV-On-Azure> and run notebooks from 1 to 4



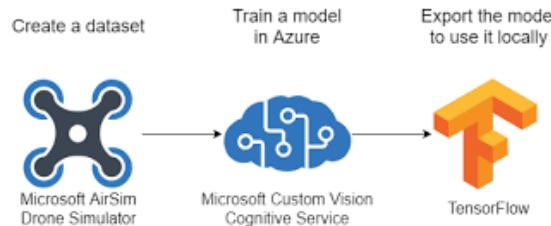
Part Two

Azure Custom Vision

Transfer Learning on Azure : Custom Vision

Azure Custom Vision is an image recognition service that lets you build, deploy, and improve your own image identifiers. An image identifier applies labels (which represent classes or objects) to images, according to their visual characteristics. Unlike the Computer Vision service, Custom Vision allows you to specify the labels and train custom models to detect them.

The Custom Vision service is optimized to quickly recognize major differences between images, so you can start prototyping your model with a small amount of data. 50 images per label are generally a good start.



Custom Vision

A customizable web service that learns to recognize specific content in imagery

Upload images

Upload your own labeled images, or use Custom Vision Service to quickly tag any unlabeled images

Train

Use your labeled images to teach Custom Vision Service the concepts you want it to learn

Evaluate

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

Active learning

Images evaluated through your custom vision model become part of a feedback loop you can use to keep improving your classifier



Custom Vision

Customize

Design your own state-of-the-art models for unique use cases

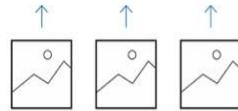
Upload

Use labeled images to quickly train and update your models

Export

Run models on a device or as a Docker container with just one click

www.customvision.ai



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.



Evaluate

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

Custom Vision for categorisation

Voitures

Training Images Performance Predictions Train Quick Test

Iteration: Workspace

Tags: Tagged Untagged

Showing: all tagged images

Search For Tags:

BMW 20, Ferrari 20, Mercedes 20, Peugeot 20, Renault 20, Rolls 20, Tesla 20

Add images Delete Tag images Select all

1 2 3 >

Tag	Probability
Renault	99.8%
BMW	22.4%
Peugeot	4.4%
Tesla	1.7%

Enter Image URL

Browse local files

File formats accepted: jpg, png, bmp
File size should not exceed: 4mb

Using model trained in

Iteration: Iteration 4

Predictions

Custom Vision for Object Detection



Car Driver

Training Images Performance

Filter Add images Delete Select all

Iteration

Workspace

Tags

Tagged Untagged

Showing: all tagged images

Search For Tags:

- Attention issue 20 ...
- Calling 20 ...
- Drinking 20 ...
- Not viewing the... 20 ...
- OK 20 ...
- Phone manipulation 20 ...



Undo Changes Regions Shown

My Objects

Phone manipulat...

Predicted Object Filter

Probability Threshold: 15%

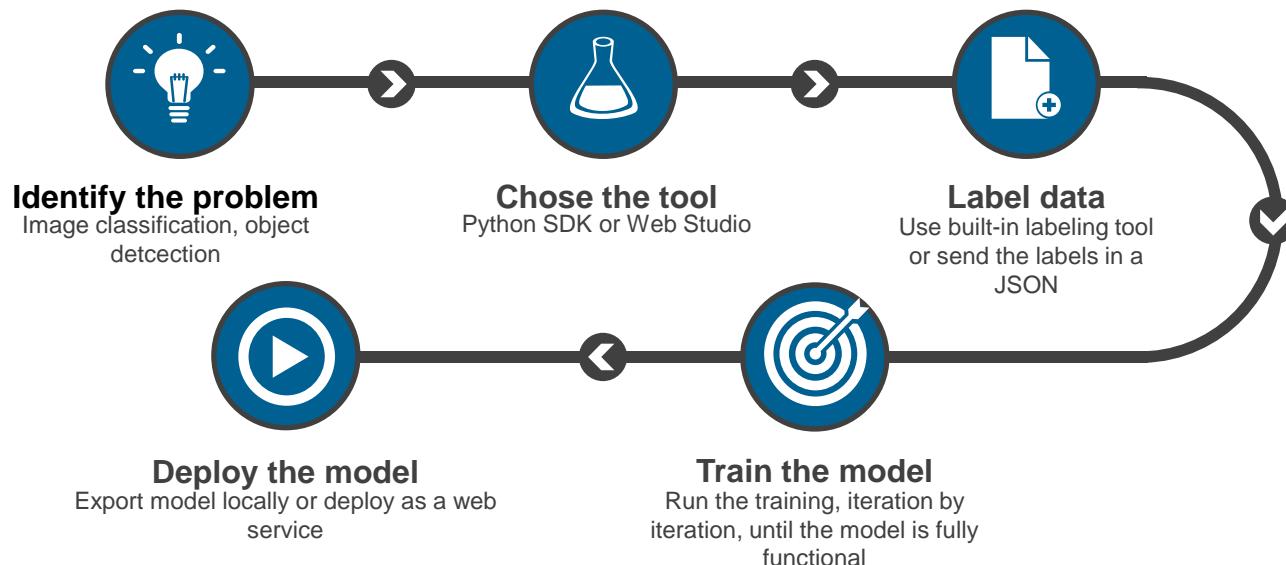
Predictions

Predictions are shown in red

Tag	Probability
Phone manipulation	83.4%
Attention issue	64.6%
Phone manipulation	16.8%

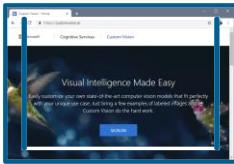
<https://www.kaggle.com/c/state-farm-distracted-driver-detection>

Transfer Learning on Azure : Custom Vision

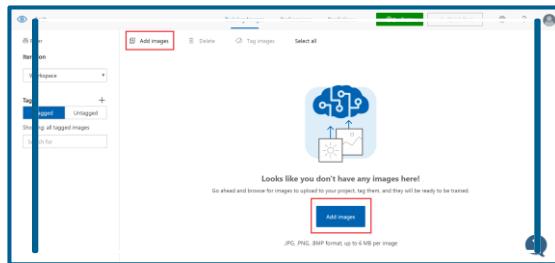


Azure Custom Vision workflow

How it works

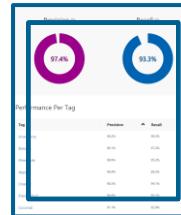


Create a new project
Using Web portal or an SDK



Preapare
Upload and tag training images

Evaluate
After training has completed, the model's performance is estimated and displayed



Azure Custom Vision : Classification and Detection

Custom Vision functionality can be divided into two features.

- Image classification applies one or more labels to an image.
- Object detection is similar, but it also returns the coordinates in the image where the applied label(s) can be found.

Multilabel classification applies any number of your tags to an image (zero or more), while multi class classification sorts images into single categories (every image you submit will be sorted into the most likely tag).

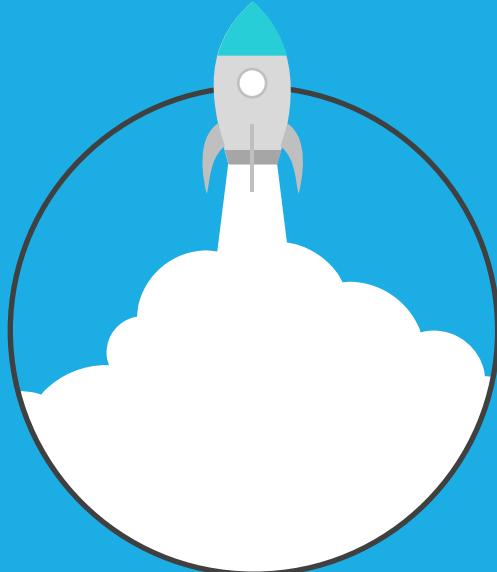
Azure Custom Vision : Lab

Train a simple classifier, that reads the video feed from the camera and classifies a product into one of two categories:

- Activia
- Vélouté

<https://github.com/ajakupov/Lab-CV-On-Azure> product_training.py





Part Three

Custom models

Azure ML updates

Custom vision with Azure ML

NEW

Some new features are available with Azure ML for Computer vision:

1. Azure Data Labelling
2. Custom vision modules with Azure ML Designer

These new features can be used from Azure ML in a no code approach as well.



Azure Machine Learning

ⓘ New feature: To make labeling faster, we've added a new feature to train an ML model while you label. This feature currently supports image classification projects with Enterprise SKU. Learn more about ML assisted labeling.

Project details

- Select or create a dataset
- Incremental refresh (optional)
- Label classes
- Labeling instructions
- ML assisted labeling (optional)

Project details

Project name *

Labeling task type *

Image Classification Multi-class



Image Classification Multi-label



Object Identification (Bounding Box)



Instance Segmentation (Polygon) (Preview)



Apply only a single class from a set of classes to an image

[Learn more](#)

- **Azure Machine Learning** data labeling gives you a central place to create, manage, and monitor labeling projects.
- Use it to coordinate data, labels, and team members to efficiently manage labeling tasks. Machine Learning supports image classification, either multi-label or multi-class, object identification with bounded boxes & polygons.
- Data labeling tracks progress and maintains the queue of incomplete labeling tasks.
- You are able to start and stop the project and control the labeling progress. You can review the labeled data and export labeled in COCO format or a san Azure Machine Learning dataset.

Azure Data Labeling

<https://docs.microsoft.com/en-us/azure/machine-learning/how-to-create-labeling-projects>



Microsoft Azure Machine Learning

azuremlvision > Data Labeling > MaskDetection > Label

MaskDetection

Instructions Tasks

Search tags

Tags

1 Mask

2 No Mask

1 0

0 0

100%

Submit



The screenshot shows the Microsoft Azure Machine Learning Data Labeling interface for a 'MaskDetection' project. The main area displays a photograph of a person wearing a face mask. A red dashed bounding box is drawn around the person's face, with the word 'Mask' written inside. The 'Mask' tag is selected in the tags panel on the right. The 'No Mask' tag is also listed. The interface includes a search bar, a tags panel, and a submit button.

Azure Data Labeling

<https://docs.microsoft.com/en-us/azure/machine-learning/how-to-create-labeling-projects>



azuremlvision > Data Labeling > MaskDetection

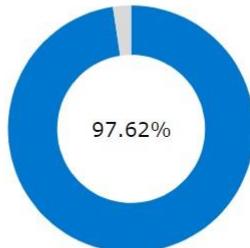
MaskDetection

Export Label data Refresh

Dashboard Data Details

Progress

164 / 168 items labeled



97.62%

Completed (164)
Skipped (0)
Pending (4)

Task queue

Category	Count
Manual	4
Prelabeled	0

Experiments

Training labeling_Training_1ab6af6a
Validation labeling_Validation_1ab6af6a
Inference Experiment not started

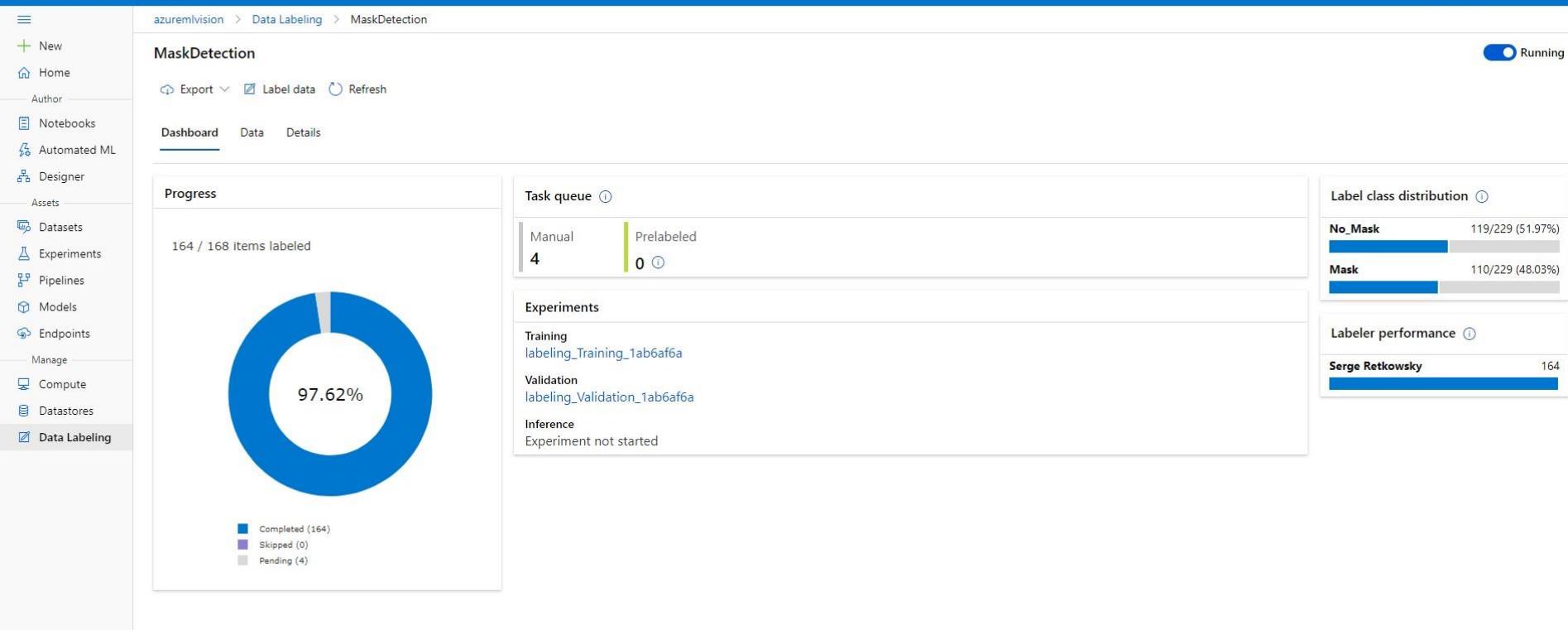
Label class distribution

Class	Count	Percentage
No_Mask	119	51.97%
Mask	110	48.03%

Labeler performance

Labeler	Count
Serge Retkowsky	164

Running



Azure Data Labeling

<https://docs.microsoft.com/en-us/azure/machine-learning/how-to-create-labeling-projects>



Submit Publish

99 assets in total Autosave on Not started

- Datasets (5)
- Sample datasets (16)
- Data Input and Output (3)
- Data Transformation (19)
- Feature Selection (2)
- Statistical Functions (1)
- Machine Learning Algorithms (18)
- Model Training (4)
- Model Scoring & Evaluation (6)
- Python Language (2)
- R Language (1)
- Text Analytics (7)
- Computer Vision (6)
- Image Data Transformation (4)
- Apply Image Transformation Microsoft
Applies a image transformation to a image directory. 9/17/2020
- Convert to Image Directory Microsoft
Convert dataset to image directory format. 9/17/2020
- Init Image Transformation Microsoft
Initialize image transformation. 9/17/2020

Image Classification using DenseNet ⚙️

99 assets in total Autosave on Not started

```
graph TD; A[Animal Images Dataset] --> B[Convert to Image Directory]; B --> C[Split Image Directory]; C --> D[Init Image Transformation]; C --> E[Apply Image Transformation]; C --> F[Apply Image Transformation]; C --> G[Apply Image Transformation]; D --> H[DenseNet]; H --> I[Apply Image Transformation]; I --> J[Train PyTorch Model]; I --> K[Apply Image Transformation]; I --> L[Apply Image Transformation]; F --> M[Apply Image Transformation]; G --> N[Apply Image Transformation]; G --> O[Apply Image Transformation];
```

Computer Vision with Azure ML Designer



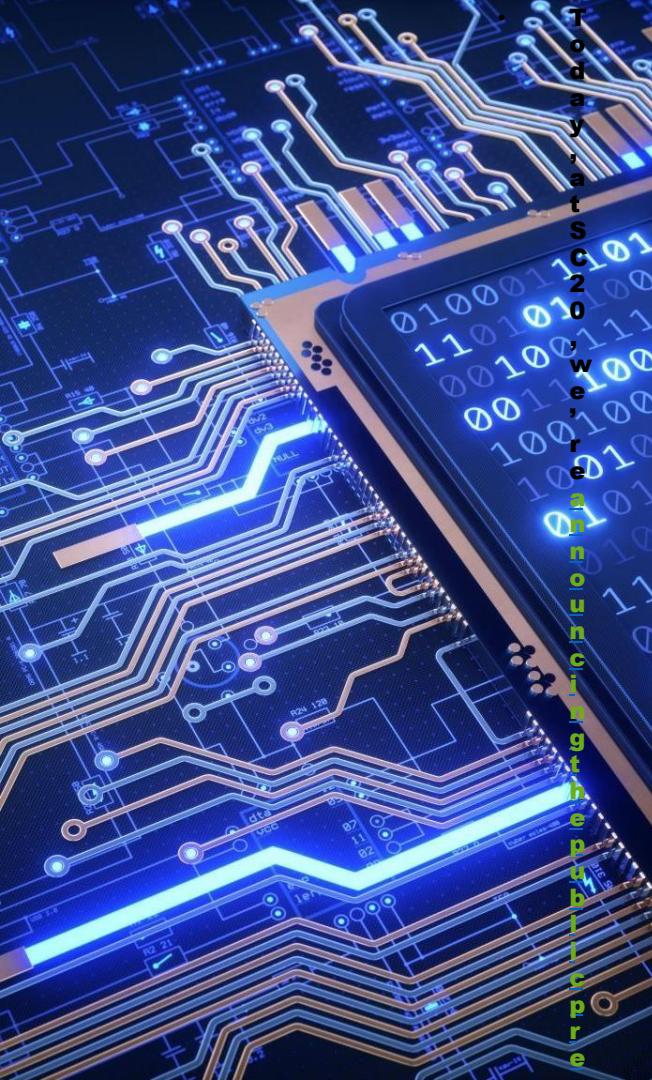
⌚ Apply Image Transformation	
👤 Microsoft	
Applies a image transformation to a image directory.	
9/17/2020	
⌚ Convert to Image Directory	
👤 Microsoft	
Convert dataset to image directory format.	
9/17/2020	
⌚ Init Image Transformation	
👤 Microsoft	
Initialize image transformation.	
9/17/2020	
⌚ Split Image Directory	
👤 Microsoft	
Partitions the images of a image directory into two distinct sets.	
9/17/2020	
Image Classification (2)	
⌚ DenseNet	
👤 Microsoft	
Creates a image classification model using the densenet algorithm.	
9/17/2020	
⌚ ResNet	
👤 Microsoft	
Creates a image classification model using the resnet algorithm.	
9/17/2020	

Computer Vision with Azure ML Designer Documentation:

- <https://docs.microsoft.com/en-us/azure/machine-learning/algorithm-module-reference/apply-image-transformation>
- <https://docs.microsoft.com/en-us/azure/machine-learning/algorithm-module-reference/convert-to-image-directory>
- <https://docs.microsoft.com/en-us/azure/machine-learning/algorithm-module-reference/init-image-transformation>
- <https://docs.microsoft.com/en-us/azure/machine-learning/algorithm-module-reference/split-image-directory>
- <https://docs.microsoft.com/en-us/azure/machine-learning/algorithm-module-reference/densenet>
- <https://docs.microsoft.com/en-us/azure/machine-learning/algorithm-module-reference/resnet>

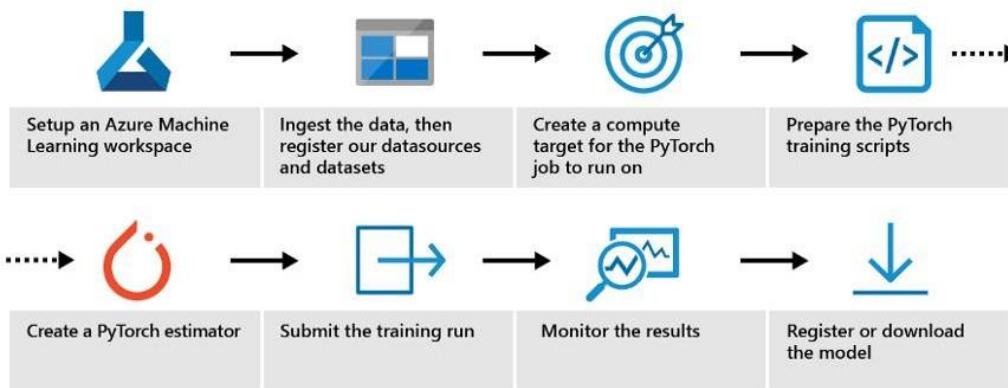
Computer Vision with Azure ML Designer





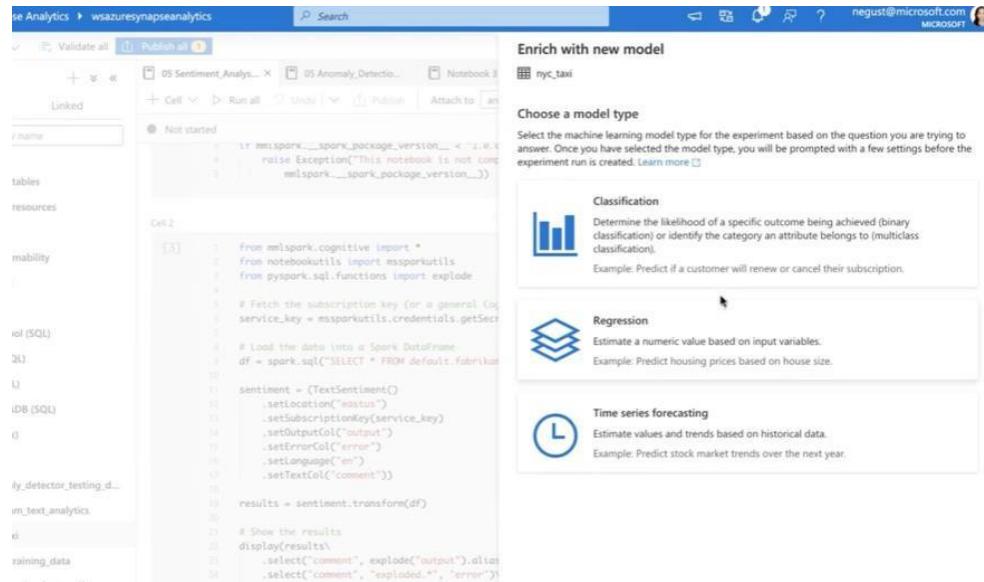
Azure Announces Public Availability of ND A100 v4 AI Supercomputing Instances (Preview)

Partnership with PyTorch



- We continue to grow our partnership with PyTorch.
- AstraZeneca, the UK-based biopharmaceutical company, is using PyTorch's natural language processing library for knowledge graphs and Azure Machine Learning to build models to recommend potential new drugs.
- [Speeding up drug discovery with advanced machine learning | by PyTorch | PyTorch | Medium](#)

Azure ML & Azure Synapse



The screenshot shows the Azure Synapse Analytics workspace. On the left, there's a sidebar with various datasets and resources. The main area shows a notebook titled '05 Sentiment_Analysis'. The code in the notebook is as follows:

```
if mlispark.__spark_package_version__ < "1.6.0":
    raise Exception("This notebook is not compatible with mlispark.__spark_package_version__ < '1.6.0'")

from mlispark.cognitive import *
from notebookutils import mlisparkutils
from pyspark.sql.functions import explode

# Fetch the subscription key for a general Cognitive Services API
service_key = mlisparkutils.credentials.getSecret("cogSubscriptionKey")

# Load the data into a Spark DataFrame
df = spark.sql("SELECT * FROM default.yelpbusinesses")

sentiment = (TextSentiment()
    .setLocation("en_us")
    .setSubscriptionKey(service_key)
    .setOutputCol("output")
    .setErrorCol("error")
    .setLanguage("en")
    .setTextCol("comment"))

results = sentiment.transform(df)

# Show the results
display(results
    .select("comment", explode("output").alias("output"))
    .select("comment", "exploded", "error"))
```

On the right, a modal dialog titled 'Enrich with new model' is open. It asks 'Choose a model type' and provides three options: 'Classification', 'Regression', and 'Time series forecasting'. Each option has a description and an example.

- Classification**: Describes binary or multiclass classification. Example: Predict if a customer will renew or cancel their subscription.
- Regression**: Estimates a numeric value based on input variables. Example: Predict housing prices based on house size.
- Time series forecasting**: Estimates values and trends based on historical data. Example: Predict stock market trends over the next year.

[Machine Learning Experiences in Azure Synapse | AI Show | Channel 9 \(msdn.com\)](#)



Resources



QnA Bot Explorer



Content Search & Intelligence



Stack Overflow Bot



Chart Reader



Custom Vision Explorer



Image Collection Insights



Bing Visual Search



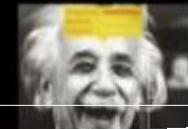
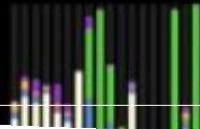
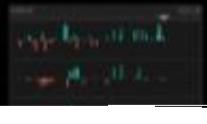
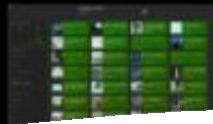
Vision API Explorer



Greeting Kiosk



Realtime Driver Monitoring



Intelligent Kiosk

- **Installation Instructions:** <http://aka.ms/intelligentkiosk>
- **Direct download:** <http://aka.ms/kioskapp>
- **Kiosk sample on GitHub:** <https://github.com/Microsoft/Cognitive-Samples-IntelligentKiosk/>

Seeing AI app from Microsoft for iOS



Introducing Seeing AI

Hear a brief overview of the Seeing AI app.

[▷ Play video about Seeing AI app](#)

Short Text Demo

Learn how to instantly hear short snippets of text.

[▷ Play video about Short Text](#)

Document Demo

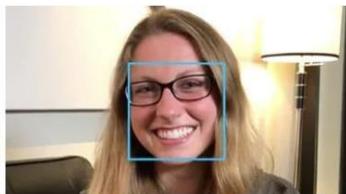
A guide on how to make the most of the Document channel.

[▷ Play Document channel video](#)

Product Recognition Demo

Listen to audio cues to locate barcodes and identify products.

[▷ Play Product channel video](#)



Person Demo

Learn how to use Seeing AI to engage with people around you.

[▷ Play Person channel video](#)

Scene Demo

Learn more about this experimental channel that describes what's in front of you.

[▷ Play Scene channel video](#)

Currency Demo

A guide for using the app to read currency bills.

[▷ Play Currency channel video](#)

Recognize Images In Other Apps

Describe images in your photo gallery and other apps including Mail, Twitter, WhatsApp and more.

[▷ Play video to learn about this feature](#)

[Seeing AI App from Microsoft](#)

Azure Cognitive Services documentation

<https://azure.microsoft.com/en-us/services/cognitive-services/>

- Documentation:

<https://docs.microsoft.com/en-us/azure/cognitive-services/>

- Samples notebooks:

<https://github.com/retkowsky/AzureCognitiveServicesPython>

[retkowsky/ai-fundamentals: Code samples for AI fundamentals \(github.com\)](https://github.com/retkowsky/ai-fundamentals)



Custom Vision

- **Azure Custom Vision.ai :** <https://www.customvision.ai>
- **Documentation:**
<https://docs.microsoft.com/en-us/azure/cognitive-services/Custom-Vision-Service>
- **Custom Vision Training API:** <https://southcentralus.dev.cognitive.microsoft.com/docs/services/Custom%20Vision%20Training%203.3/operations/5eb0bcc6548b571998fddebd>
- **Custom Vision Prediction API:** <https://southcentralus.dev.cognitive.microsoft.com/docs/services/Custom%20Vision%20Prediction%203.1/operations/5eb37d24548b571998fde5f3>
- **AI Dev Kit:** <https://visionai.devkit.com>