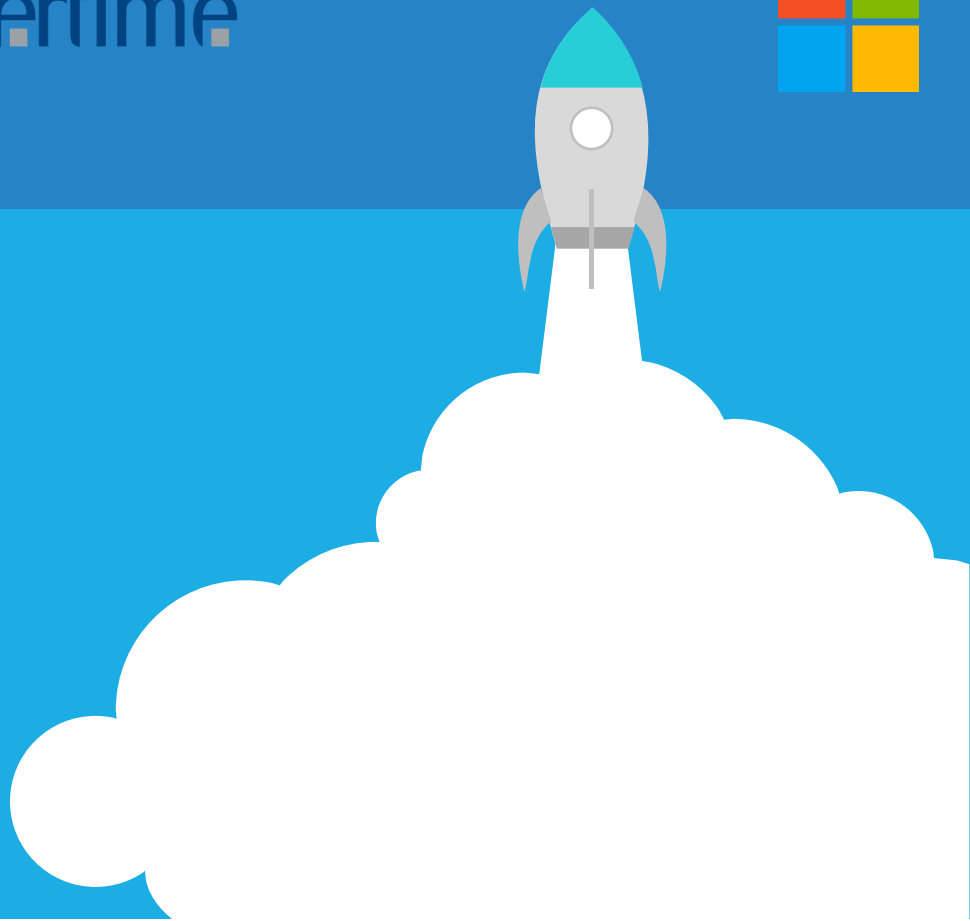
CV on Azure

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

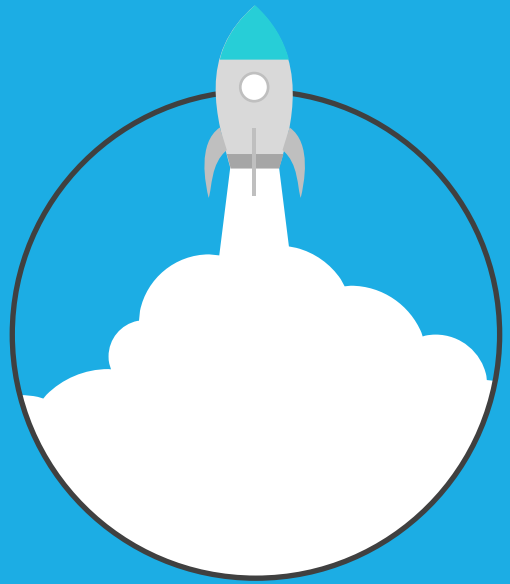
Part Two

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:

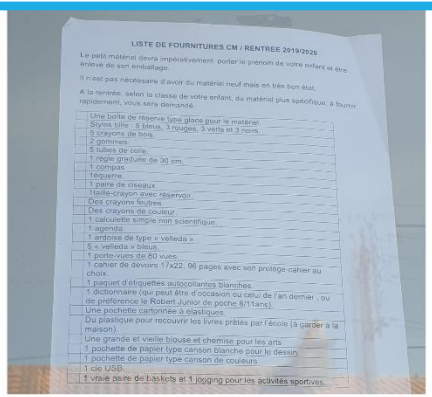
- MacNabbs: Knowledge Extraction from Unstructured Data using Semantic Analysis and User Activity Logging (11.2019)
- Comparative analysis of GIS in sight of view of renewable energy sources monitoring (03.2016)
- Virtual Physics Experiment in High Educational Institutions (08.2015)

Expertime

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

180
collaborateurs

20 M€ (p)
chiffre d'affaires



LISTE DE FOURNITURES CM / RENTREE 2019/2020

Le petit matériel devra impérativement porter le prénom de votre enfant et être enlevé de son emballage.

Il n'est pas nécessaire d'avoir du matériel neuf mais on très bon état.

A la rentrée, selon la classe de votre enfant, du matériel plus spécifique, à fournir rapidement, vous sera demandé.

- Une boîte de réserve type glace pour le matériel
- Stylos bille : 5 bleus, 3 rouges, 3 verts et 3 noirs
- 5 crayons de bois
- 2 gommes
- 5 tubes de colle
- 1 règle graduée de 30 cm
- 1 compas
- 1équerre
- 1 paire de ciseaux
- 1taille-crayon avec réservoir
- Des crayons feutres
- Des crayons de couleur
- 1 calculette simple non scientifique
- 1 agenda
- 1 ardoise de type « velleda »
- 5 « velleda » bleus
- 1 porte-vues de 80 vues
- 1 cahier de devoirs 17x22, 96 pages avec son protège-cahier au choix
- 1 paquet d'étiquettes autocollantes blanches
- 1 dictionnaire (qui peut être d'occasion ou celui de l'an dernier , ou de préférence le Robert Junior de poche 8/11ans).
- Une pochette cartonnée à élastiques
- Du plastique pour recouvrir les livres prêtés par l'école (à garder à la maison)
- Une grande et vieille blouse et chemise pour les arts
- 1 pochette de papier type canson blanche pour le dessin
- 1 pochette de papier type canson de couleurs
- 1 clé USB
- 1 vraie paire de baskets et 1 jogging pour les activités sportives.

City	School	Class	UserRequest	ProductCode	Quantity	ProductName
CALAIS	Ecole primai	CM1_Liste d	styyos bille 5 b	8308621	1	bic cristal stylos bille ast x4
CALAIS	Ecole primai	CM1_Liste d	5 crayons de boi	919261	3	bic kids learner crayon à papier x2
CALAIS	Ecole primai	CM1_Liste d	2 gommes	926272	2	bic précision gomme x1
CALAIS	Ecole primai	CM1_Liste d	5 tubes de colle	950641	1	bic bâtons de colle décors 8 g x6
CALAIS	Ecole primai	CM1_Liste d	1 règle graduée	330172	1	trousse formes assorties polyester color exacompta
CALAIS	Ecole primai	CM1_Liste d	1 compas	935708	1	bic compas avec crayon à papier x1
CALAIS	Ecole primai	CM1_Liste d	i équerre	300008	1	kit de traçage 1 règle de 30 cm 1 équerre 60 ° 21 cm 1
CALAIS	Ecole primai	CM1_Liste d	1 aire de ciseau	926278	1	bic comfort ciseaux 13 cm x1
CALAIS	Ecole primai	CM1_Liste d	1 a enda	null		1 non disponible
CALAIS	Ecole primai	CM1_Liste d	1 ardoise de typ	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 mullti-class classifier and create a shopping cart

Text classification + OCR

ID product	Designation	Photo	Original	Recommandation selon Texte	Recommandation selon Image	...
1022160	Bonnet de vélo coupe vent Craft		Montres Montres VTT non communiqué	Bonneterie - Manchettes - Jambières (100%) Bonnet de Sport (100%) non communiqué (93%) Homme (99%)	Bonneterie - Manchettes - Jambières (97%) Casquette Vintage (route, coursier) (28%) Outdoor (8%) Homme (63%)	Autre

Product classification

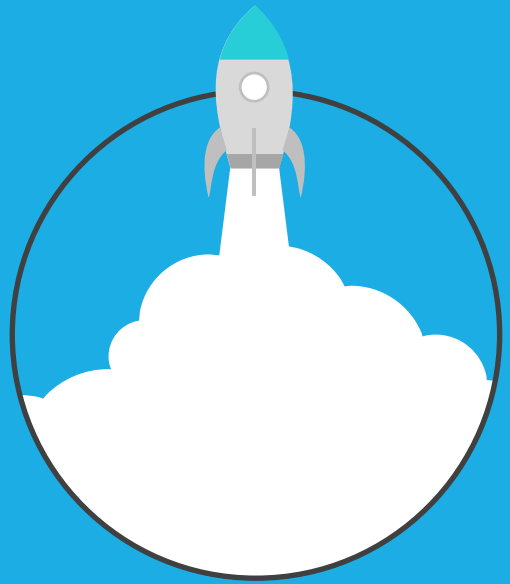
Connect to the e-commerce site and get all the products uploaded by the partners to the marketplace.

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.

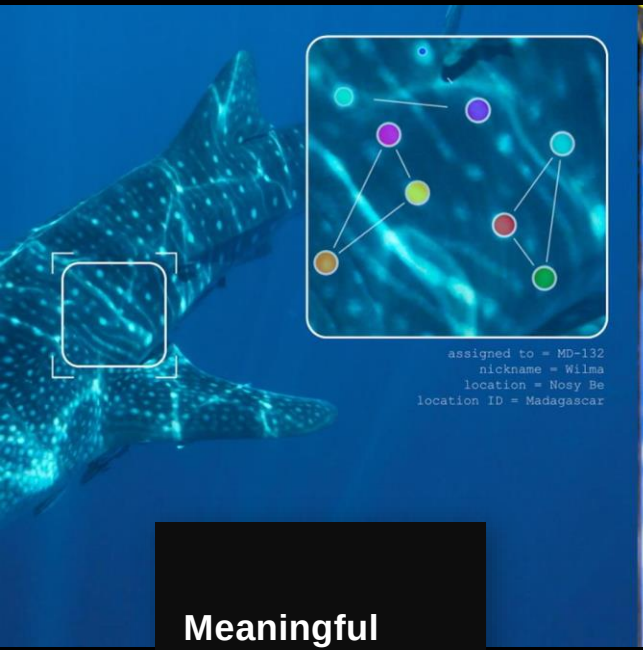


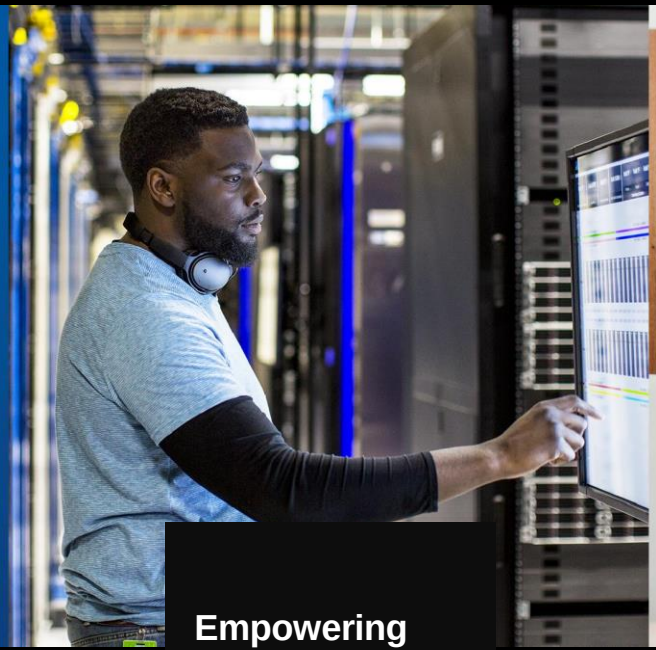
Part One

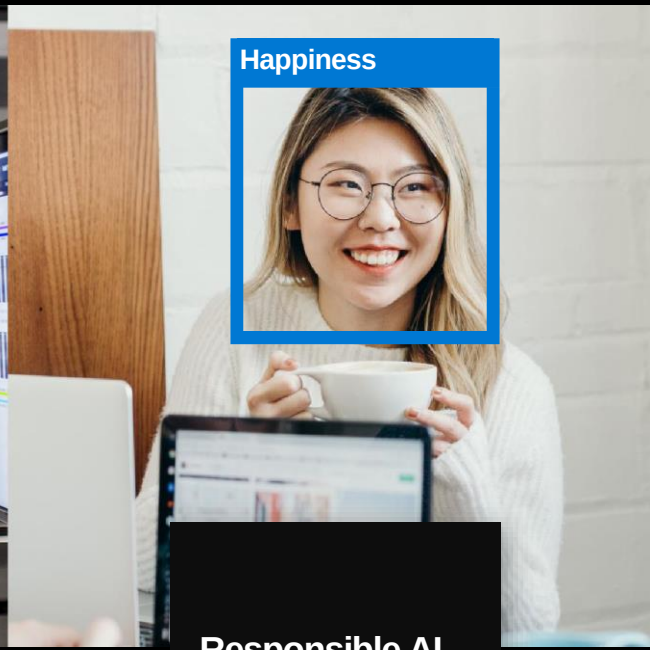
Azure Cognitive Services

Azure AI Cognitive services

Microsoft's AI Approach







Meaningful Innovation

Empowering People

Responsible AI

Democratizing AI for every employee

https://azurecharts.com/overview

Azure Services Overview

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

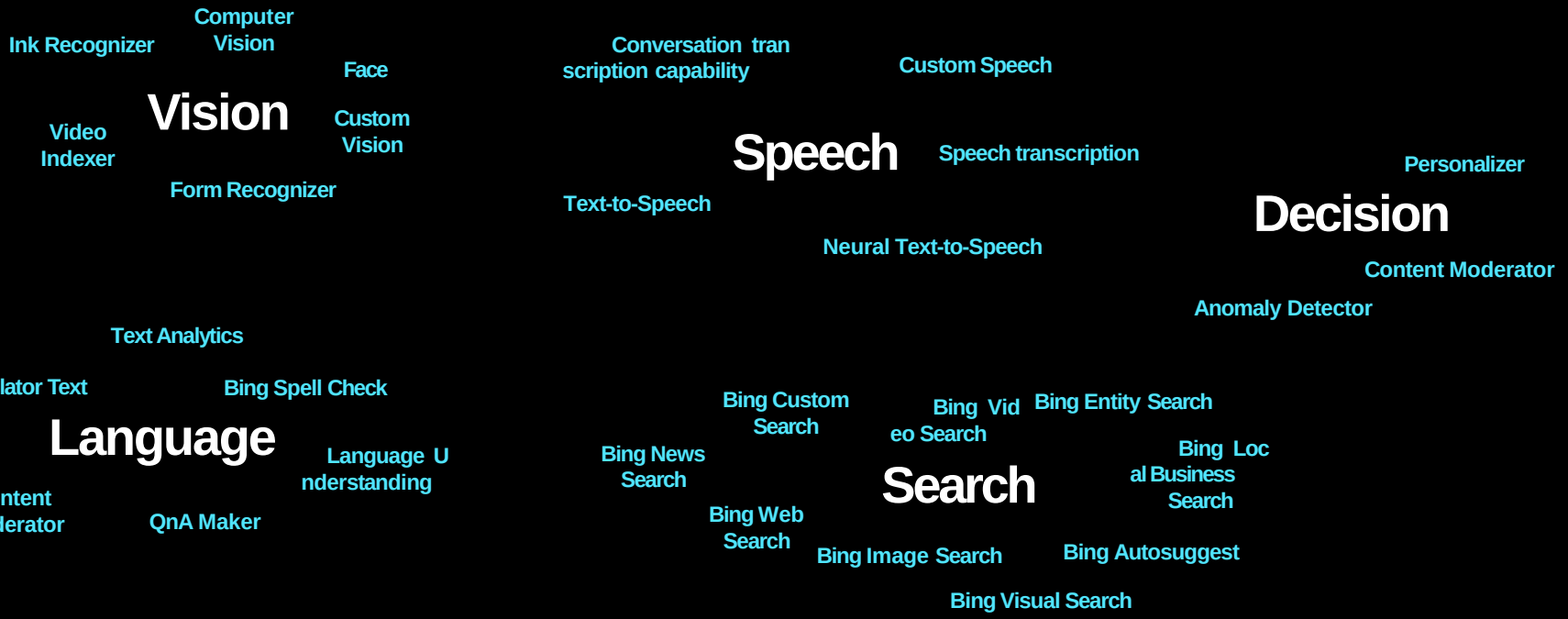

GPU

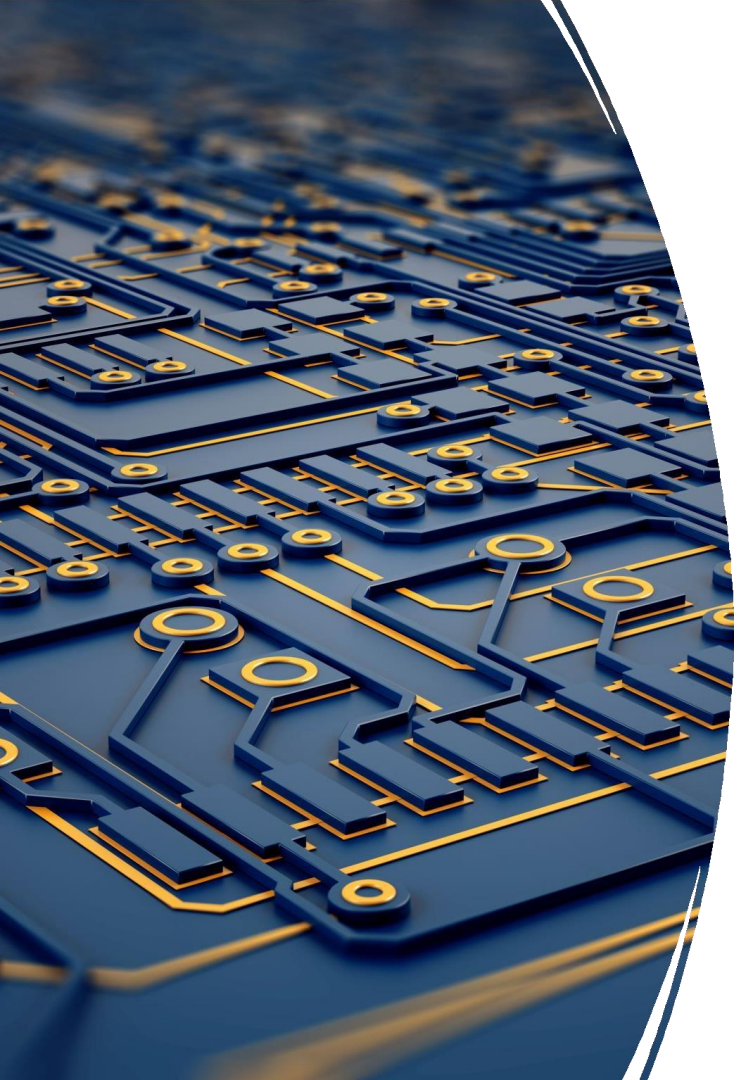

FPGA


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

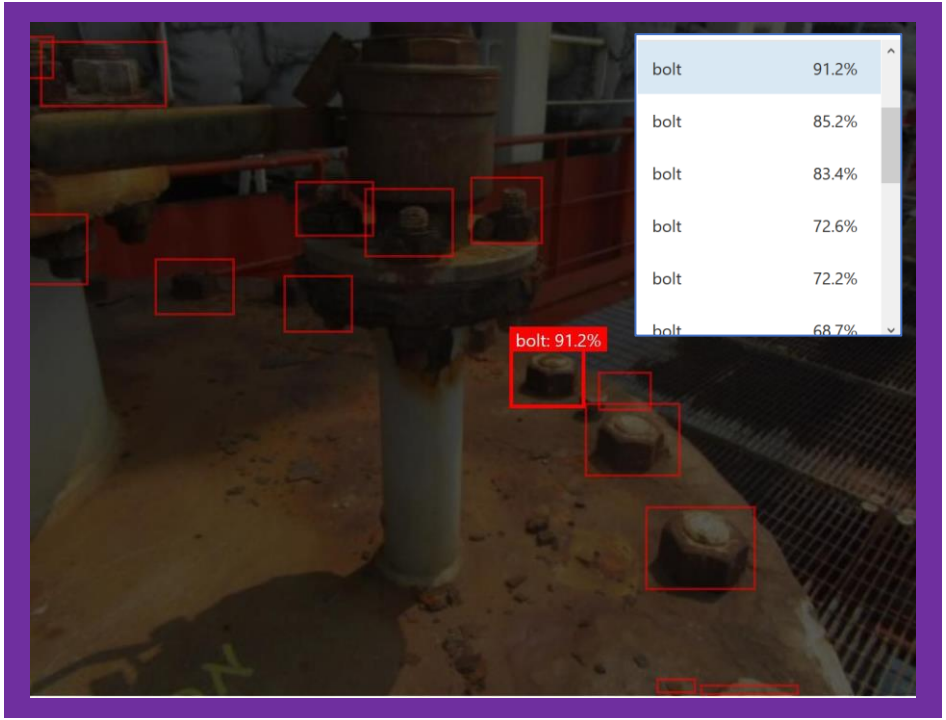
Locate rectangular areas containing known objects in an image

Image Classification Common Scenarios

Scaffold	95.0%
Guardrail	89.3%
Water	60.7%

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

Object Detection Common Scenarios

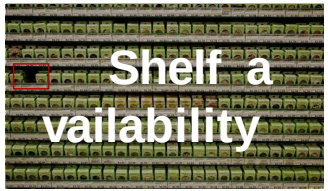


- Object counting
- Locate an object or a group of objects
- Size / measurements

Some computer vision references

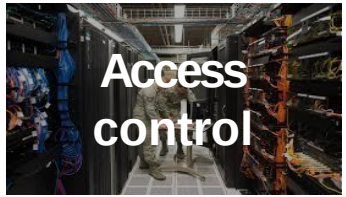
In IoT Computer Vision is about converting Cameras into Sensors

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

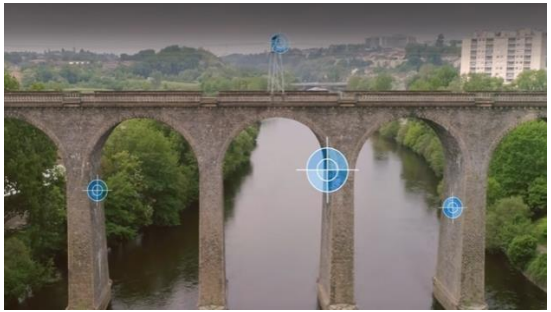
Bühler’s mission is to i mprove food quality an d safety

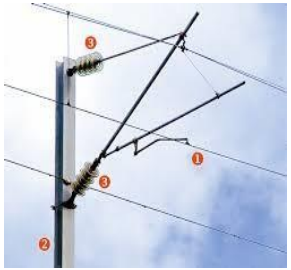
Bühler’s LumoVision solution is a data-driven optical grain sorter that is connected to Azure for data analysis. It uses powerful cameras an d ultraviolet lighting to hunt for hidden infecti ons, sorting good corn from bad corn.

BÜHLER

▷ 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

https://customers.microsoft.com/fr-fr/story/altametris-viseo-azure-travel-transportation-france-fr

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

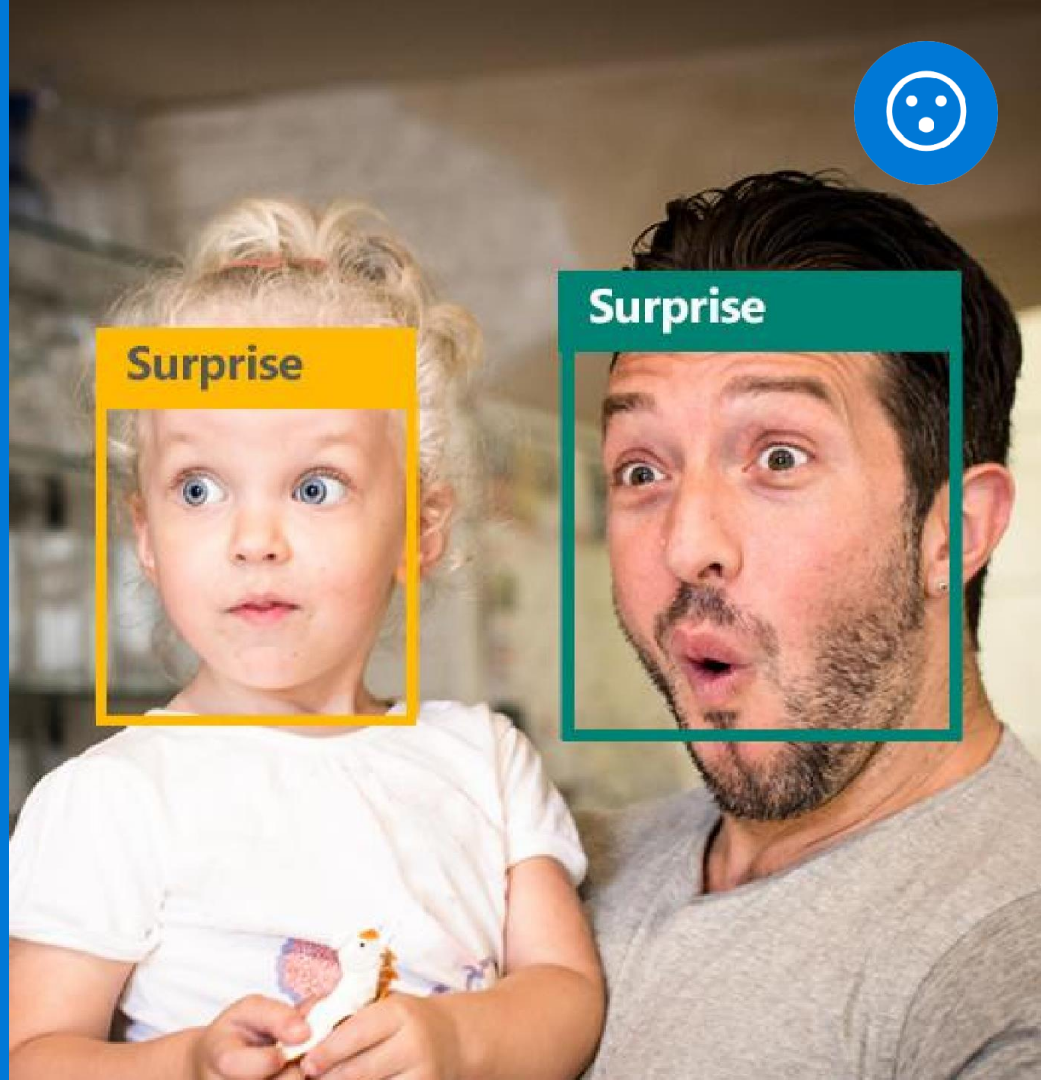
Emotion

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

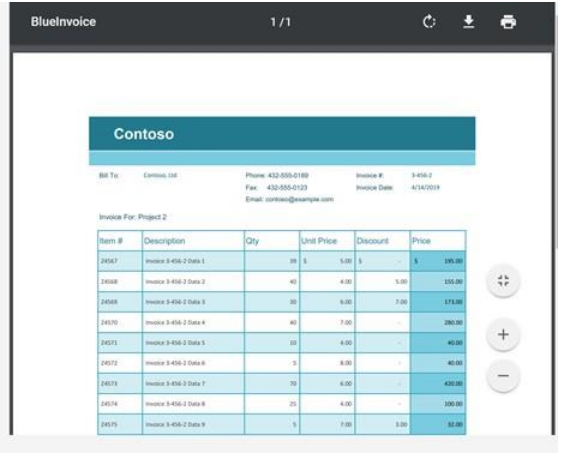
OCR
Detect and recognize words within an image

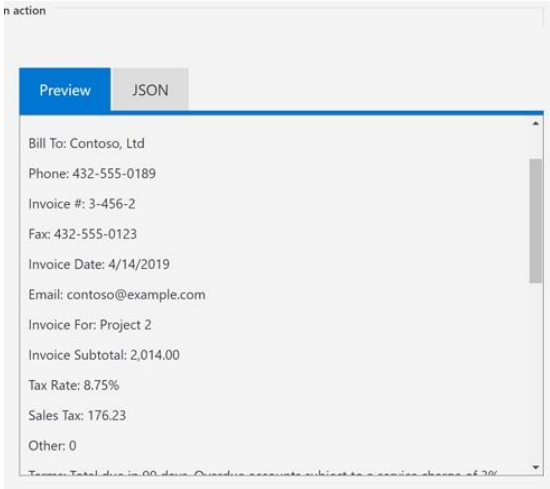
Generate thumbnail
Scale and crop images, while retaining key content

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 machin e learning technology to quickly and mor e accurately extract text and data from b usiness's forms and documents. With con tainer support, this service can run on-pr emises and in the cloud. Automate inform ation extraction quickly and tailor to speci fic content, with only 5 samples, and no manual labeling.





https://azure.microsoft.com/en-us/services/cognitive-services/form-recognizer/

Content Moderator

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

Image moderation

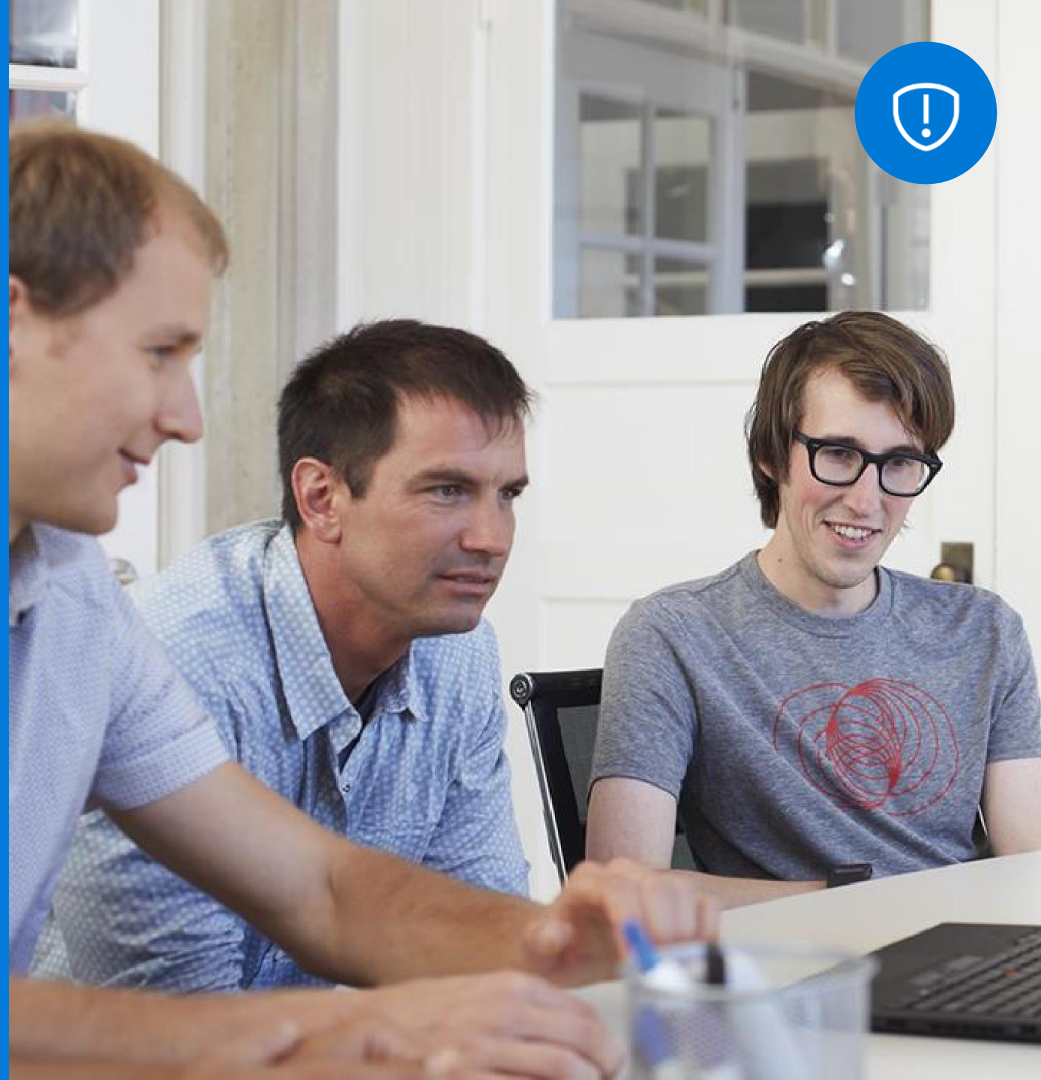
Machine-learning based classifiers, custom blacklists, and Optical Character Recognition (OCR)

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



Video Indexer

Video Indexer

Unlock video insights

Upload your video and go

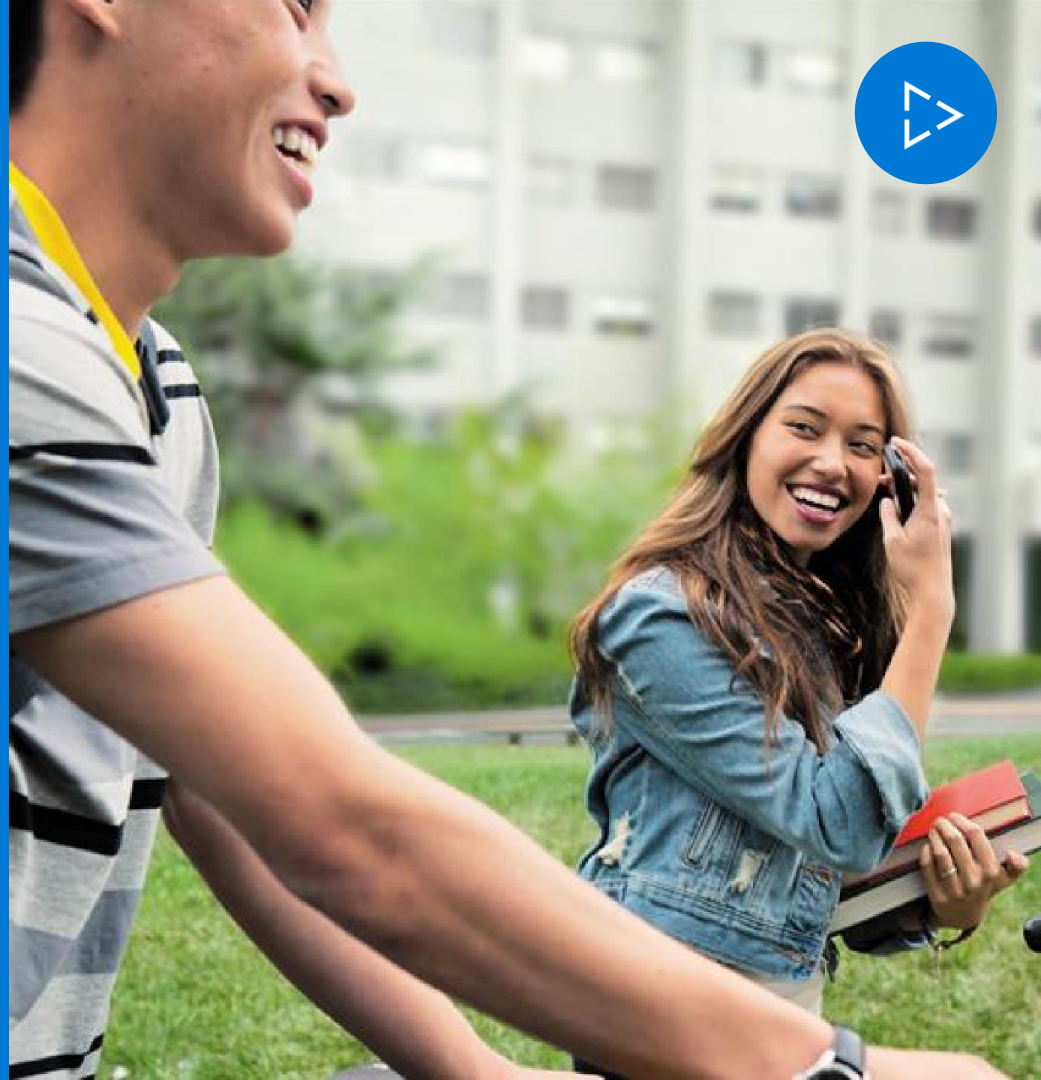
Start turning your video into insights right away.

Make your content more discoverable

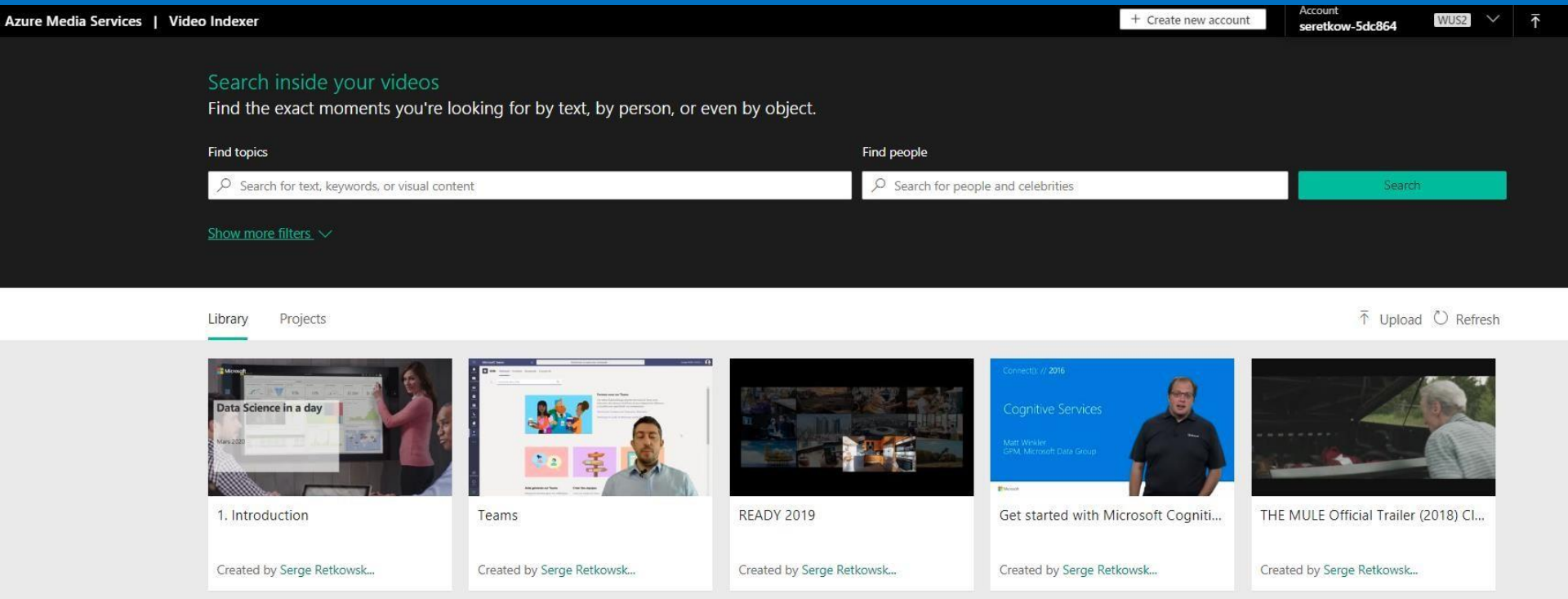
Enhance content discovery experiences such as search results by detecting spoken words, faces, characters, and emotions

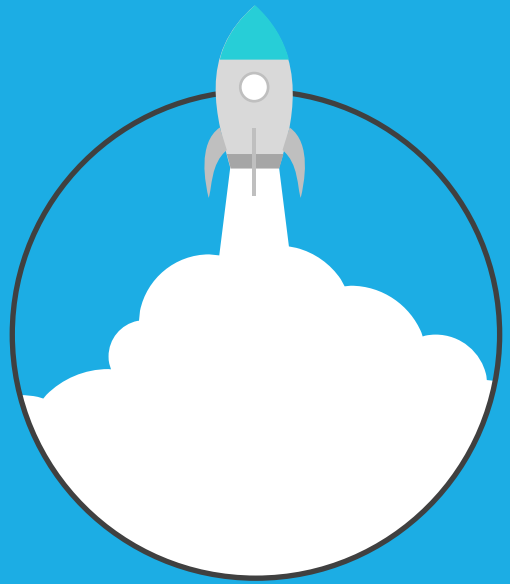
Improve engagement with your video

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



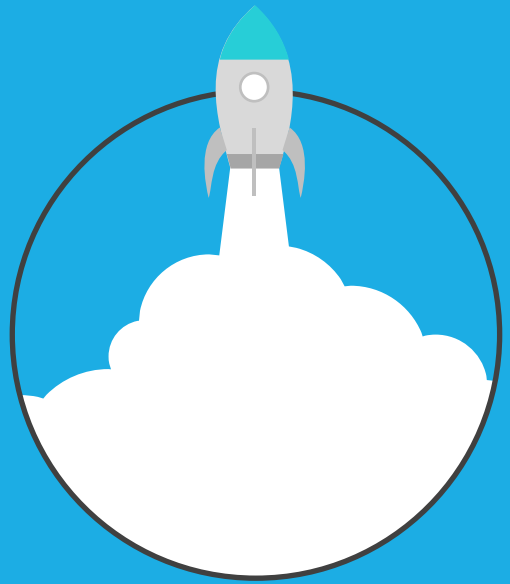
Video Indexer – www.videoindexer.ai/





Hands-on Lab

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



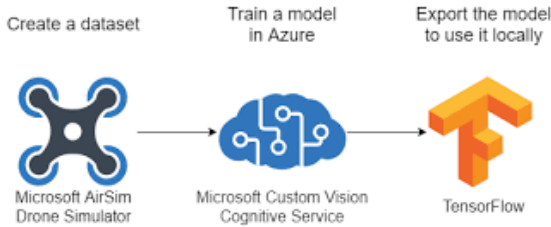
Part Two

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

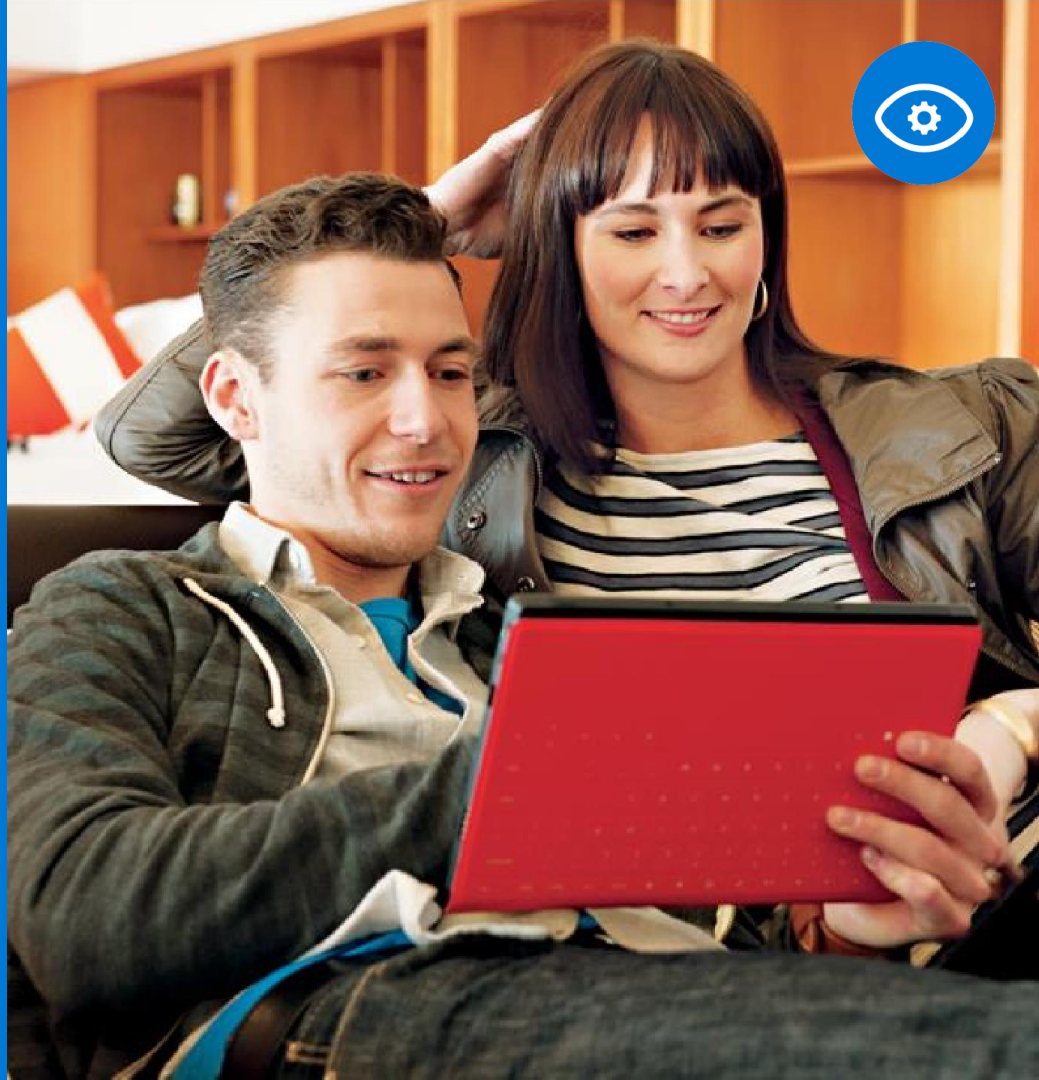
Use your labeled images to teach Custom Vision Service the concepts you want it to learn

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



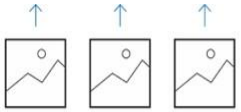
Custom Vision

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.

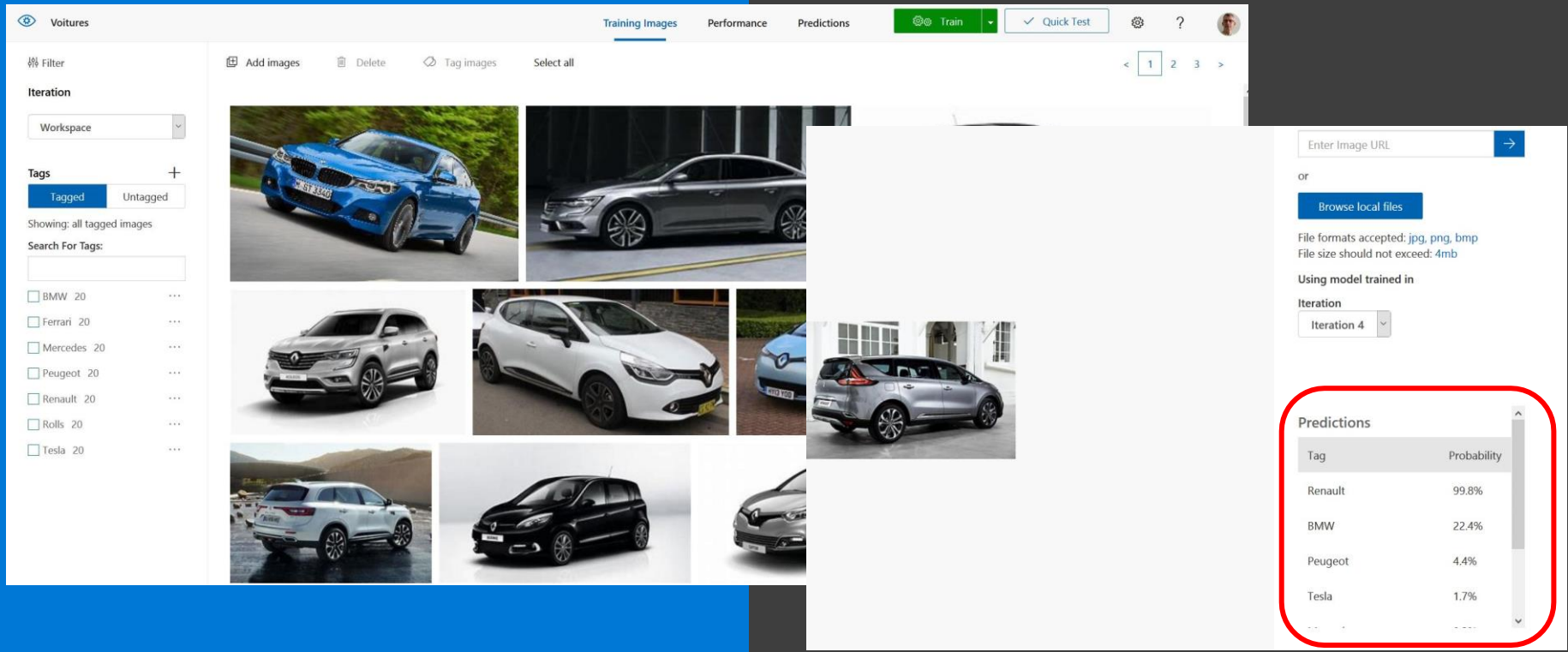
Train

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

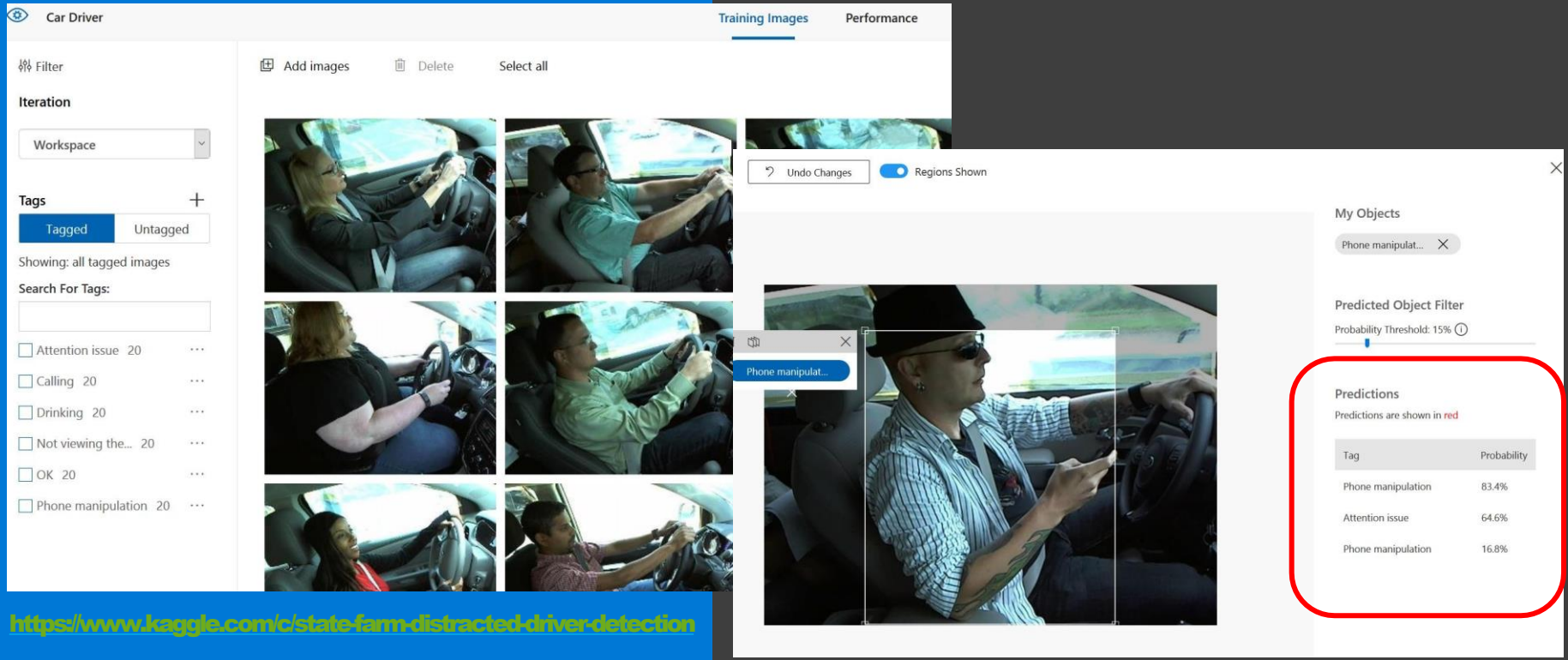
Evaluate

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

Custom Vision for categorisation

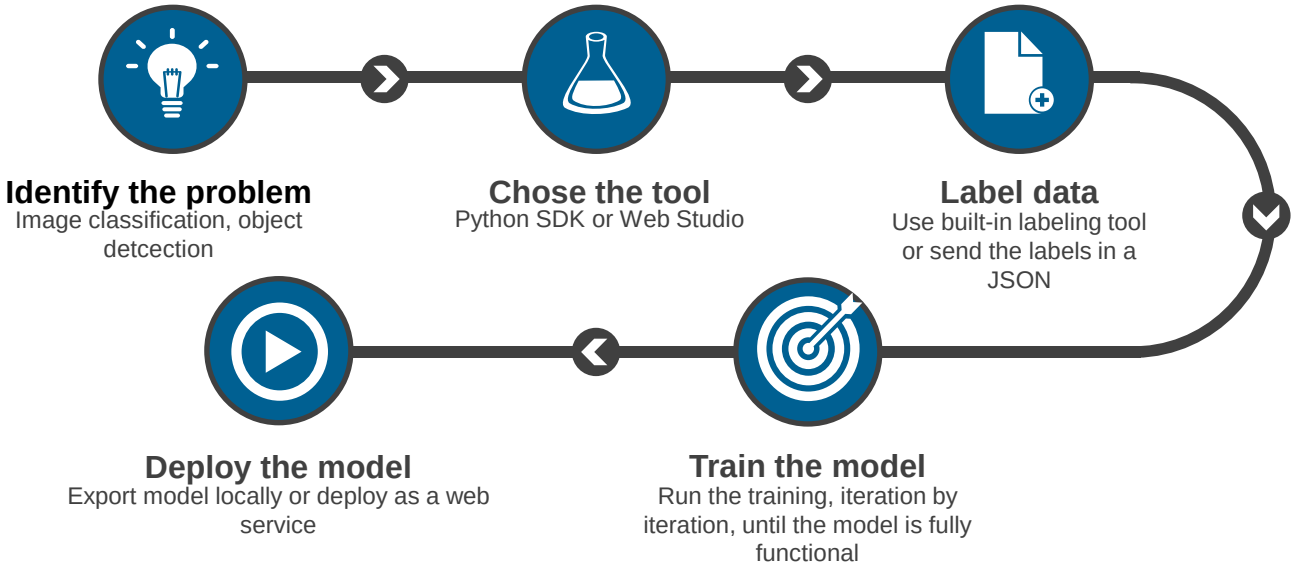


Custom Vision for Object Detection



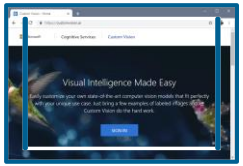
https://www.kaggle.com/c/state-farm-distracted-driver-detection

Transfer Learning on Azure : Custom Vision

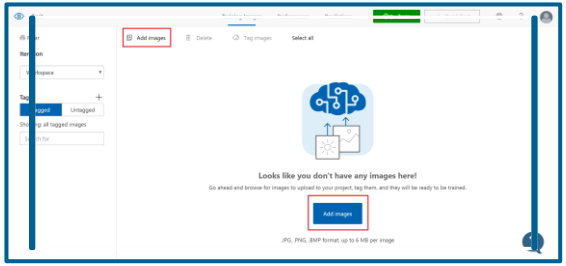


Azure Custom Vision workflow

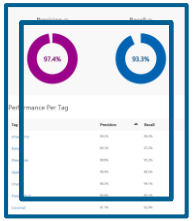
How it works



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

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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.

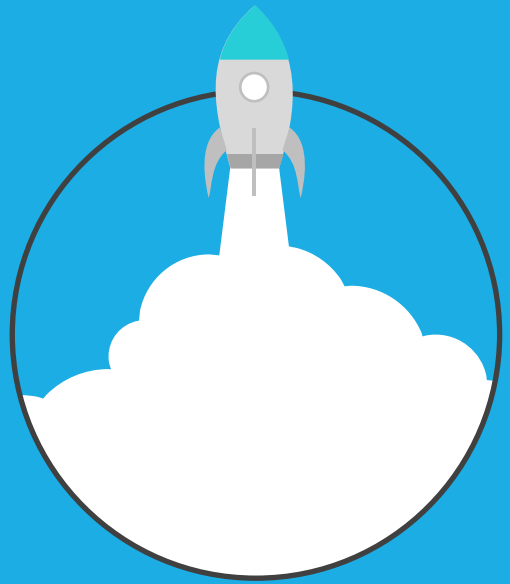
Multilabel classification applies any number of your tags to an image (zero or more), while multi class classification sorts images into single categories (every image you submit will be sorted int o the most likely tag).

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

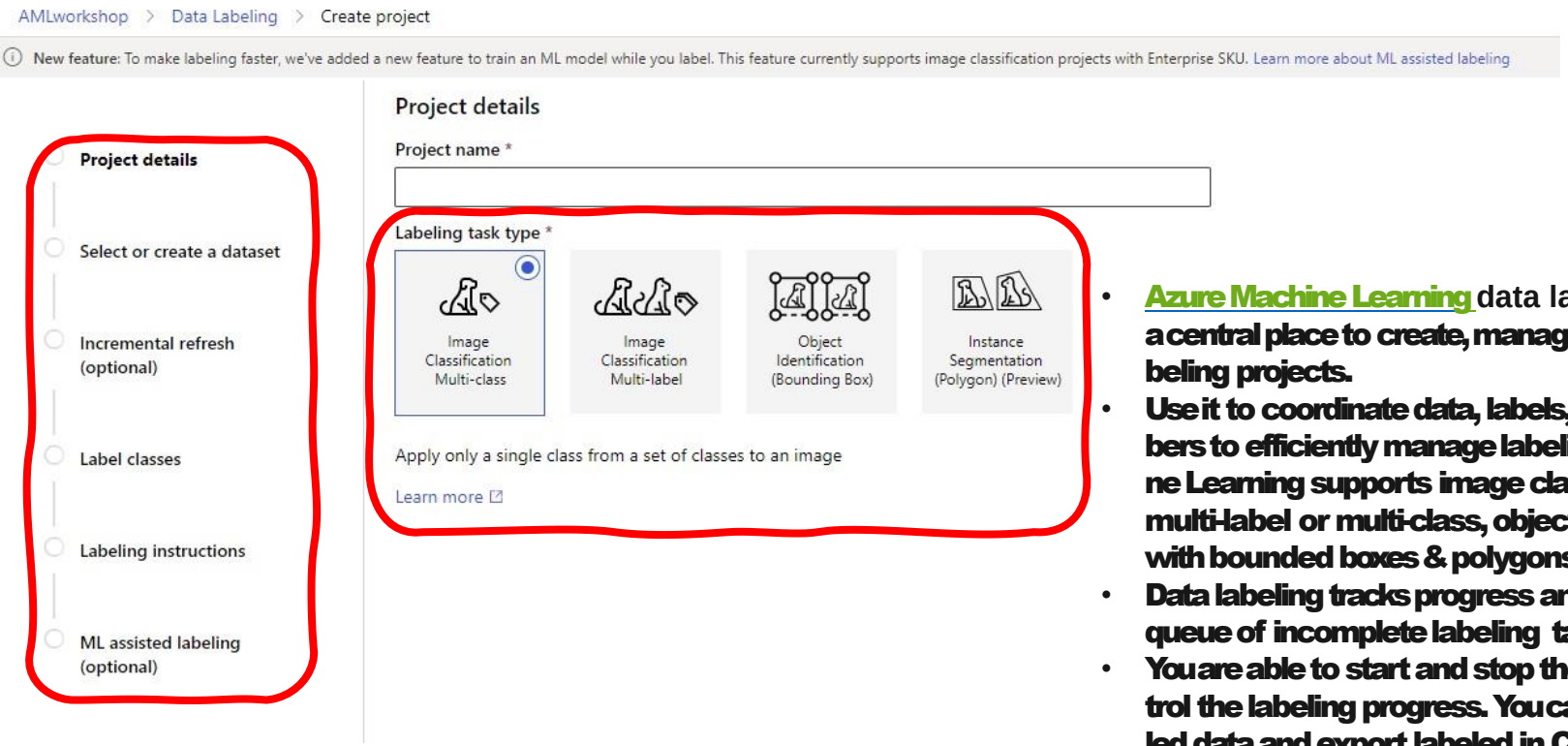

Microsoft
Azure ML updates

Custom vision with Azure ML

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.

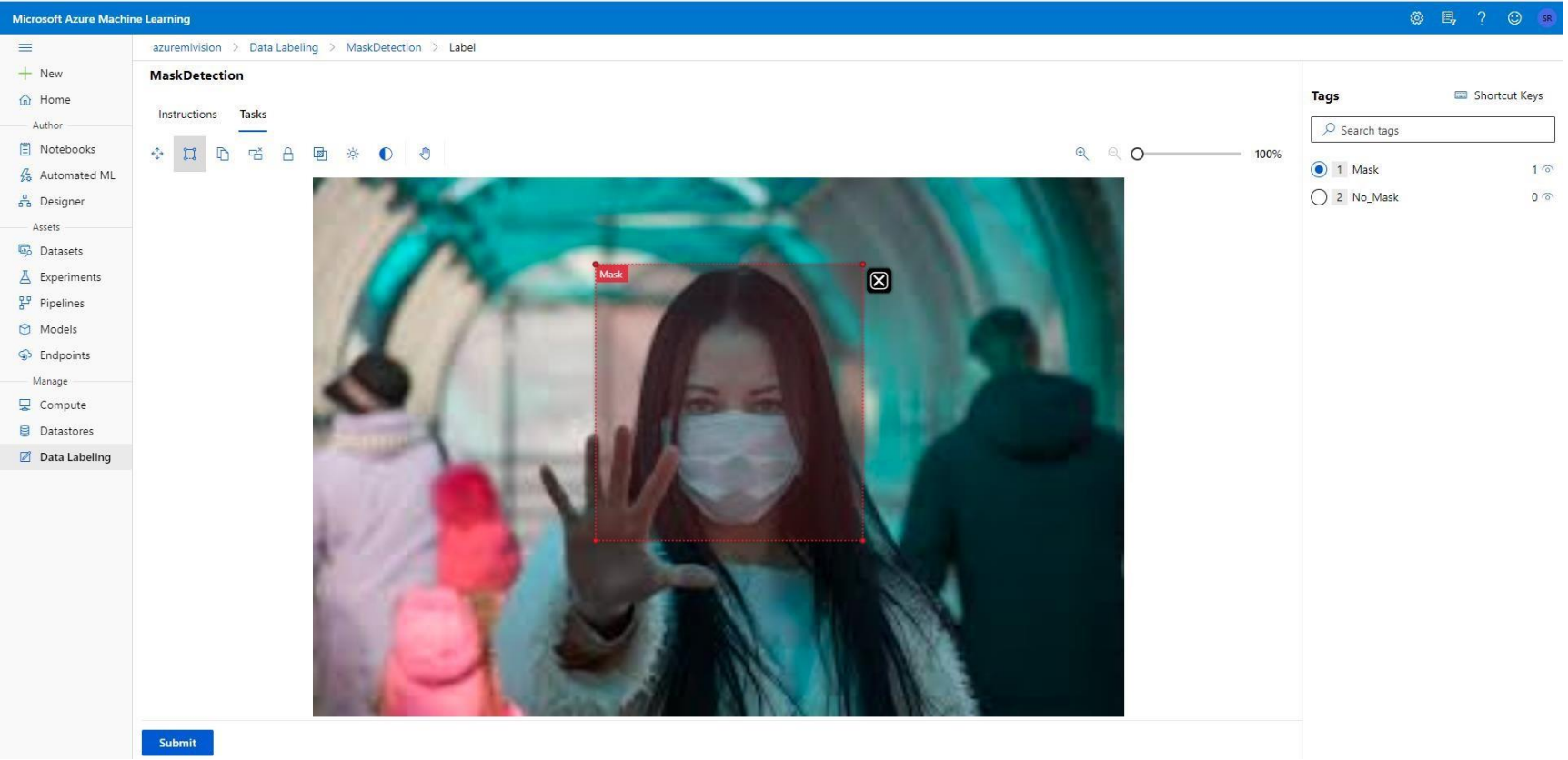


- **Azure Machine Learning data labeling gives you a central place to create, manage, and monitor labeling projects.**
- **Use it to coordinate data, labels, and team members to efficiently manage labeling tasks. Machine Learning supports image classification, either multi-label or multi-class, object 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 as an Azure Machine Learning dataset.**

Azure Data Labeling

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

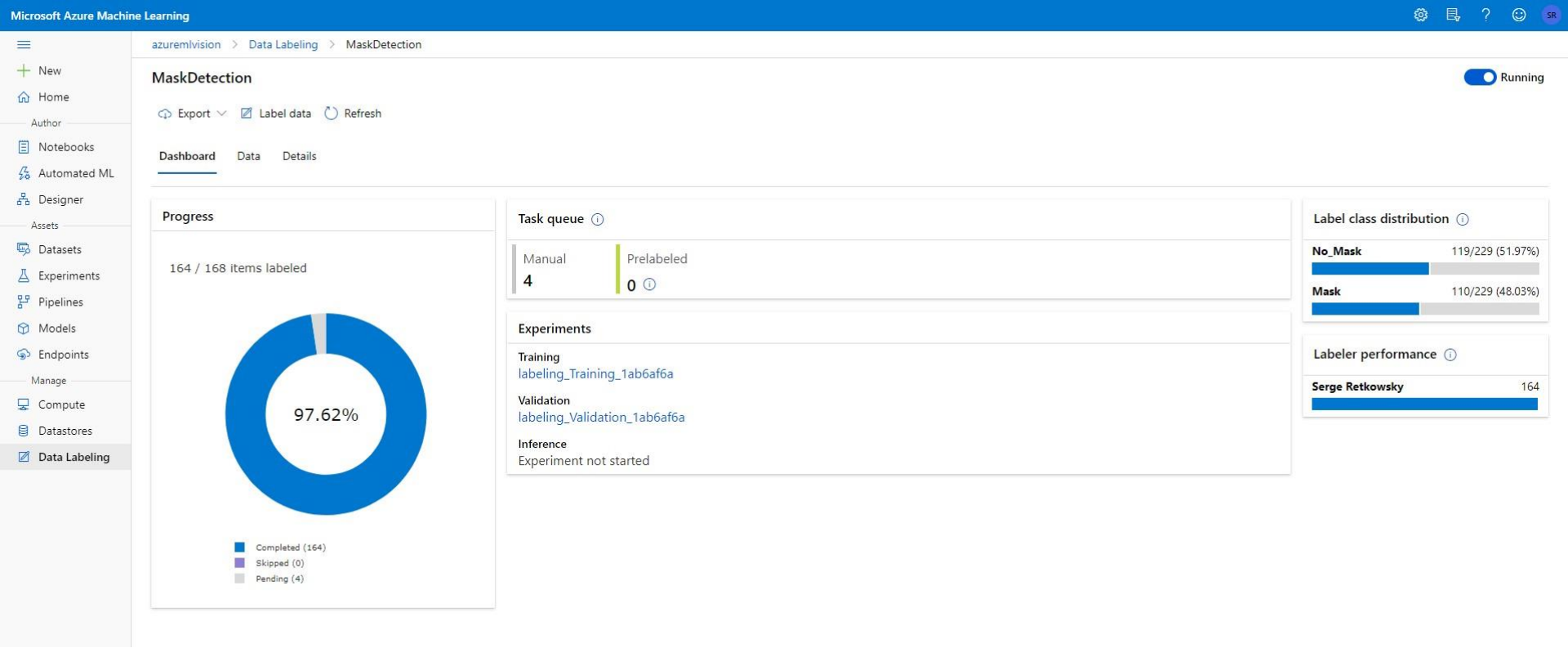
Azure Machine Learning



Azure Data Labeling

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

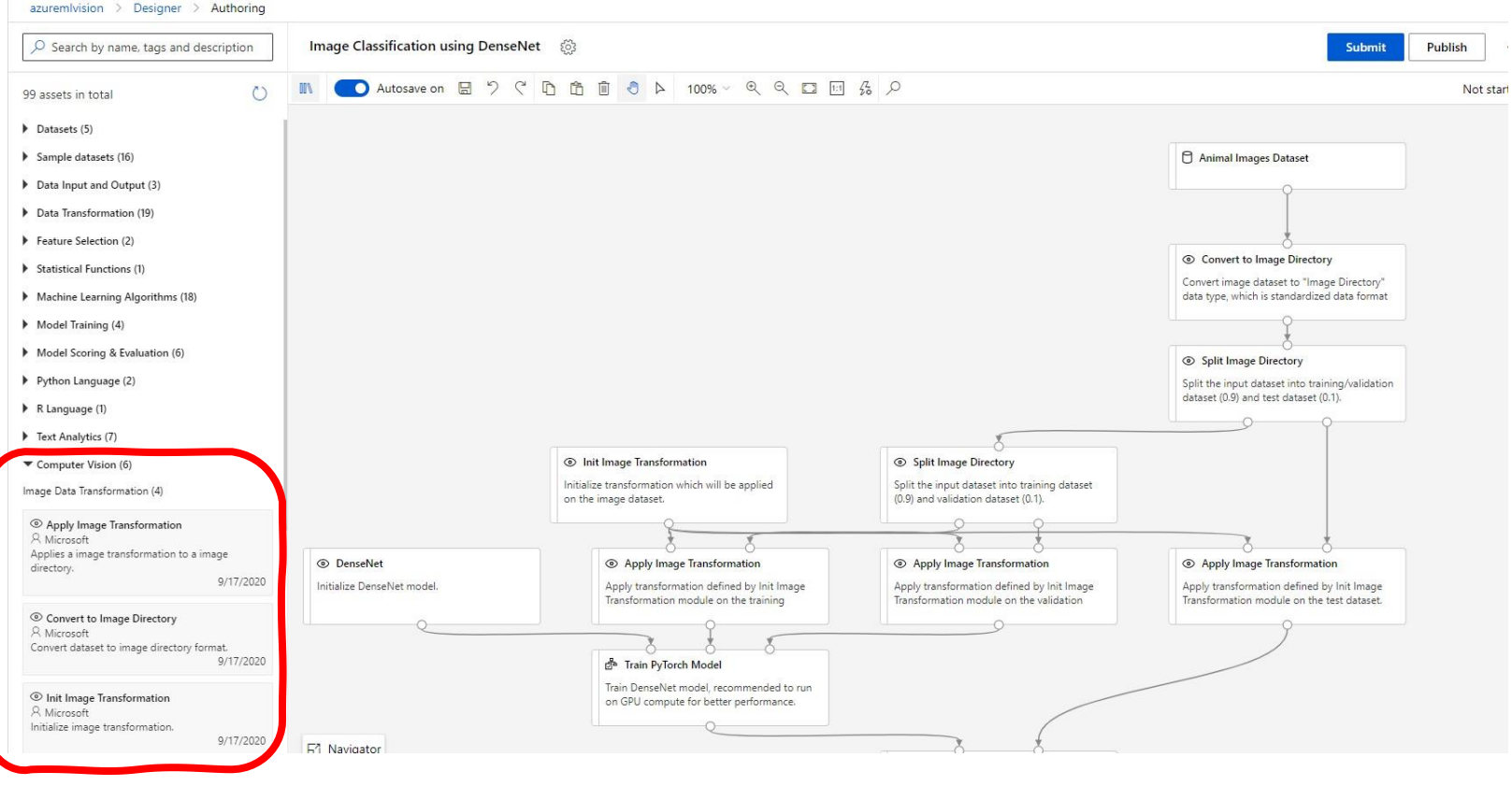
Azure Machine Learning



Azure Data Labeling

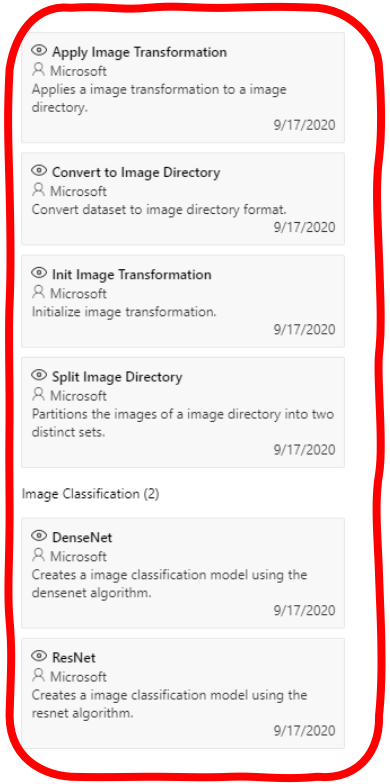
https://docs.microsoft.com/en-us/azure/machine-learning/how-to-create-labeling-projects

Azure Machine Learning



Computer Vision with Azure ML Designer

Azure Machine Learning

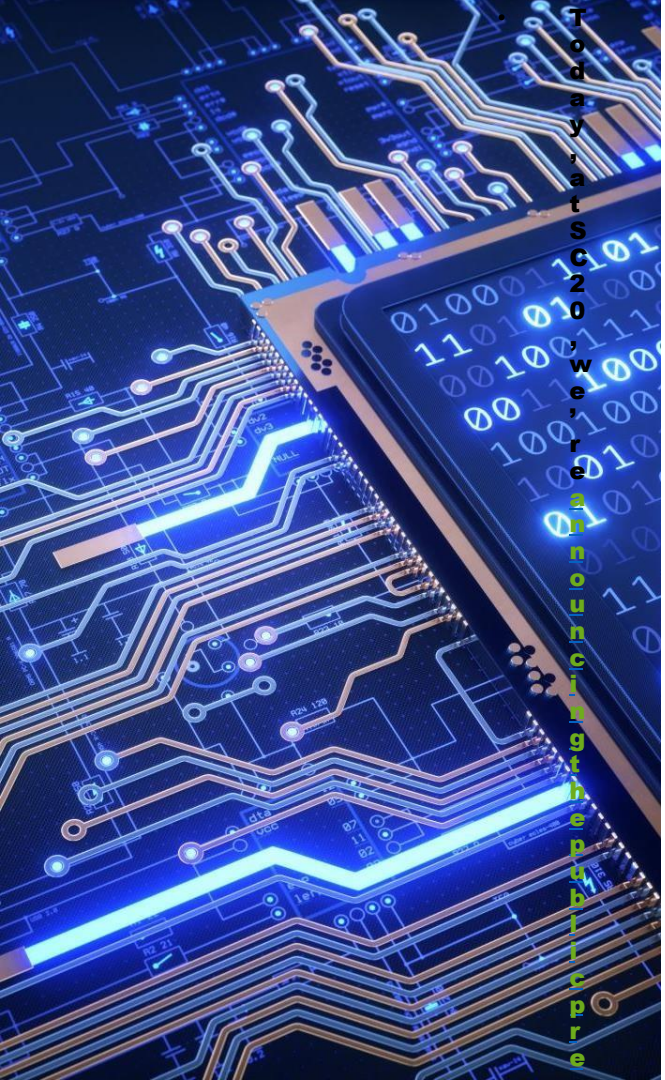


Computer Vision with Azure ML Designer Documentation:

- 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

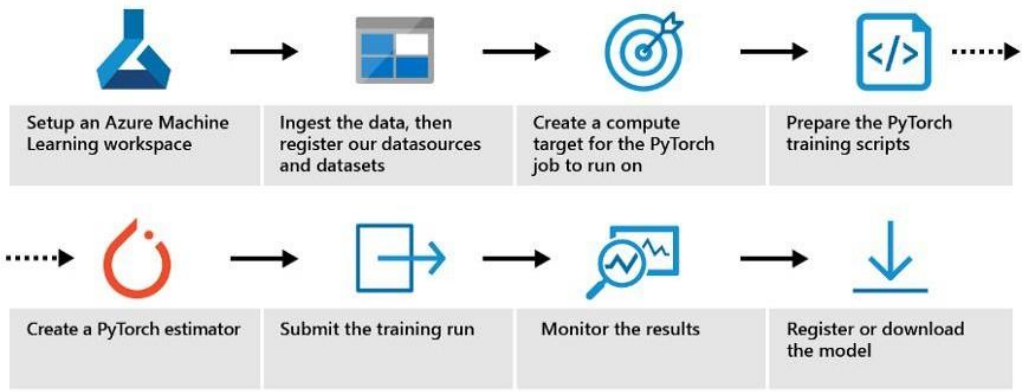
Azure Machine Learning



Today, at SC20, we're announcing the public pre

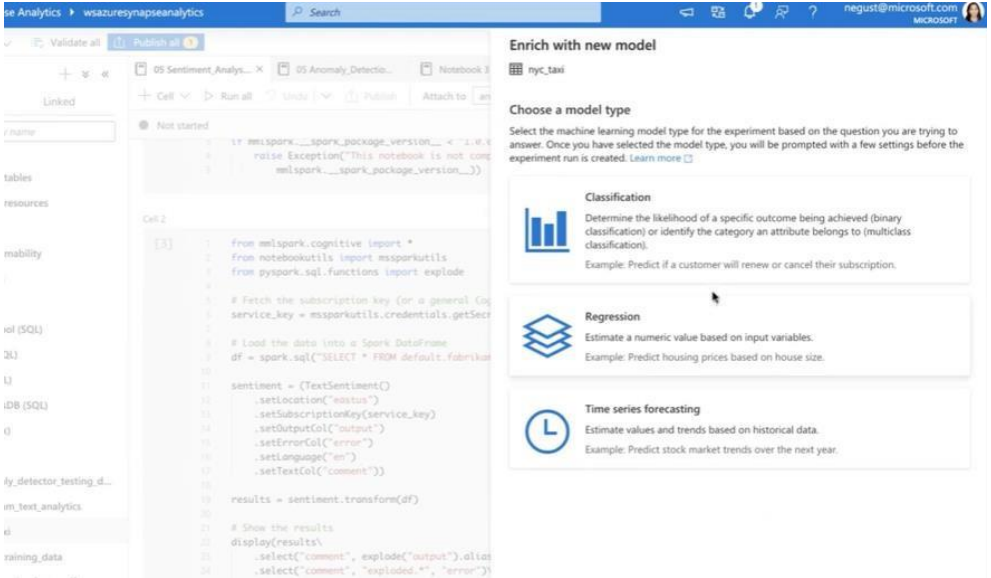
Azure Announces Public Availability of ND A100 v4 AI Supercomputing Instances (Preview)

Partnership with PyTorch



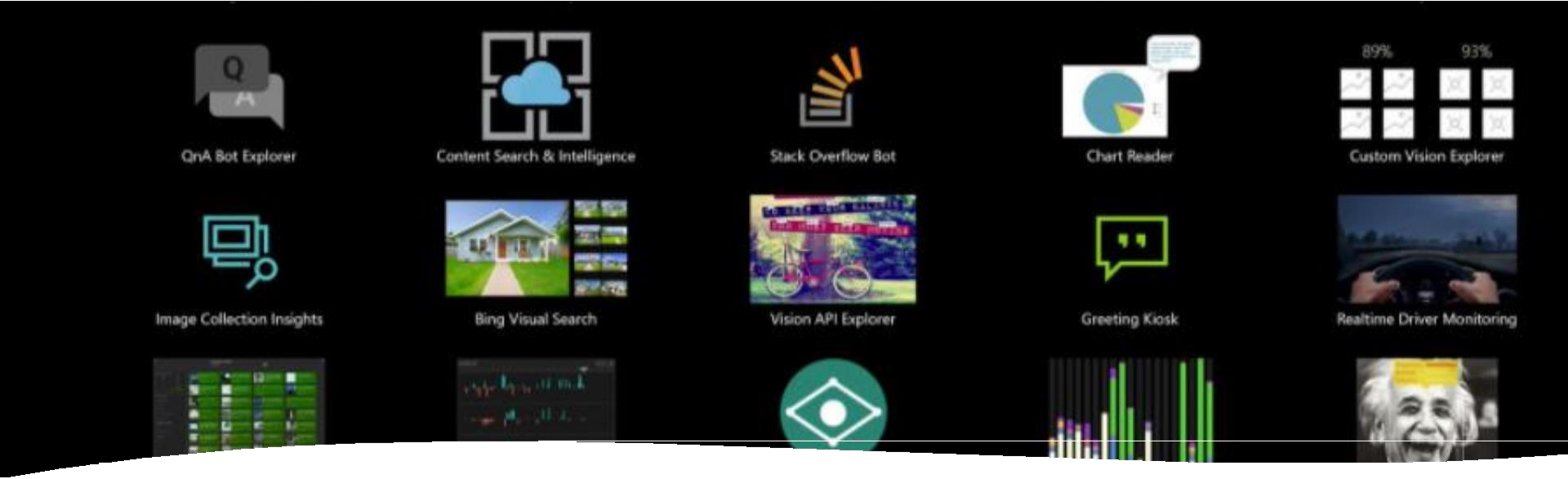
- We continue to grow our partnership with PyTorch.
- AstraZeneca, the UK-based biopharmaceutical company, is using PyTorch's natural language processing library for knowledge graphs and Azure Machine Learning to build models to recommend potential new drugs.
- Speeding up drug discovery with advanced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

Azure ML & Azure Synapse



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

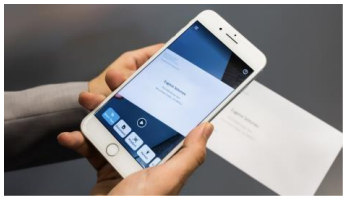
Resources



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

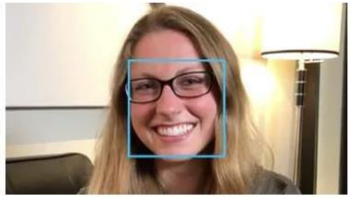


Introducing Seeing AI
Hear a brief overview of the Seeing AI app.
▷ Play video about Seeing AI app

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)

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_Vision_Training_3.3/operations/5eb0bcc6548b571998fddebd
- Custom Vision Prediction API: https://southcentralus.dev.cognitive.microsoft.com/docs/services/Custom_Vision_Prediction_3.1/operations/5eb37d24548b571998fde5f3
- AI Dev Kit: https://visionaidevkit.com