Cloud-based Partnerships for a Climate-stable Future

Lucas Joppa
Chief Environmental Officer, Microsoft
Microsoft Azure

- 54 Azure regions
- 100+ datacenters
- 140 countries
Microsoft AI & ML

Bot Service
Intelligent, serverless bot service that scales on demand

Azure Search
Fully-managed search-as-a-service

Bing Custom Search
An easy-to-use, AI-first, commercial-grade search tool that lets you deliver the results you want

Bing Image Search
Search for images and get comprehensive results

Bing Spell Check
Detect and correct spelling mistakes in your app

Bing Visual Search
Get rich insights to help build compelling image applications on the懂s of your choice.

Cognitive Services
Add instant AI capabilities to enable contextual interactions.

Content Moderator
Automated image, text, and video moderation

Custom Vision
Easily customize your own state-of-the-art computer vision models for your unique use case.

Face
Detect, identify, analyze, recognize, and tag faces in photos.

Machine Learning Studio
Easily build, deploy, and manage predictive analytics solutions.

Translator Speech
Easily conduct real-time speech translation with a simple REST API call.

Linguistic Analysis
Simplify complex language concepts and parse text with the linguistic analytics API.

Ink Recognizer
An AI service that recognizes digital ink content, such as handwriting, shapes, and ink document layout.

QnA Maker
Dialog information into conversational, easy-to-navigate answers.

Speech Translation
Easily integrate real-time speech translation to your app.

Text Analytics
Easily evaluate sentiment and topics to understand what users want.

Translator Text
Easily conduct machine translation with a simple REST API call.

Kinect DK
Build computer vision and speech models using a developer kit with advanced AI sensors.

Azure Open Datasets
Cloud platform to host and share curated open datasets to accelerate development of machine learning models.

Azure Databricks
Fast, easy, and collaborative Apache Spark-based analytics platform.

Bing Autosuggest
Give your app intelligent autosuggest options for searches.

Bing Entity Search
Search for and get comprehensive results.

Bing News Search
Search results from the Bing web.

Bing Video Search
Search for videos and get comprehensive results.

Bing Web Search
Search results from billions of web documents.

Computer Vision
Determine actionable information from images.

Custom Speech
Overcome speech recognition barriers like speaking style, background noise, and vocabulary.

Data Science Virtual Machines
Rich pre-configured environment for AI development.

Machine Learning service
Bring AI to everyone with an easy-to-use, scalable, trusted platform with experimentation and model management.

Microsoft Genomics
Power genome sequencing & research insights.

Language Understanding
Teach your apps to understand commands from your users.

Form Recognizer
The AI-powered document extraction service that understands your forms.

Personalizer
An AI service that delivers a personalized user experience.

Speaker Recognition
Use speech to identify and verify individual speakers.

Speech to Text
The Speech-to-Text API is part of Azure Cognitive Services Speech Services.

Text to Speech
Convert text to speech to create more natural, accessible interfaces.

Video Indexer
Unlock video insights.

Anomaly Detector
Empower users of all ages and abilities to read and comprehend text content.

Immersive Reader
Empower users of all ages and abilities to read and comprehend text content.
Transform our company

Empower our partners
Microsoft AI Platform

Azure AI Services

**PRE-BUILT AI**
- Cognitive Services

**CONVERSATIONAL AI**
- Bot Service

**CUSTOM AI**
- Azure Machine Learning

Azure Infrastructure

**AI ON DATA**
- Cosmos DB
- SQL DB
- SQL DW
- Data Lake

**AI COMPUTE**
- Spark
- DSVM
- Batch AI
- ACS
- IoT Edge

- CPU, FPGA, GPU

Tools

**CODING & MANAGEMENT TOOLS**
- VS Tools for AI
- Azure ML Studio
- Azure ML Workbench
- Others (PyCharm, Jupyter Notebooks...)

**DEEP LEARNING FRAMEWORKS**
- Cognitive Toolkit
- TensorFlow
- Caffe
- Others (Scikit-learn, MXNet, Keras, Chainer, Gluon...)

**3rd Party**
What is Cray in Azure?

Scalable, powerful infrastructure for the most demanding workloads in engineering, climate, energy, and scientific research

A dedicated, single-tenant supercomputing resource with complete control and security over your applications, data, and hosting environment

Integrated ClusterStor™ high performance storage that centralizes your data resource and eliminates spinning up additional data repositories

Built to your custom specifications so you can get the scale of the public cloud without compromising specific application, compliance, or regulatory requirements

Fully managed service and support by Cray specialists, integrated alongside Azure support resources for the best of both worlds
Environmental Science

AI for Earth
Monitor | Model | Manage

Computer Science
Increase access to cloud and AI technologies through grants.
Grantees: 381
Countries impacted: 66
Demos
Azure Open Datasets

Curated open data made easily accessible on Azure

Start free » Explore datasets »

NOAA NEXRAD Level II
This dataset contains both current and archival level II data from the NEXRAD system.

NOAA Integrated Surface Data (ISD)
Worldwide hourly weather history data (e.g. temperature, precipitation, wind) sourced from the National Oceanic and Atmospheric Administration (NOAA).

NOAA Global Forecast System (GFS)
15-day US hourly weather forecast data (e.g. temperature, precipitation, wind) produced by the Global Forecast System (GFS) from the National Oceanic and Atmospheric Administration (NOAA).
LILA BC
Labeled Information Library of Alexandria: Biology and Conservation

Home  Data Sets  FAQ

WCS Camera Traps
This data set contains approximately 1.4M camera trap images representing around 675 species from 12 countries, making it one of the most diverse camera trap data sets available publicly. Data were provided by the Wildlife Conservation Society. The most...

NOAA Arctic Seals
This data set contains about one million thermal/RGB image pairs, representing a 2016 aerial survey of sea ice habitat in U.S. waters of the Chukchi Sea, conducted by NOAA fisheries. Annotations indicate the locations of approximately 7000 seals in...

Chesapeake Land Cover
Overview This dataset contains high-resolution aerial imagery from the USDA NAIP program [1], high-resolution land cover labels from the Chesapeake Conservancy [2], and low-resolution land cover labels from the USGS NLCD 2011 dataset 3 formatted to...

Snapshot Serengeti
This data set contains 1.2M sequences of camera trap images, totaling 3.2M images, from seasons one through six of the Snapshot Serengeti project. Labels are provided for 48 animal categories, primarily at the species level (for example, the most common...
A geo-spatial analytics and AI extension to the Microsoft Data Science Virtual Machine

The Geo AI Data Science VM is an extension to the Windows Server 2016 edition of the Microsoft Data Science Virtual Machine (DSVM) on Azure, offered through the collaboration between Esri and Microsoft. The Microsoft DSVM contains popular tools for data science as well as AI tools, such as enterprise grade R and Python on the Microsoft Machine Learning Server, Anaconda Python, JuliaPro, Jupyter Notebook for Python, Julia and R, Visual Studio Community edition with Python and R Tools, SQL Server Developer edition, standalone instance of Apache Spark, deep-learning frameworks like TensorFlow, Microsoft Cognitive Toolkit, and several other data science tools and machine learning algorithms. See a comprehensive list of Microsoft DSVM tools and algorithms.

ArcGIS Pro is Esri’s next-gen 64-bit desktop geographic information system (GIS). Technologically ahead of everything else on the market, ArcGIS Pro provides professional 2D and 3D mapping in an intuitive user interface. ArcGIS Pro is a big step forward in advancing visualization, analytics, image processing, data management, and integration.

The Geo AI Data Science VM augments the Microsoft DSVM with rich geo-spatial capabilities of Esri’s ArcGIS Pro. Python and R interfaces to ArcGIS Pro are pre-configured on the Geo AI Data Science VM, enabling programmatic access to geo-spatial analytics within your AI applications out of the box. We also provide samples in the form of Jupyter notebooks to help you start building AI applications infused with geo-spatial intelligence.

If you are building deep learning models on the Geo AI Data Science VM, we recommend you use Azure NC-Series GPU VM instances which is available in select Azure regions. Check here for availability of various services by Azure regions.

By continuing to create and use this extension, you are accepting the Esri ArcGIS Pro license agreements and the Microsoft Data Science Virtual Machine terms.

Learn more

Documentation
ArcGIS Pro Help
Data Science VM Overview
Seal detection API demo

In areas with limited tree cover and large wildlife, aerial wildlife population surveys are often more efficient than surveys using camera traps or “boots on the ground”. The downside of aerial surveys is that even in areas dense with wildlife, the vast majority of images are empty, which makes population counting laborious. In this notebook, we demonstrate the ability of a machine learning model – trained in PyTorch and hosted as an API via the AI for Earth API Platform – to detect large wildlife in an arctic environment.

The API underlying this demo is not a production or public API, rather it demonstrates ongoing work and the potential for automating incredibly tedious manual annotation.

Images courtesy of NOAA. The entire training data set is available on ilia.science, an collaboration between AI for Earth and several external partners to make training data available for conservation problems.

Contact dan@microsoft.com with questions.

Imports and constants

```python
import requests
from io import BytesIO
import random
random.seed(0)
import glob
import PIL.Image
import numpy as np
import os
from IPython.core.display import Image, display

api_address = 'http://sealsapi.southcentralus.cloudapp.azure.com:8088/
test_image_folder = '/data/seals_blob1_test/
with open('data/seals_api_key.txt', 'rt') as fi:
    api_key = fi.read().strip()

print(requests.get(api_address).text)
```

Health check OK

Autosave disabled

Retrieve and display IR image

```python
image_path = random.choice(glob.glob(os.path.join(test_image_folder, '*.THERM-16BIT-N.png')))
upload_image = PIL.Image.fromarray((np.array(PIL.Image.open(image_path))/256).astype(np.uint8))
upload_image
```
RESULTS

CLASSIFICATION RESULTS

Animal 1

wildebeest 99.99%

FILE NAME | RESULTS | BOUNDING BOXES | PATH
---|---|---|---
S5_G04_R1_IMAG0154.JPG | ✓ | 1 | /CameraTra... |
S5_L04_R2_IMAG0455.JPG | ✓ | 3 | /CameraTra... |
S6_C01_R1_IMAG1806.JPG | ✓ | 1 | /CameraTra... |
S1_P07_R1_PICT0370.JPG | ✓ | 1 | /CameraTra... |
S1_P07_R1_PICT0996.JPG | ✓ | 1 | /CameraTra... |
S5_N04_R3_IMAG0074.JPG | ✓ | 2 | /CameraTra... |
S6_I01_R1_IMAG0306.JPG | ✓ | 5 | /CameraTra... |
S1_M04_R1_PICT0095.JPG | ✓ | 1 | /CameraTra... |
S1_R12_R1_PICT0454.JPG | ✓ | 1 | /CameraTra... |
S6_C03_R1_IMAG0183.JPG | ✓ | 1 | /CameraTra... |
S6_I04_R2_IMAG1275.JPG | ✓ | 2 | /CameraTra... |
S5_G03_R1_IMAG1519.JPG | ✓ | 4 | /CameraTra... |
YouTube Video Source
https://www.youtube.com/watch?v=mmS3XJhJd4

Intelligent Agent Process

<table>
<thead>
<tr>
<th>Modules</th>
<th>Input</th>
<th>Output</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detect language and translate</td>
<td>120 Spanish</td>
<td>125 English</td>
<td>Complete</td>
</tr>
<tr>
<td>Text analysis and prediction</td>
<td>125 Words</td>
<td>8 Keywords</td>
<td>91.12%</td>
</tr>
<tr>
<td>Extract video keyframes</td>
<td>35 Seconds</td>
<td>18 Keyframes</td>
<td>Complete</td>
</tr>
<tr>
<td>Object detection and prediction</td>
<td>18 Keyframes</td>
<td>15 Images</td>
<td>86.31%</td>
</tr>
<tr>
<td>Extract text from video</td>
<td>17 Keyframes</td>
<td>-</td>
<td>Extracting</td>
</tr>
<tr>
<td>Determine where and when</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Output Logs

01:58:38 PM | Starting Azure Cognitive Services OCR Text Extraction. Input frames: 20
01:58:39 PM | 01/20 - Detected: "Buceo con Dominós" Translated: "Diving with Dominos"
01:58:39 PM | 01/20 - Detected: "Buceo con Dominós" Translated: "Diving with Dominos"
01:58:39 PM | 05/20 - Detected: "2017-07-26"
01:58:40 PM | 07/20 - Detected: "2017-07-26"
01:58:40 PM | 09/20 - Detected: "2017-07-26"
01:58:40 PM | 11/20 - Detected: "2017-07-26"
01:58:40 PM | 013/20 - Detected: "2017-07-26"
Climate Stable Cloud

93% More Energy Efficient Cloud Services through energy storage & grid integration R&D

60% Renewable Energy & Growing Globally through policy, partnerships & procurement

Driving Industry Transformation through new platforms, services & programs
THANK YOU