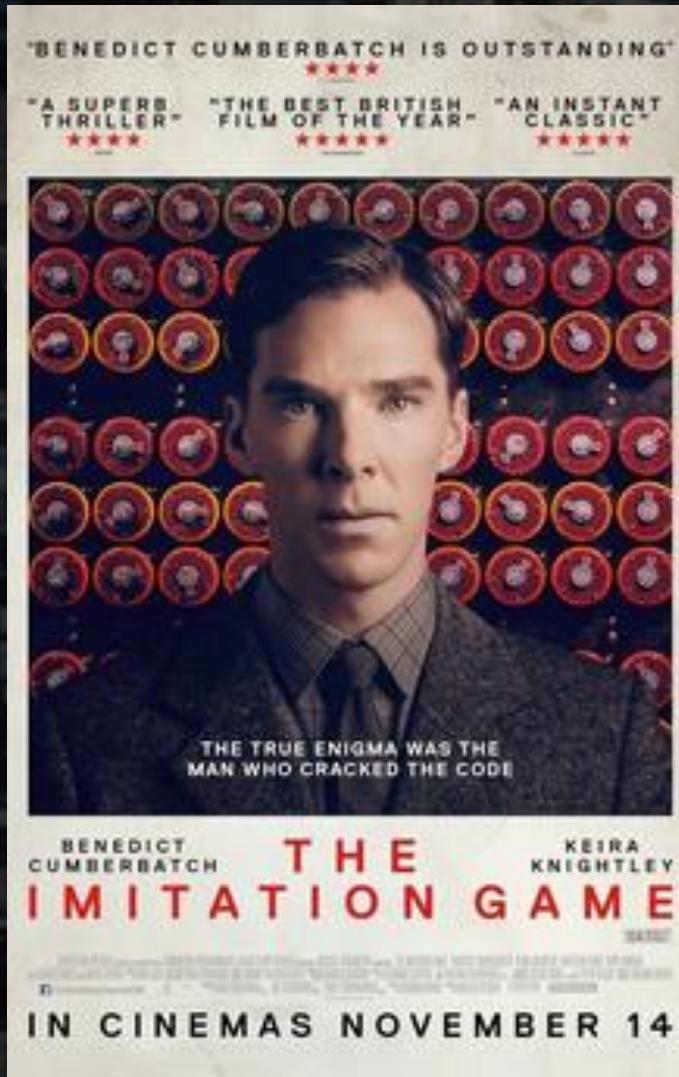




Microsoft AI



Machine Learning



Artificial Intelligence



Difference between machine learning and AI:

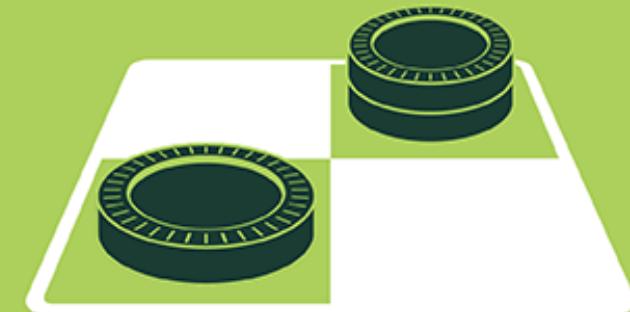
If it is written in Python...
it's probably machine learning

If it is written in PowerPoint...
it's probably AI

*Mat Velloso
Technical Advisor Office of the CEO
Microsoft*

ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



1950's

1960's

1970's

1980's

MACHINE LEARNING

Machine learning begins to flourish.



1990's

2000's

2010's

DEEP LEARNING

Deep learning breakthroughs drive AI boom.



Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

Source: <https://blogs.nvidia.com/blog/2016/07/29/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/>

Artificial Intelligence

"A computer would deserve to be called intelligent if it could deceive a human into believing that it was human."

- Alan Turing (1950)

Machine Learning

*"field of study that gives computers the ability
to learn without being explicitly programmed"*

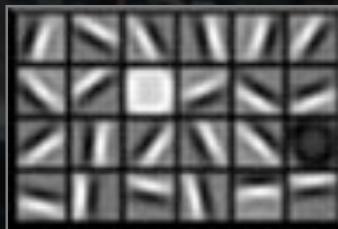
- Arthur Samuel (1954)

Deep Learning

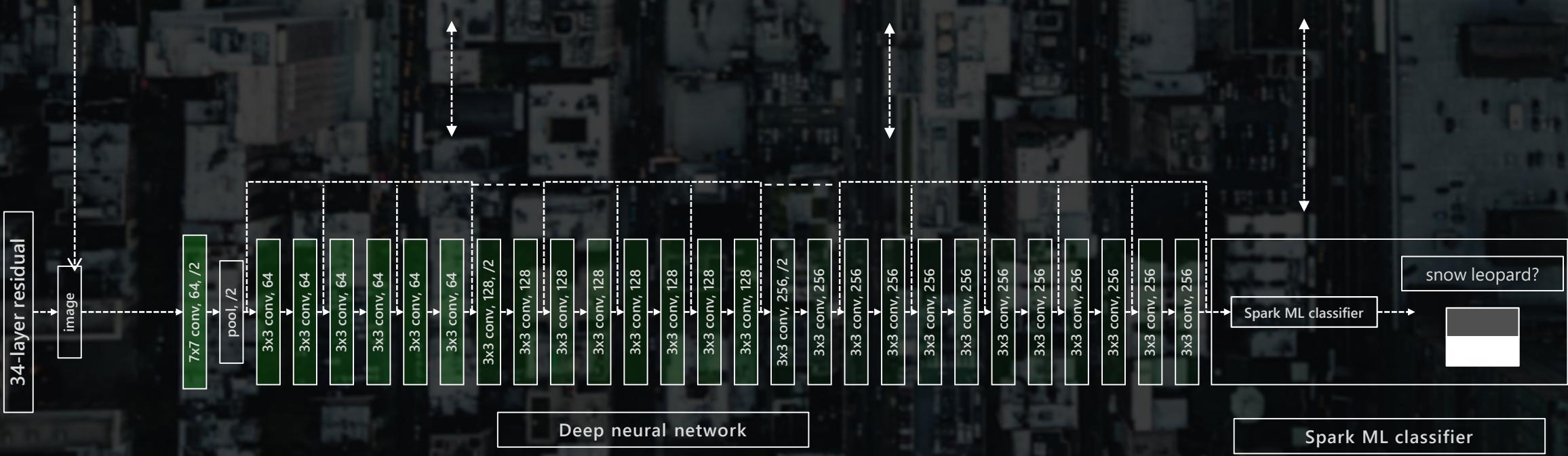
Image



Image features



Decision tree or logistic regression



Why now?

Open Source Tools



TensorFlow



PyTorch



Scikit-Learn



ONNX



Caffe2



MXNet

Data



Compute



Open Source Tools



TensorFlow



PyTorch



Scikit-Learn



ONNX



Caffe2



MXNet

Data



Compute



Open Source Tools



TensorFlow



PyTorch



Scikit-Learn



ONNX



Caffe2



MXNet

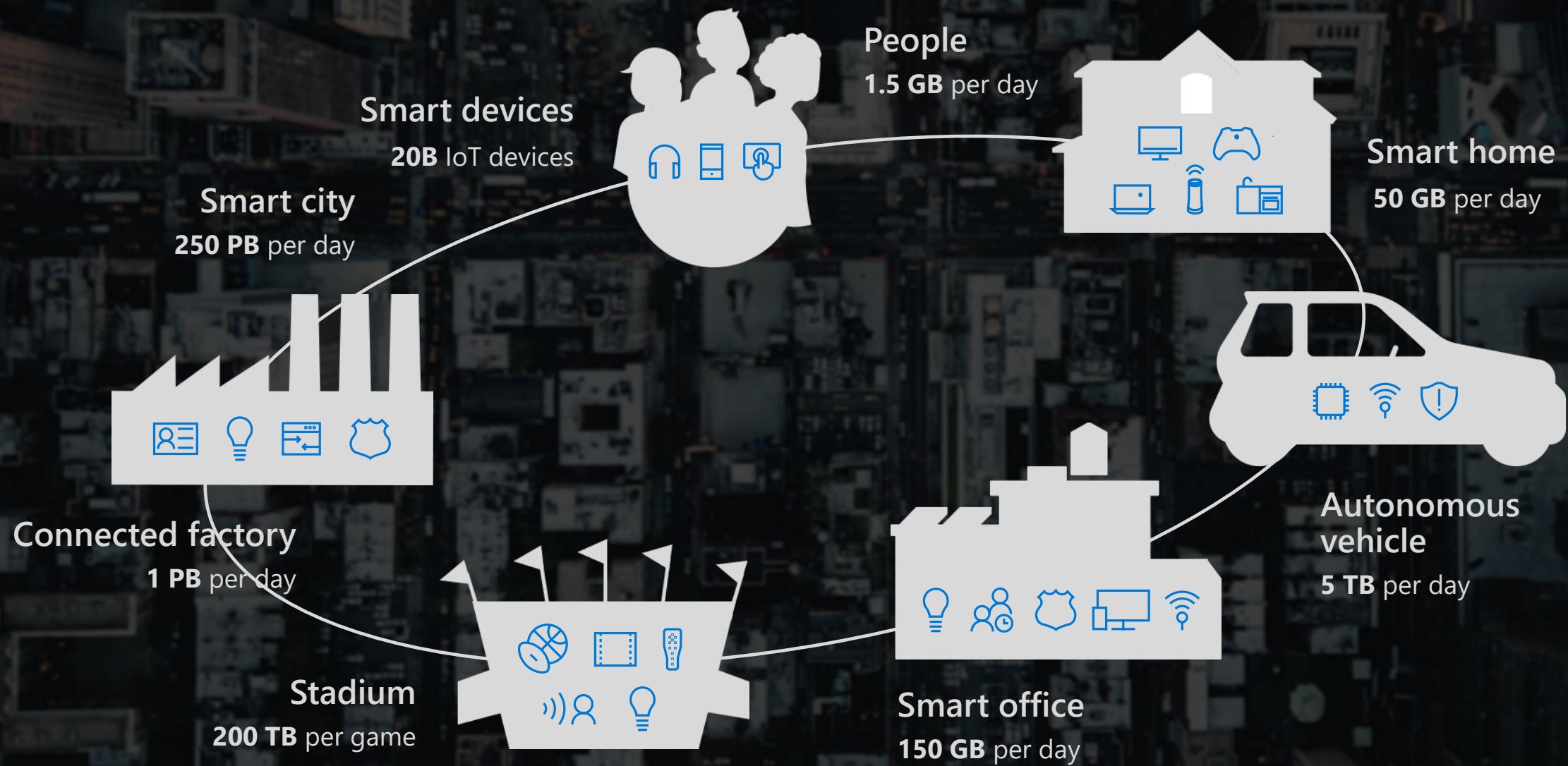
Data



Compute



Data by 2020...



Open Source Tools



TensorFlow



PyTorch



Scikit-Learn



ONNX



Caffe2



MXNet

Data



Compute



CPU



TensorFlow

Task Manager

File Options View

Processes Performance App history Start-up Users Details Services

CPU 85% 2.27 GHz

CPU % Utilisation

Intel(R) Core(TM) i7-8650U CPU @ 1.90GHz

100%

INFO:tensorflow:loss = 5.145779, step = 0
INFO:tensorflow:learning_rate = 0.1, loss = 5.145779
INFO:tensorflow:Average examples/sec: 14.0729 (14.0729), step = 10
INFO:tensorflow:Average examples/sec: 14.8607 (15.7419), step = 20

Ethernet S: 0 R: 0 Kbps

GPU 0 Intel(R) UHD Graphics 6 2%

GPU 1 NVIDIA GeForce GTX 10 0%

60 seconds

Utilisation	Speed	Base speed:	2.11 GHz
85%	2.27 GHz	Sockets:	1
		Cores:	4
		Logical processors:	8
		Virtualisation:	Enabled
233	2969	116185	
		L1 cache:	256 KB
		L2 cache:	1.0 MB
		L3 cache:	8.0 MB

Processes Threads Handles Up time 0:00:51:33

Anaconda Prompt - python cifar10_main.py --data-dir=\$(PWD)/cifar-10-data --job-dir=tmp/cifar10 --num-gpus=0 --train-steps=1000

2018-11-19 08:36:42.812182: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1484] Adding visible gpu devices: 0
2018-11-19 08:36:42.812182: I tensorflow/core/common_runtime/gpu/gpu_device.cc:965] Device interconnect StreamExecutor strength 1 edge matrix:
2018-11-19 08:36:42.825841: I tensorflow/core/common_runtime/gpu/gpu_device.cc:971] 0
2018-11-19 08:36:42.828773: I tensorflow/core/common_runtime/gpu/gpu_device.cc:984] 0: N
2018-11-19 08:36:42.833563: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1097] Created TensorFlow device (/job:
host/replica:0/task:0/device:GPU:0 with 1366 MB memory) -> physical GPU (device: 0, name: GeForce GTX 1050, pci bu:
: 0000:02:00.0, compute capability: 6.1)
INFO:tensorflow:Restoring parameters from tmp/cifar10\model.ckpt-0
INFO:tensorflow:Running local_init_op.
INFO:tensorflow:Done running local_init_op.
INFO:tensorflow:Evaluation [10/100]
INFO:tensorflow:Evaluation [20/100]
INFO:tensorflow:Evaluation [30/100]
INFO:tensorflow:Evaluation [40/100]
INFO:tensorflow:Evaluation [50/100]
INFO:tensorflow:Evaluation [60/100]
INFO:tensorflow:Evaluation [70/100]
INFO:tensorflow:Evaluation [80/100]
INFO:tensorflow:Evaluation [90/100]
INFO:tensorflow:Evaluation [100/100]
INFO:tensorflow:finished evaluation at 2018-11-18-19:40:11
INFO:tensorflow:Saving dict for global step 0: accuracy = 0.1, global_step = 0, loss = 8.044731
INFO:tensorflow:Saving 'checkpoint_path' summary for global step 0: tmp/cifar10\model.ckpt-0
INFO:tensorflow:Validation (step 1): accuracy = 0.1, global_step = 0, loss = 8.044731
INFO:tensorflow:loss = 5.145779, step = 0
INFO:tensorflow:learning_rate = 0.1, loss = 5.145779
INFO:tensorflow:Average examples/sec: 14.0729 (14.0729), step = 10
INFO:tensorflow:Average examples/sec: 14.8607 (15.7419), step = 20

GPU



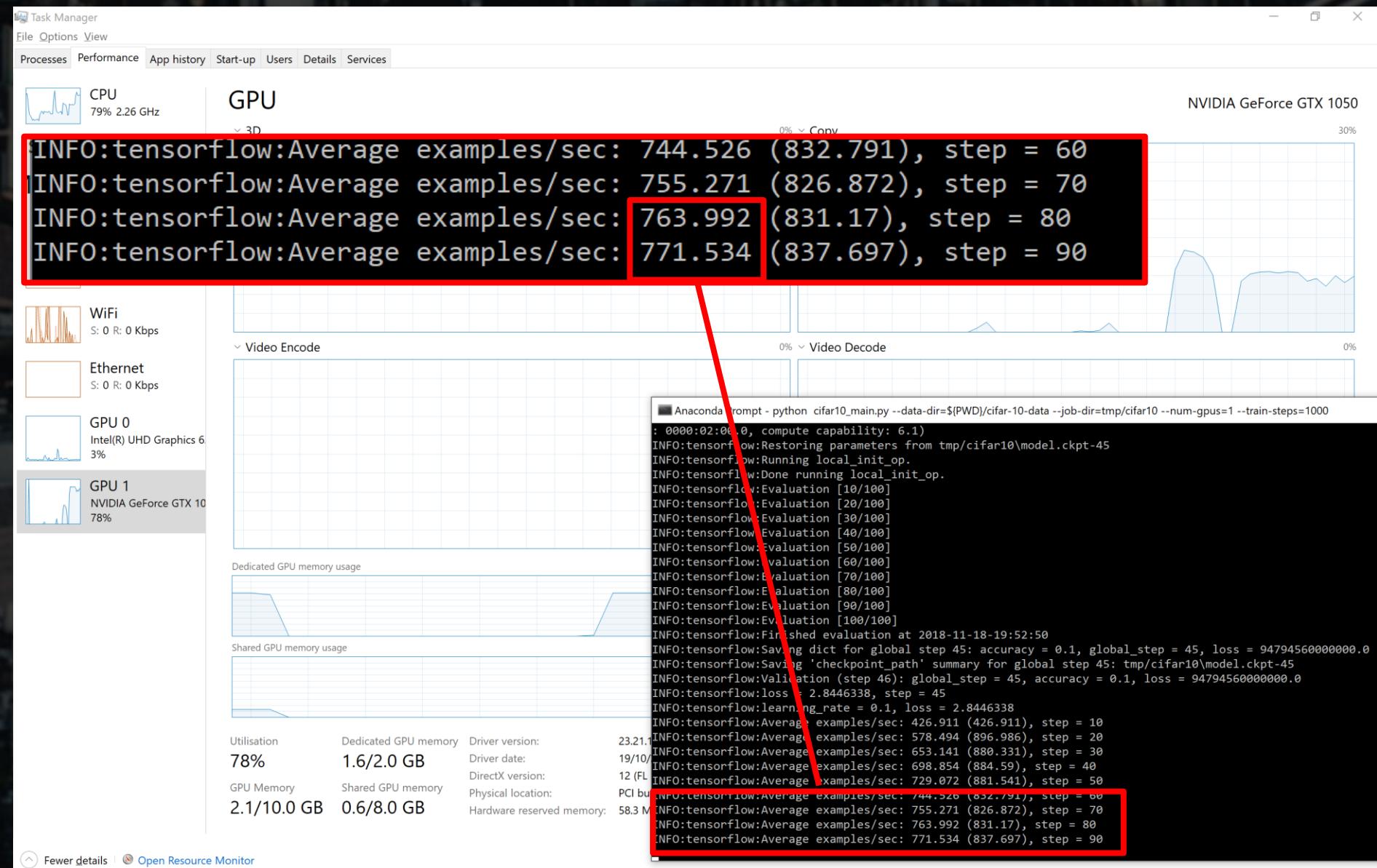
TensorFlow

~14/sec

VS

~750/sec

x54



Cloud Infrastructure for AI

Laptop – Surface Book 2
NVIDIA GeForce GTX 1050

Cores: 1

Memory: 2GB

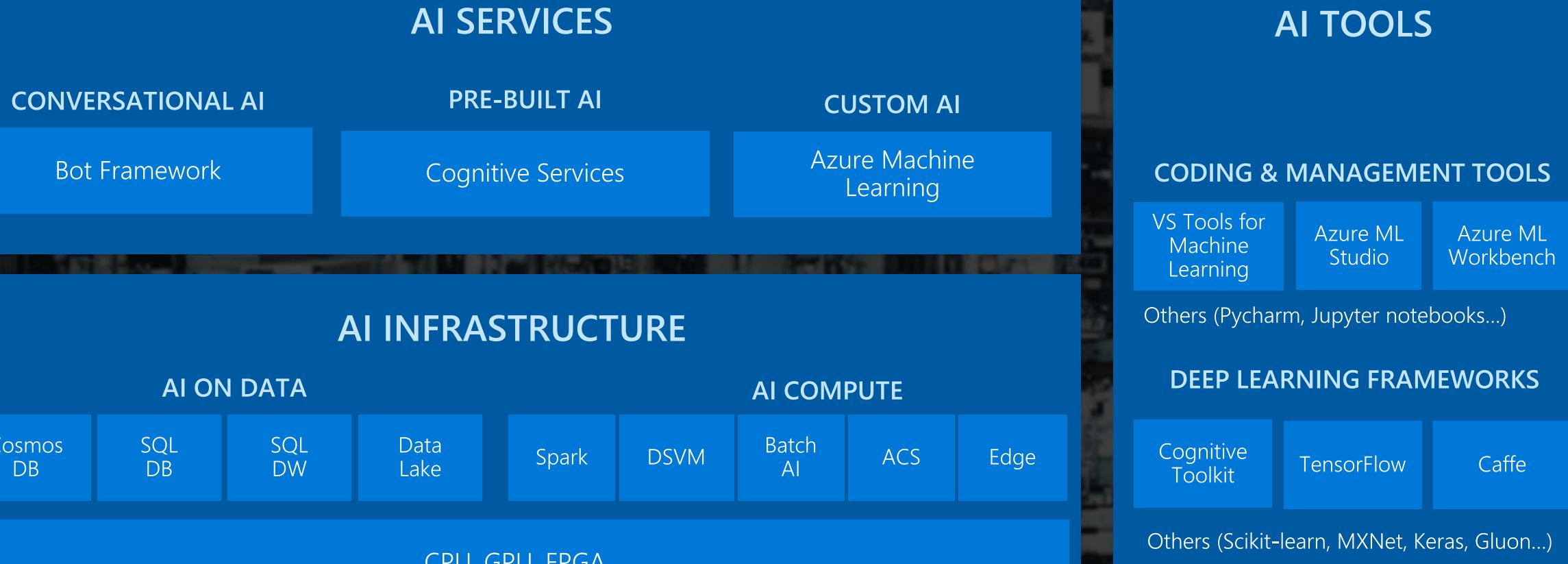
Cloud – Azure NDv2

NVIDIA Tesla V100 NVLINK

Cores: 640

Memory: 672 GB

The Microsoft AI platform



Practice Development Playbook

Access Playbook @ <https://aka.ms/aiplaybook>



Artificial
Intelligence

Microsoft Practice
Development
Playbook

Microsoft
aka.ms/practiceplaybooks



AI is about amplifying *human ingenuity*
with *intelligent technology*



Reasoning

Learn and form
conclusions with imperfect
data



Understanding

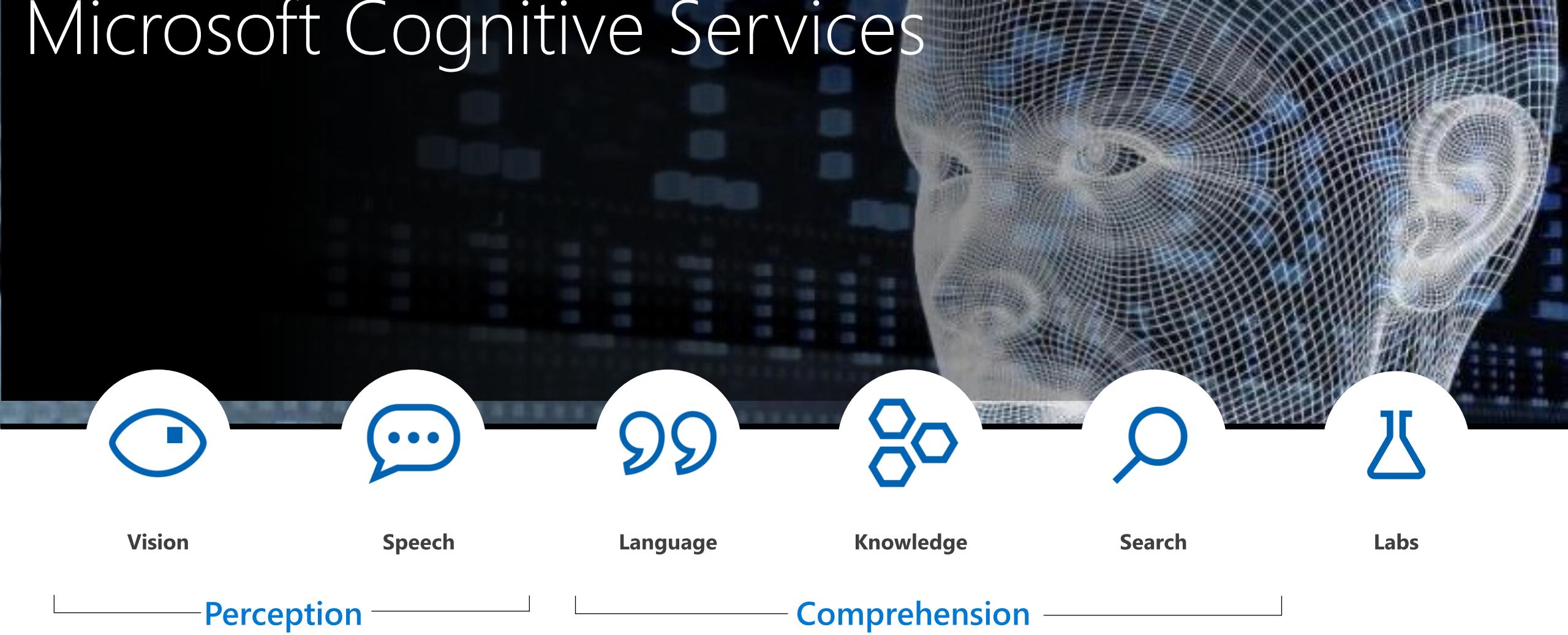
Interpret meaning of data
including text, voice, images



Interacting

Interact with people
in natural ways

Microsoft Cognitive Services



Microsoft Cognitive Services



Vision

Video Indexer
Computer Vision
Face
Emotion
Content Moderator
Custom Vision



Speech

Speaker Recognition
Bing Speech
Custom Speech
Translator Speech
Unified Speech
Speech to Text w. Custom Speech
Text to Speech w. Custom Voice
Speech Translation w. Custom Translator



Language

Text Analytics
Bing Spell Check
Translator Text
Language Understanding (LUIS)



Knowledge

QnA Maker
Custom Decision



Search

Bing Entity Search
Bing Autosuggest
Bing Search
Web Search
Image Search
News Search
Video Search
Bing Statistics add-in
Bing Visual Search
Bing Custom Search



Labs

Project Gesture
Project Local Insights
Project Academic Knowledge
Project Entity Linking
Project Knowledge Exploration
Project Event Tracking
Project Answer Search
Project URL Preview
Project Anomaly Finder
Project Conversation Learner
Project Personality Chat

Microsoft Cognitive Services



Vision



Speech



Language



Knowledge



Search

Face Recognition



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



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



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

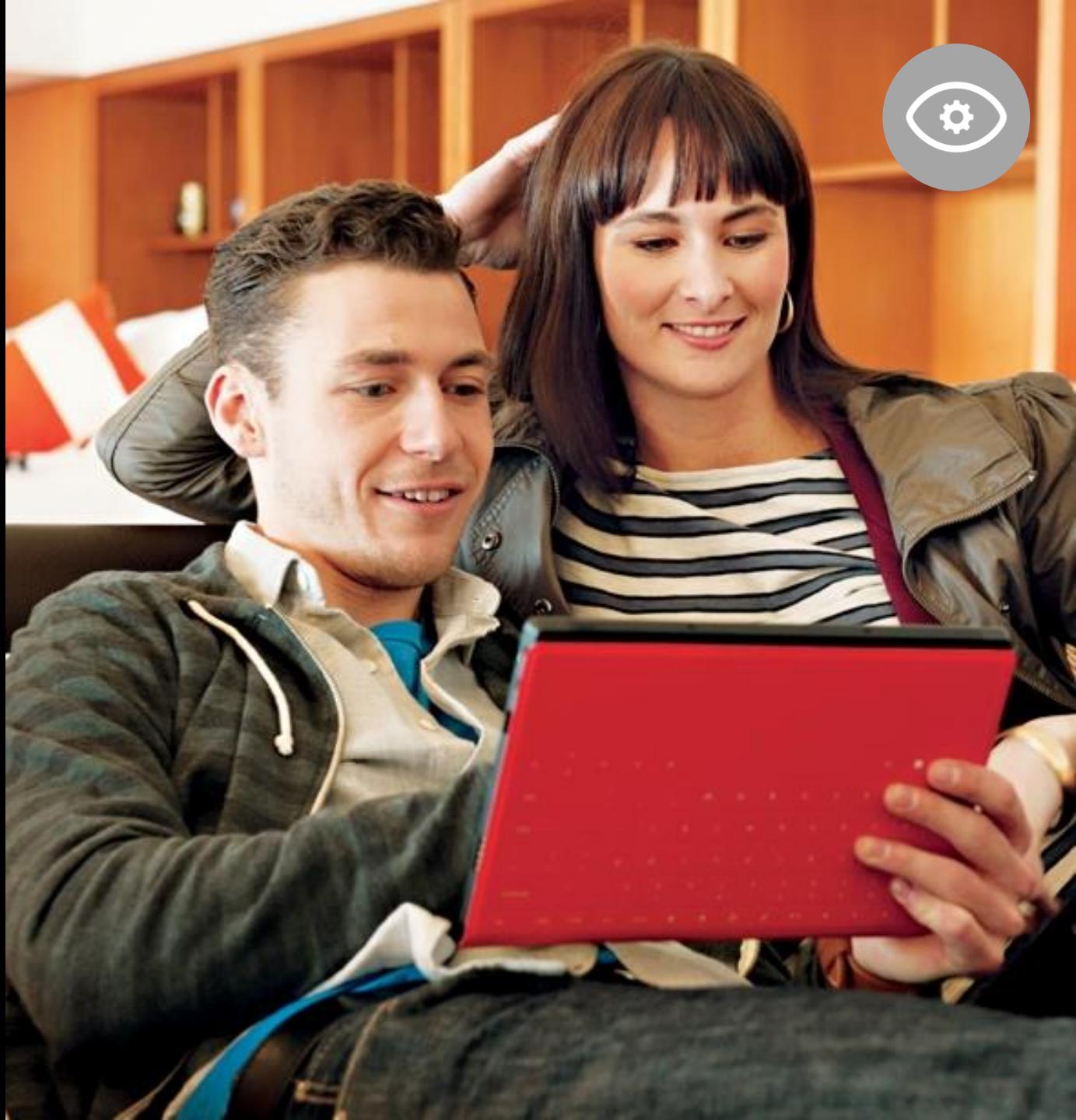
Use your labeled images to teach Custom Vision Service the concepts you want it to learn

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



Microsoft Cognitive Services



Vision



Speech



Language



Knowledge



Search

Unified Speech

Combine speech recognition, text-to-speech, customized voice models, and translation service

Speech to text

Convert continuous human speech to text that can be used as inputs

Text to speech

Convert text to audio files of natural-sounding speech

Speech translation

Use text or speech to provide translations of speech to other languages



Microsoft Cognitive Services



Vision



Speech



Language



Knowledge



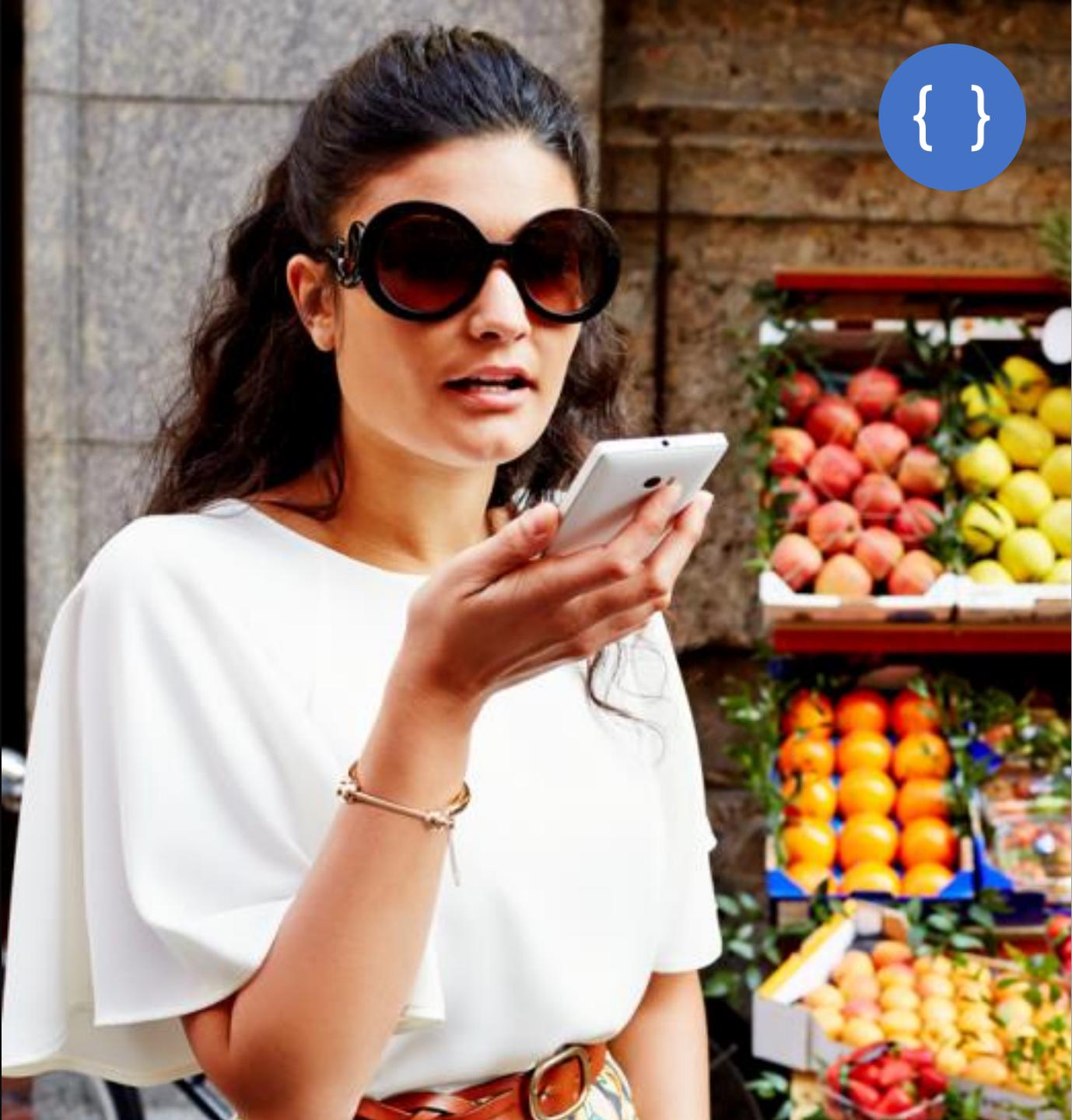
Search

{ }

Language Understanding Intelligent Service (LUIS)

**Understand what
your users are saying and
create agents that perform
custom actions**

Use pre-built models or create your own



Text Analytics



Sentiment analysis

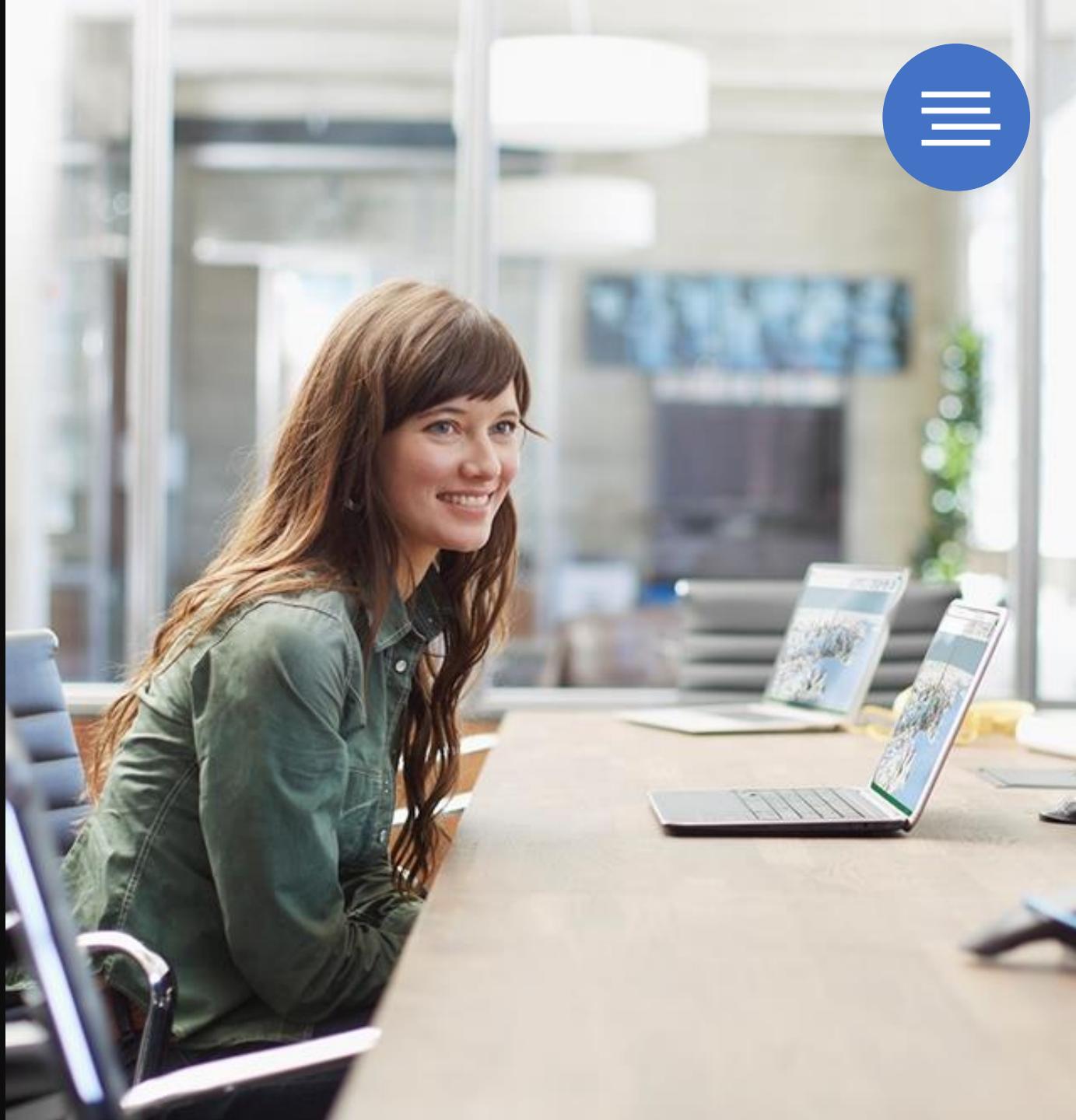
Understand if a record has positive or negative sentiment

Key phrase extraction

Extract key phrases from a piece of text, and retrieve topics

Language detection

Identify the language, 120 supported languages



Text Translator

Conduct real-time translation
with a REST API call

Automatic detection

Accurately detect specific languages
on any text string

Transliterate

Translate and display text
in different language alphabets

Speech translation

Build custom NTM models that better
handle writing styles and expressions



Content Moderator



Image moderation

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

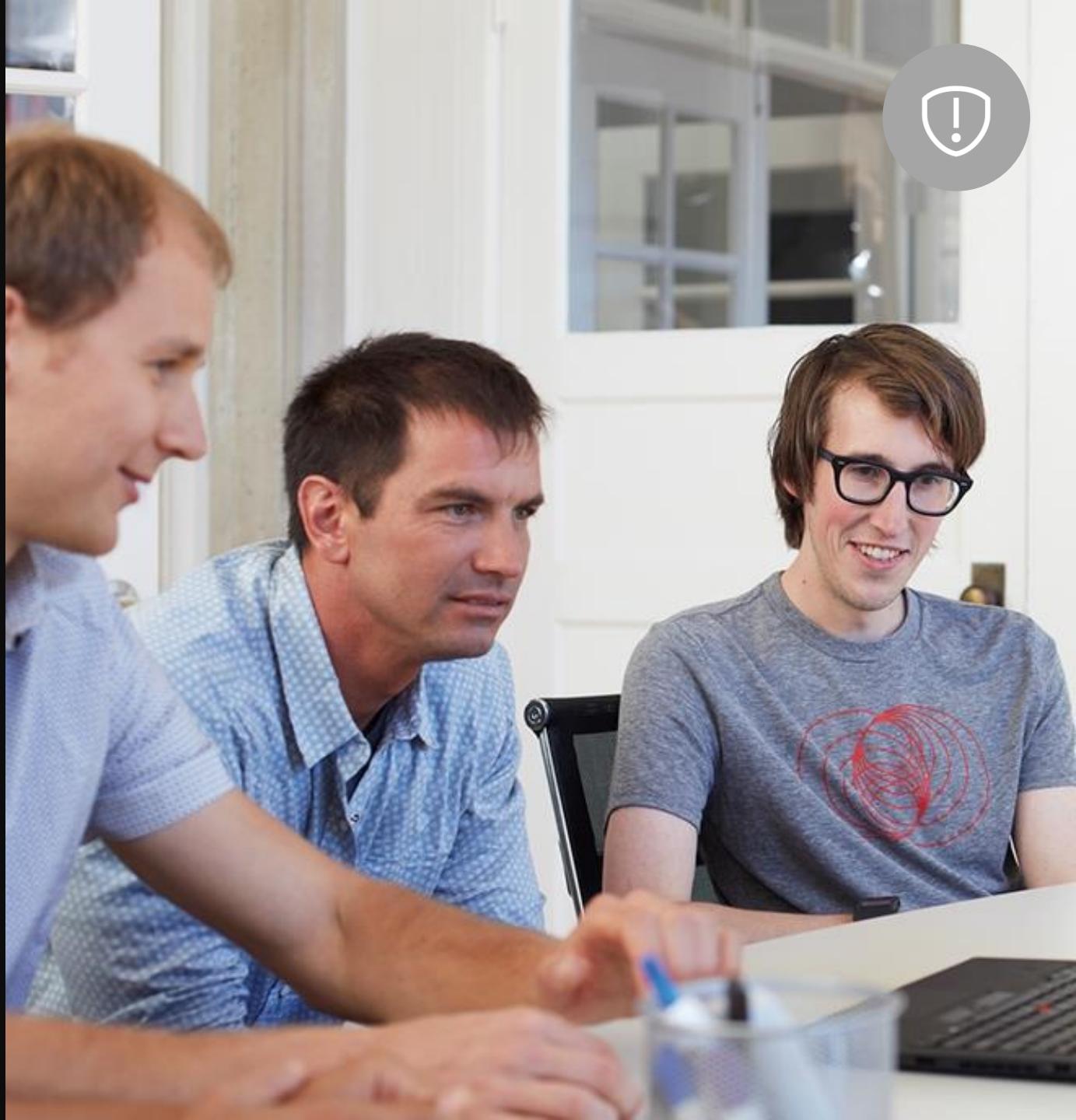
Text moderation

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)

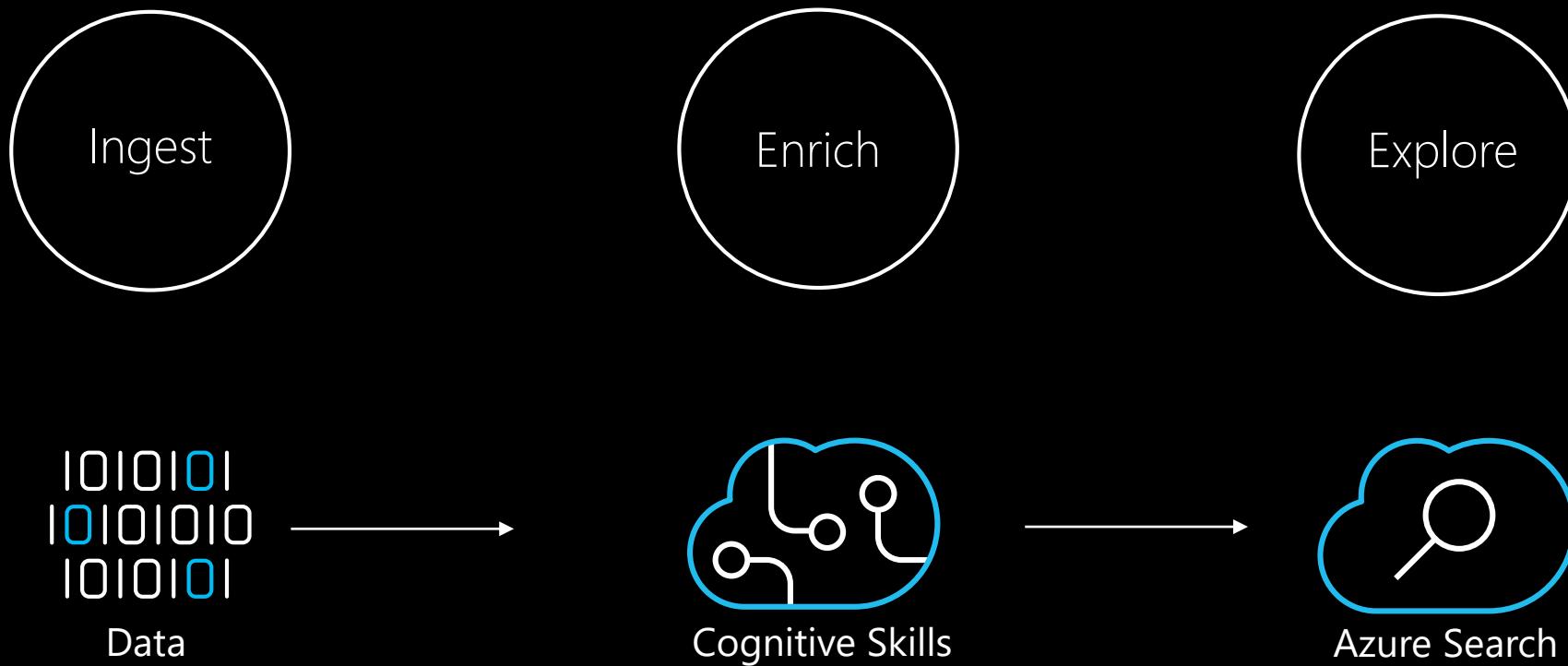
Video moderation

Scoring of possible adult or racy content in videos.



Cognitive Search

AN AI-FIRST APPROACH TO CONTENT UNDERSTANDING



The JFK Files Architecture

- JFK FILES
- COGNITIVE SEARCH
- ARCHITECTURE
- **DECLASSIFIED**

