



Cognitive Services: Computer vision + Java

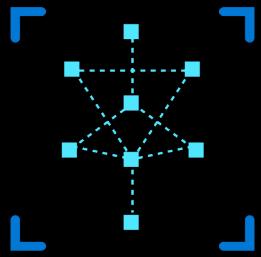
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<https://aka.ms/java-vision>



Novel object captioning at scale (nocaps) challenge



Microsoft achieves
Image Captioning
Human Parity
July 2020

training
COCO (80 classes)

Two pug dogs sitting on a bench at the beach.

A child is sitting on a couch and holding an umbrella.

Open Images (600 classes)

goat artichoke accordion

dolphin waffle balloon

nocaps validation/test

in-domain: only COCO classes

The person in the brown suit is directing a dog.

near-domain: COCO & novel classes

A person holding a black umbrella and accordion.

out-of-domain: only novel classes

Some dolphins are swimming close to the base of the ocean.

The **nocaps** benchmark for novel object captioning (at scale).

Leaderboard

Phase: Test Phase, Split: Entire Dataset

B - Baseline submission * - Private submission

Rank	Participant team	B1	B2	B3	B4	ROUGE-L	METEOR	CIDEr	SPICE	Last submission at
1	Microsoft Cognitive Services team	79.44	61.66	40.65	22.32	54.65	26.30	86.58	12.38	3 months ago
2	nocaps Team (Human)	B 76.64	56.46	36.37	19.48	52.83	28.15	85.34	14.67	1 year ago

Why Microsoft Cognitive Services?

Easy

Roll your own with REST APIs

Simple to add: just a few lines of code required

Flexible

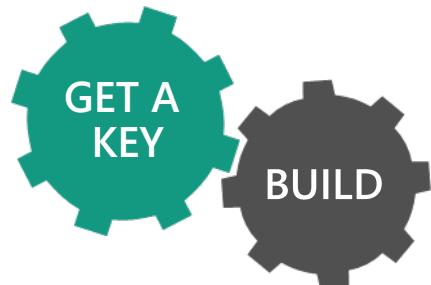
Integrate into the language and platform of your choice

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

Tested

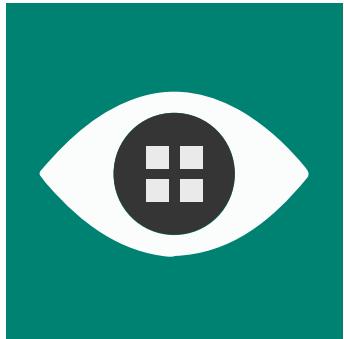
Built by experts in their field from Microsoft Research, Bing, and Azure Machine Learning

Quality documentation, sample code, and community support





Vision



Computer Vision API

Distill actionable information from images



Face API

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



Emotion API

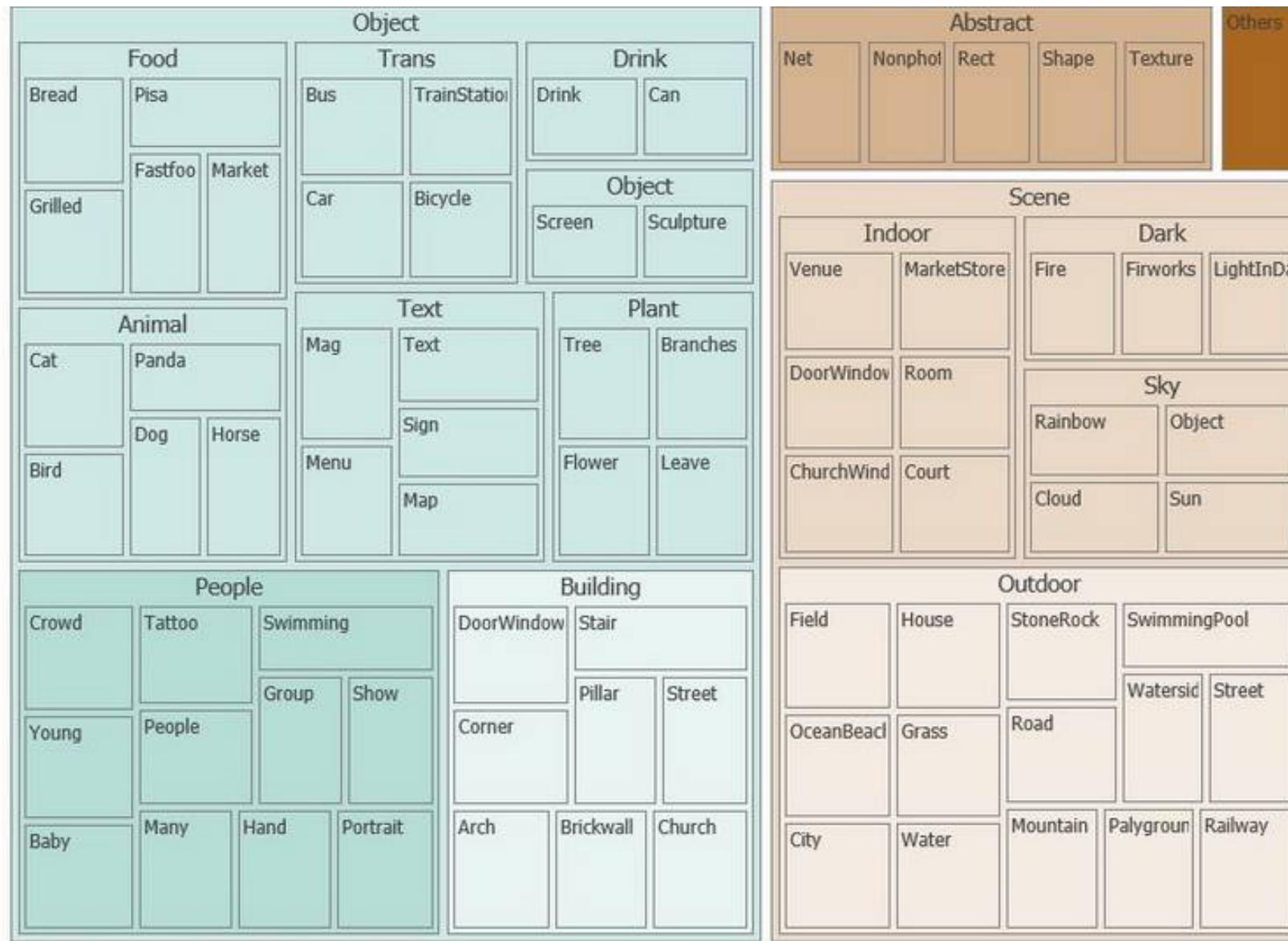
Personalize experiences with emotion recognition



Video API

Analyze, edit, and process videos within your app

Computer Vision: 86 Categories



Data

Computer Vision

Description, tags, clip art, line drawing, black & white, IsAdultContent/Score, IsRacy/Score, categories, faces, dominant colors, accent color

<https://www.microsoft.com/cognitive-services/en-us/computer-vision-api>

Emotions

Anger, contempt, disgust, fear, happiness, sadness, surprise, and neutral

<https://www.microsoft.com/cognitive-services/en-us/emotion-api>

Face

Bounding box, 27 facial landmarks, age, gender, head pose, smile, facial hair, glasses

<https://www.microsoft.com/cognitive-services/en-us/face-api>

Captioning

Problem Statement: Generate textual description (typically sentence) that is both adequate and fluent.



A person riding a motorcycle on a dirt road.



A group of young people playing a game of frisbee.



Two dogs play in the grass.



Two hockey players are fighting over the puck.

The long-held dream

- Image understanding by computers



Boy riding on
horse

Time for a Turing test



A man standing on a tennis court holding a racquet



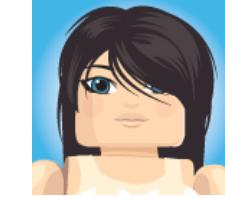
The man is on the tennis court playing a game



Another one



An ornate kitchen is designed with rustic wooden parts



A kitchen with wooden cabinets and a sink



Another one



A little girl in a pink shirt standing near a blue metal sculpture



A group of young people play soccer on a city street



a crowd of people watching a baseball game
(before)

a group of football players in red jerseys celebrating
(after)

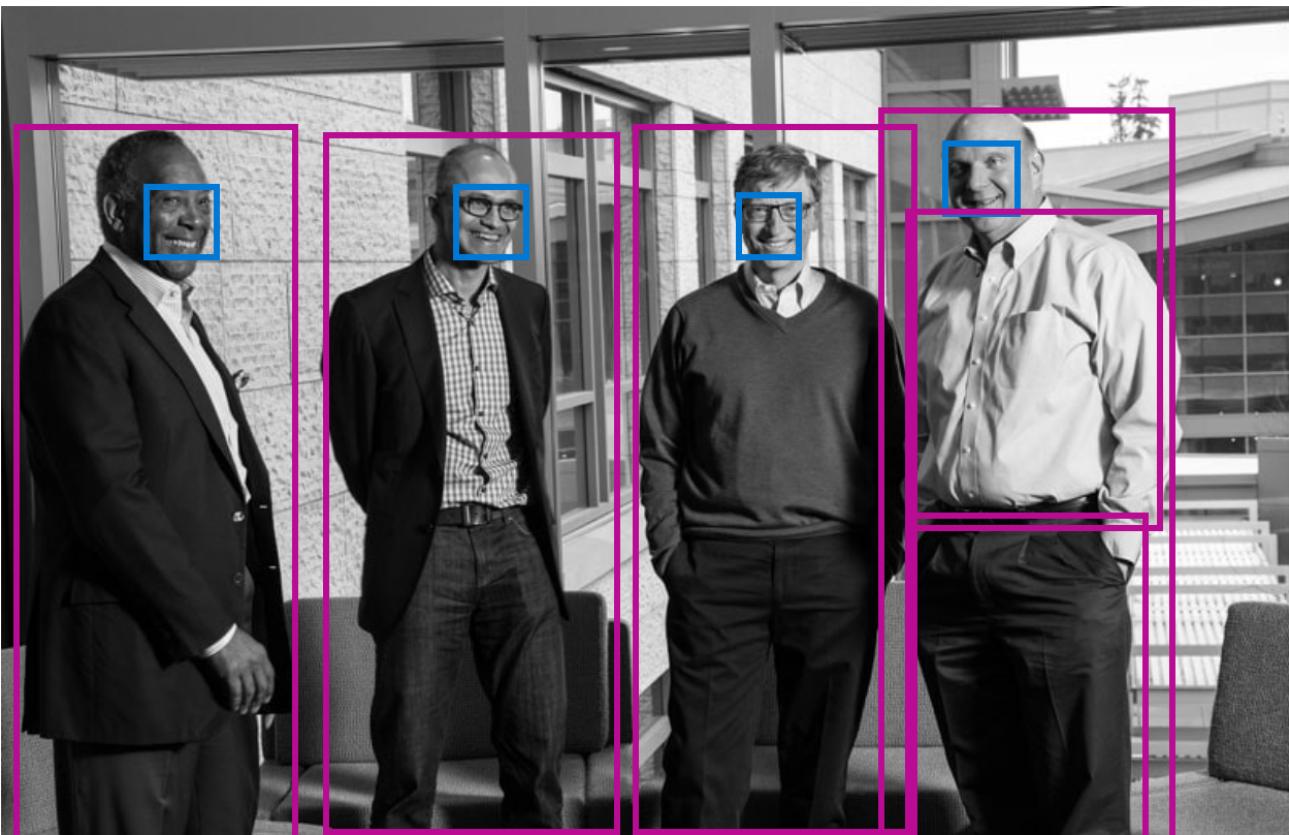


How did we do it?

- Language generation
 - Markov model, trained on caption, conditional on words detected from image
- Image analysis
 - Deep-learned features, applied to likely objects in the image, trained to produce words in captions
- Reranking
 - Hypothetical captions reranked by deep-learned model looking at entire image

<https://www.microsoft.com/en-us/research/project/azure-florence-vision-and-language/>

SDK results



0.967977047 }, { "name": "smile", "confidence": 0.9477451 }, { "name": "black and white", "confidence": 0.9309614 }, { "name": "man", "confidence": 0.926383138 }, { "name": "outdoor", "confidence": 0.8966964 }, { "name": "posing", "confidence": 0.834066331 }, { "name": "human face", "confidence": 0.7781277 }, { "name": "group", "confidence": 0.7551476 }, { "name": "suit", "confidence": 0.7084104 }, { "name": "clothes", "confidence": 0.172121257 }]

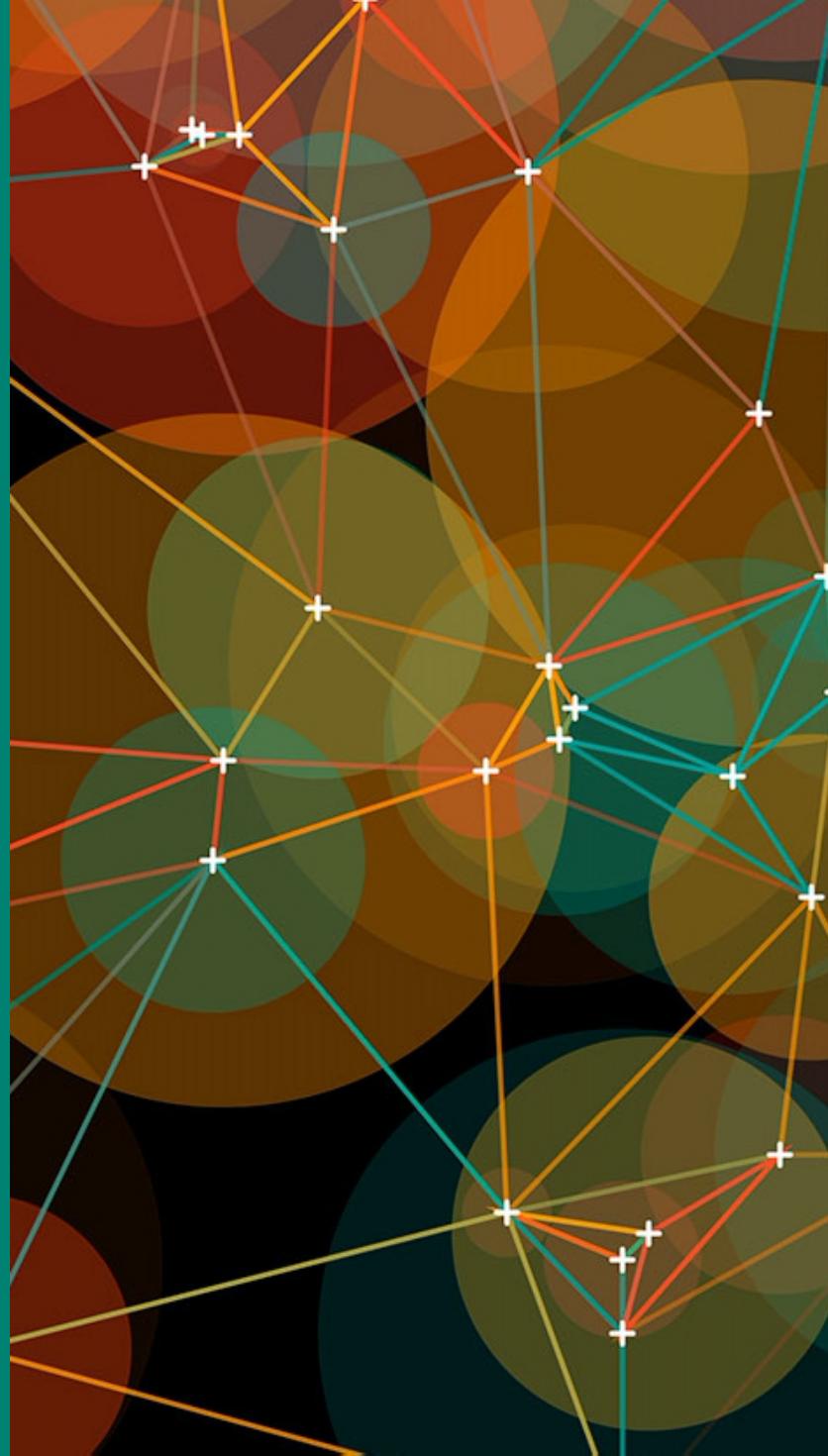
Description { "tags": ["person", "building", "standing", "photo", "man", "outdoor", "posing", "group", "suit", "wearing", "player", "front", "people", "old", "court", "woman", "holding", "dressed", "room", "baseball", "field"], "captions": [{ "text": "Satya Nadella, Bill Gates, Steve Ballmer posing for a photo", "confidence": 0.9753075 }] }

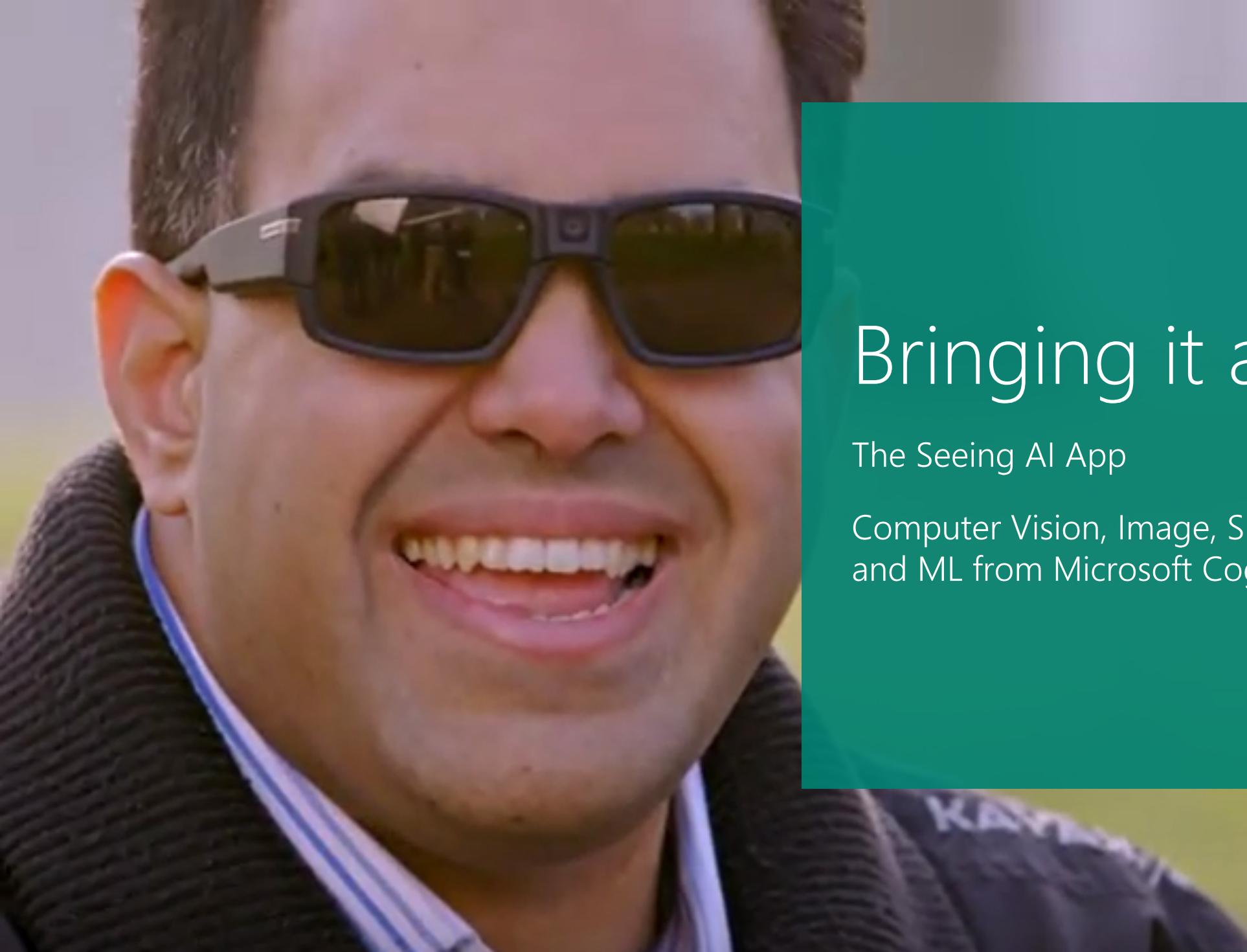
Image format "Jpeg"

Image 516 x 800

Demo

- Caption Bot – Computer Vision API
 - <http://captionbot.ai>
- Java SDK
 - <https://github.com/Azure-Samples/cognitive-services-quickstart-code/tree/master/java/ComputerVision>





Bringing it all together

The Seeing AI App

Computer Vision, Image, Speech Recognition, NLP,
and ML from Microsoft Cognitive Services

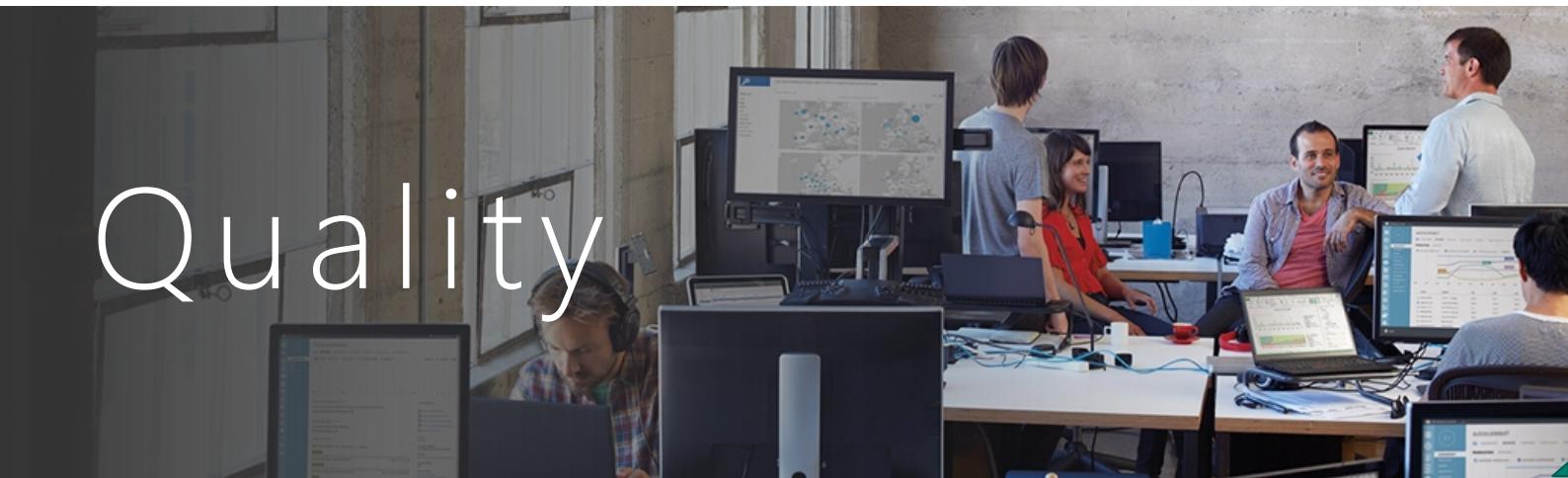


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Easy



Flexible



Quality

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Thank you

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