

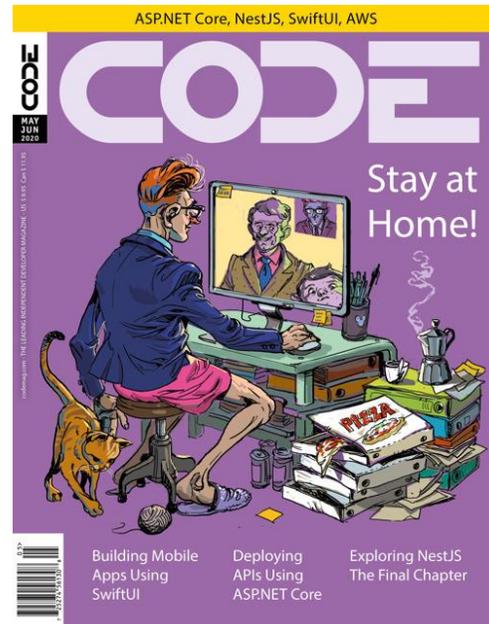
State of .NET

Azure Cognitive Services, A.I. & Machine Learning

Markus Egger
President and Chief Software Architect
CODE Magazine & Consulting

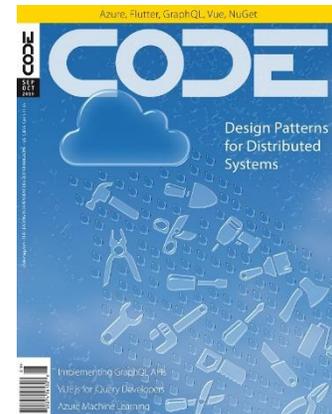
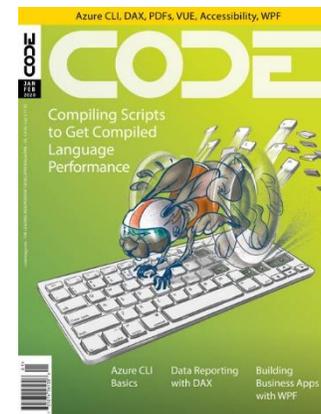
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About the Presenter

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THIS SLIDE WILL BE REPEATED AT THE END OF THE WEBINAR!

Agenda

- Overview of AI and especially Azure Cognitive Services
- Which apps can benefit from Cognitive Services?
- Lots of Examples

Overview

Cognitive Services



- “Cognition” is the ability to recognize things that are not purely logical, yet often obvious to humans
 - “The stuff computers traditionally aren’t good at”
- Azure Cognitive Services are a set of AI-based services, exposed through simple REST APIs, that enable developers to add “cognition” to applications

Which types of Apps
can benefit?

Azure Cognitive Services

Several Major Categories of Services

- **Decision:** Detect anomalies, personalization, moderator,...
- **Language:** Language understanding, analytics, translator,...
- **Speech:** Speech recognition, synthesis, translation,...
- **Vision:** All kinds of services related to computer vision
- **(Web) Search:** Various search services (many powered by Bing)

- Note: The definition of what is an "Azure Cognitive Service" is somewhat fluid (and not that important for us). For instance, Azure Search is technically not in this category, but still very similar

(Web) Search

- Bing Autosuggest, Bing Custom Search, Bing Entity Search, Bing Image Search, Bing News Search, Bing Spell Check, Bing Video Search, Bing Visual Search, Bing Web Search
- Azure Search Service
 - Not technically part of "Azure Cognitive Services"

Example: BuyPono.com with Azure Search

The screenshot displays the BuyPono.com website interface. The browser address bar shows the URL <https://www.buypono.com>. The navigation menu includes "Buy Pono", "Vendor Signup", "Map", and "About". A search bar contains the text "Produce". The main content area is split into two sections: a map of Maui on the left and a list of vendor cards on the right.

The map shows the island of Maui with various locations marked by colored pins. Labels on the map include Ualapue, Kaanapali, Lahaina, Olowalu, Maalaea, Wailea-Makena, Kahoolawe, Paia, Haiku-Pauwela, Ke'Anae, Nahiku, Hana, and Kaupo. The map is powered by Google, as indicated by the "Google" logo and "Map data ©2020" text at the bottom.

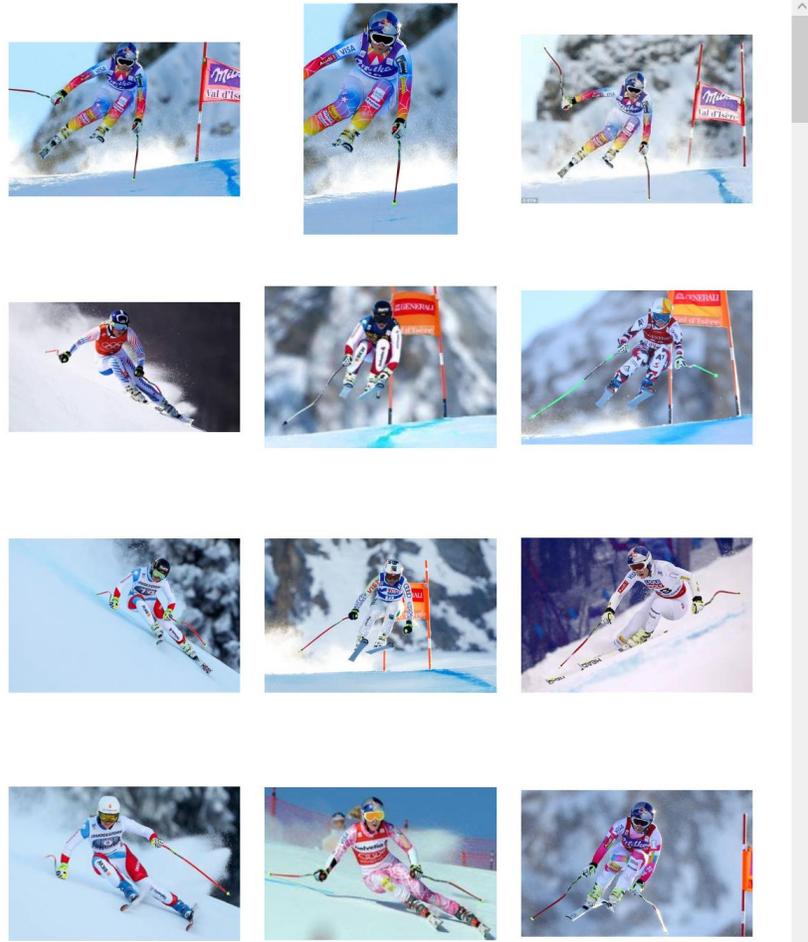
The vendor list on the right includes the following entries:

- Kula Grown Organic Produce**
Groceries
Organic produce
- Graze & Sprout**
Groceries
Produce box for pickup
- Pacific'O**
Food
Creatively prepared local seafood is accompanied by creative sauces & local, organic produce.
- Hawaiian Moons Natural Foods**
Food
Store for organic produce, groceries, supplements & beauty items, with a deli, buffet & salad bar.
- okoia farms**
Groceries
Tuesday Kaahumanu Mall Farmers Market 275 W Kaahumanu Ave. Kahului, HI 96732 7am - 3pm

Example: Bing Image Search

BING Image API Example

Ski racer Search Check for fruit [Find Similar](#)



downhill skiing, ski racings, skiing, skis, alpine skiing world cups, alpine ski racings, freestyle skiing, slalom, winter olympics,

Vision

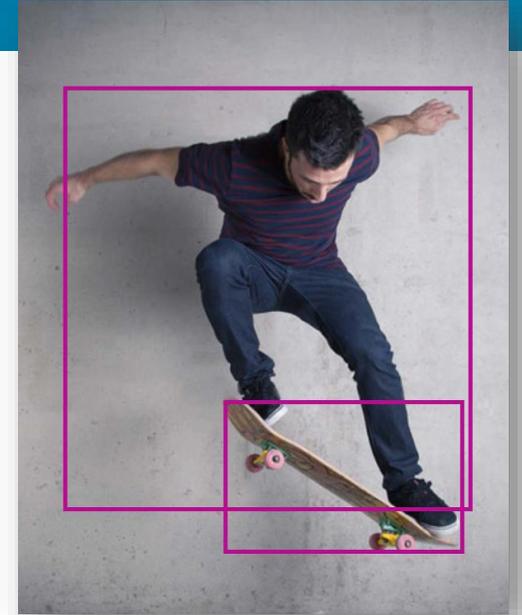
- **Computer Vision** – standard pre-trained image recognition
- **Custom Vision** – train custom models for recognition
- **Face Recognition** – recognize people in images
- **Form Recognition** – recognize data in images
- **Ink Recognizer** – handwriting recognition
- **Video Indexer** – index audio and visual content in videos

Form Recognizer

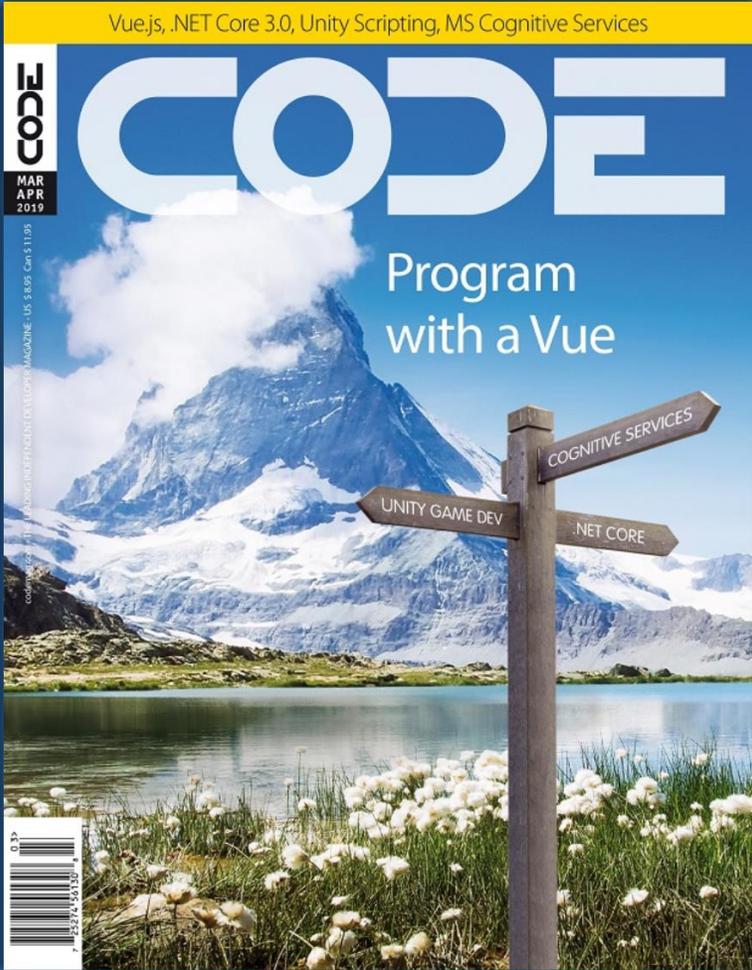
- Extracts information (content and layout) from images of forms
- There are pre-built models (such as receipts and business cards)
- Generic and customizable recognition
- <https://azure.microsoft.com/en-us/services/cognitive-services/form-recognizer/>

Microsoft Computer Vision

- A pre-trained service capable of recognizing images and objects within images
- A great standard service to use if you need a generic service that can recognize all kinds of things, and you do not want to go through the trouble of creating a custom service
 - Less accurate on details and specifics than a custom model
- Various APIs as well as a test-bench-page are available
- <https://azure.microsoft.com/en-us/services/cognitive-services/computer-vision/>

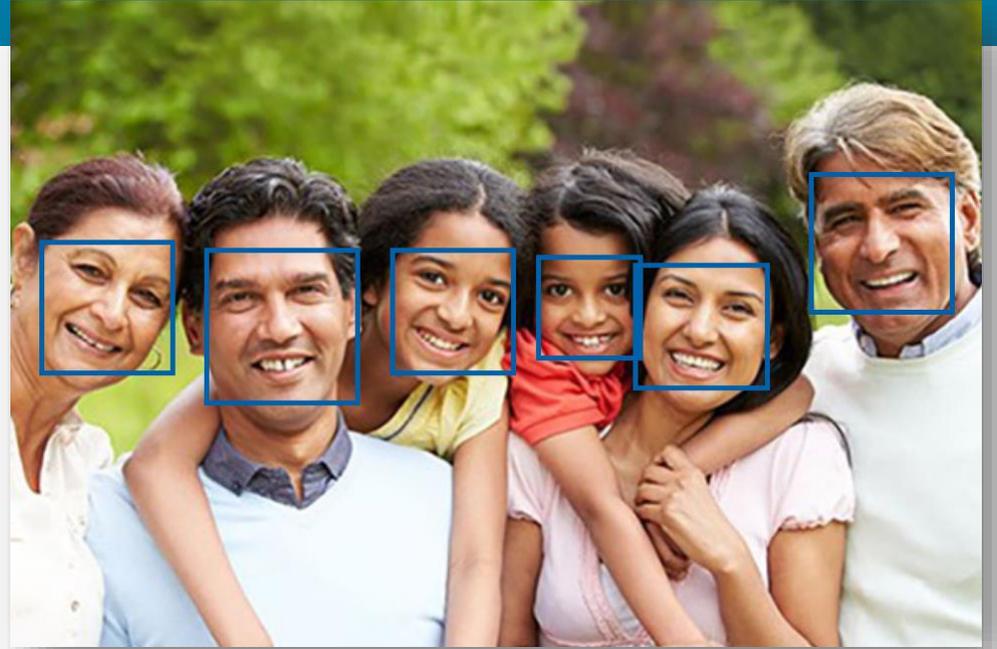


Example: CodeMag.com



Microsoft Face ID

- A pre-trained service capable of recognizing faces, emotions,...
- Similar in usage to the Computer Vision Service



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

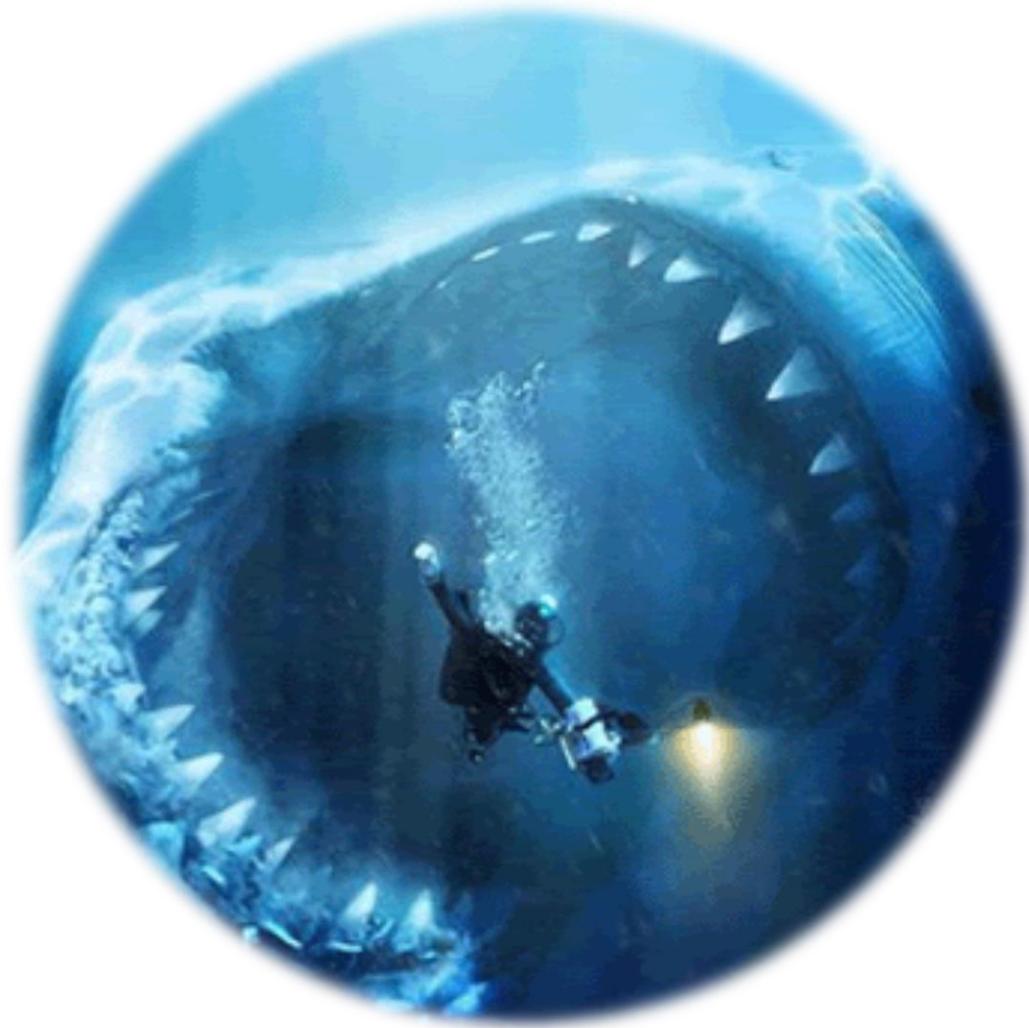
Custom Vision API Overview

- Taking things a step further...
- Instead of using a pre-trained model, we can create our own model purpose-built for a specific example
- Leads to better results in a more specific/narrow scenario

Custom Vision Steps

1. Train a Custom Model based on your own data/images
 - Can be done through a UI
 - Can also be done through programmatic service calls
2. Publish the new Model as your private/personal service
 - Often done as part of Azure Cloud
 - Can be deployed as local services
3. Call the service from your application

Example: Fish ID



Example: Retina Images



Example: Logo Detection



Training Best Practices

- Have lots of different images
 - 50 is the recommended minimum, but I recommend more for production
- Different sizes, angles, lightning, backgrounds,...
- Do NOT aim for “unnatural” images (such as images without background)
- Add “negatives” to teach the model what NOT to match

Side-Note: Locally Deployed Models

- Once a model is trained, it can be taken offline
- Deployment to mobile devices is an important scenario...
- ...as is deployment to IoT devices
- While training takes a lot of resources, you can run trained models on small devices

Speech

- **Speech to Text** – understanding of the spoken word
- **Text to Speech** – convert text to audio output
- **Speech Translation** – real time translation in apps
- **Speaker Recognition** – identify a speaker

Speech to Text

- Transcribes spoken content into text (in various languages)
- <https://azure.microsoft.com/en-us/services/cognitive-services/speech-to-text/>

Text to Speech

- Fluid, natural sounding speech synthesis in various languages and with different (and customizable) voices
- <https://azure.microsoft.com/en-us/services/cognitive-services/text-to-speech/>

Speech Translation

- Real-time speech translation into a variety of languages
- <https://azure.microsoft.com/en-us/services/cognitive-services/speech-translation/>

Language

- **Immersive Reader** – help readers understand text with various cues
- **Language Understanding** – for apps and IoT devices
- **QnA Maker** – builds conversational q&a layer over your data
- **Text Analytics** – detect sentiment, key phrases, and named entities
- **Translator** – detect and translate more than 60 languages

Decision

- **Anomaly Detector** – identify potential problems in your data
- **Content Moderator** – detect potentially offensive or unwanted content
- **Metrics Advisor** – monitor metrics and diagnose issues
- **Personalizer** – create rich, personalized experiences for individual users

Other Announcements

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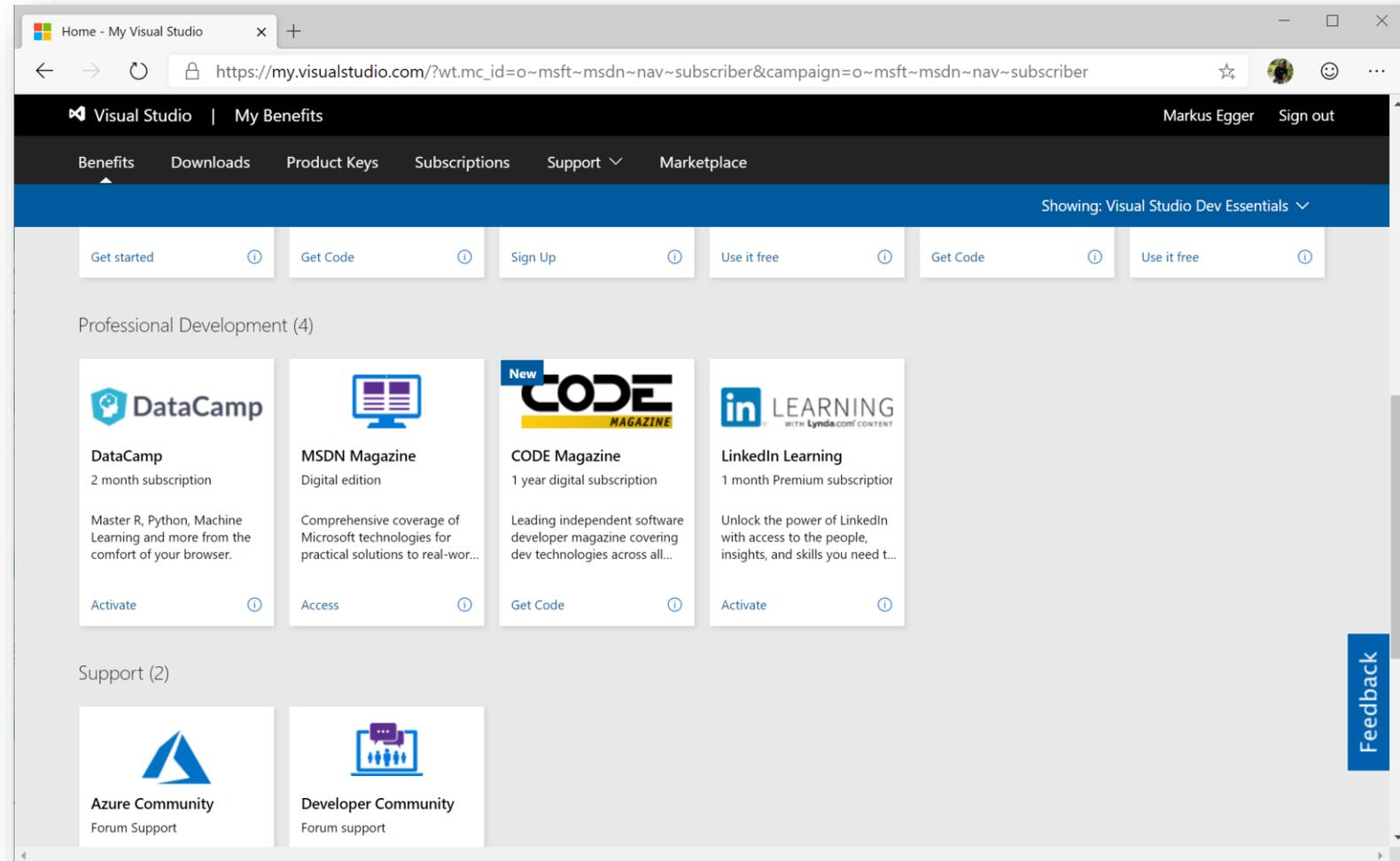
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Q&A

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