Developing and Deploying Intelligent Chat Bots: Cognitive Services

Main site: aka.ms/botedu
Chat room: aka.ms/botedu-discuss

Today's Agenda

Cortana Intelligence Suite overview
Cognitive Services overview
Demos from Cognitive Services

Be ready for fun labs throughout ☺

Microsoft

Prerequisites for today

GitHub account
Microsoft account

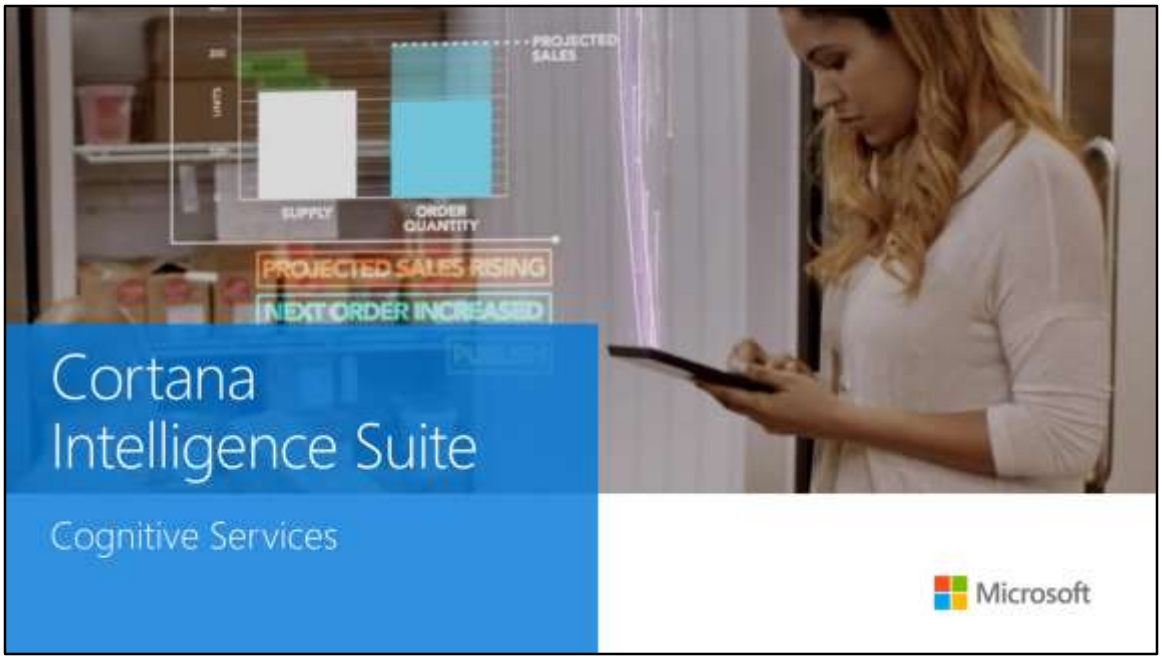
Microsoft

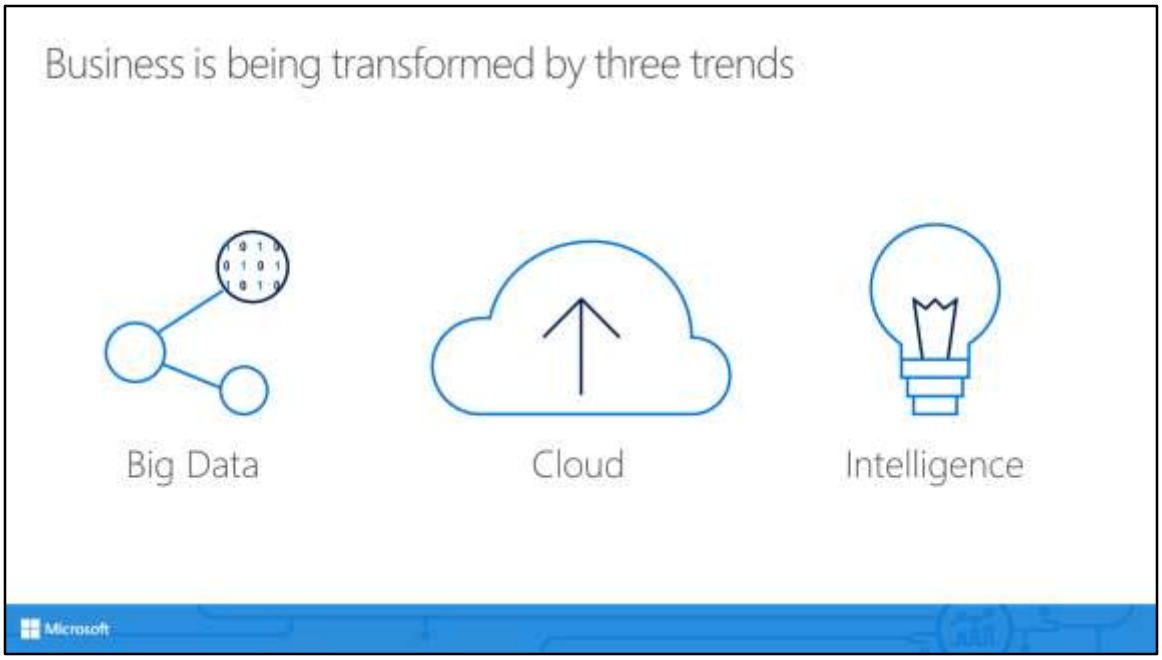
Class site (for almost everything)

https://aka.ms/botedu

- This is a link to the wiki
- Click on "Code" for the rest

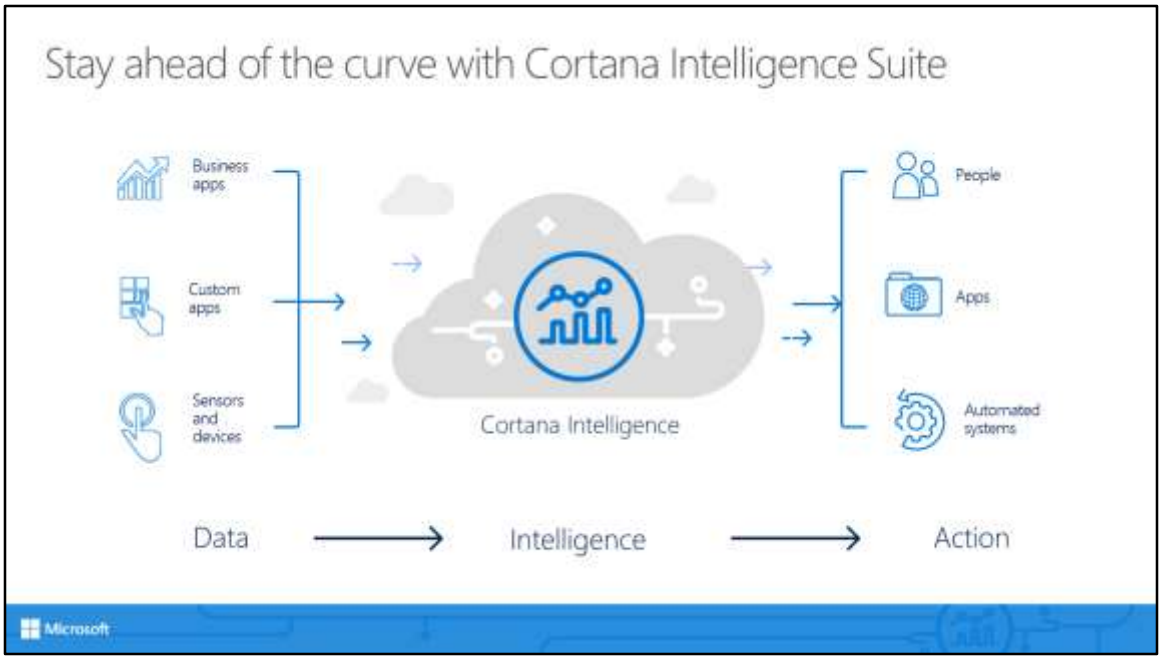
Microsoft


PROJECTED SALES
SUPPLY
ORDER QUANTITY
PROJECTED SALES RISING
NEXT ORDER INCREASED
Cortana Intelligence Suite
Cognitive Services
Microsoft



Today, the world around us is rapidly changing, faster than at any other point in history. This is an indicator of the **fourth industrial revolution** that is emerging, largely driven by the rise of Big Data, the growth of the cloud, and a new era of intelligence capabilities.

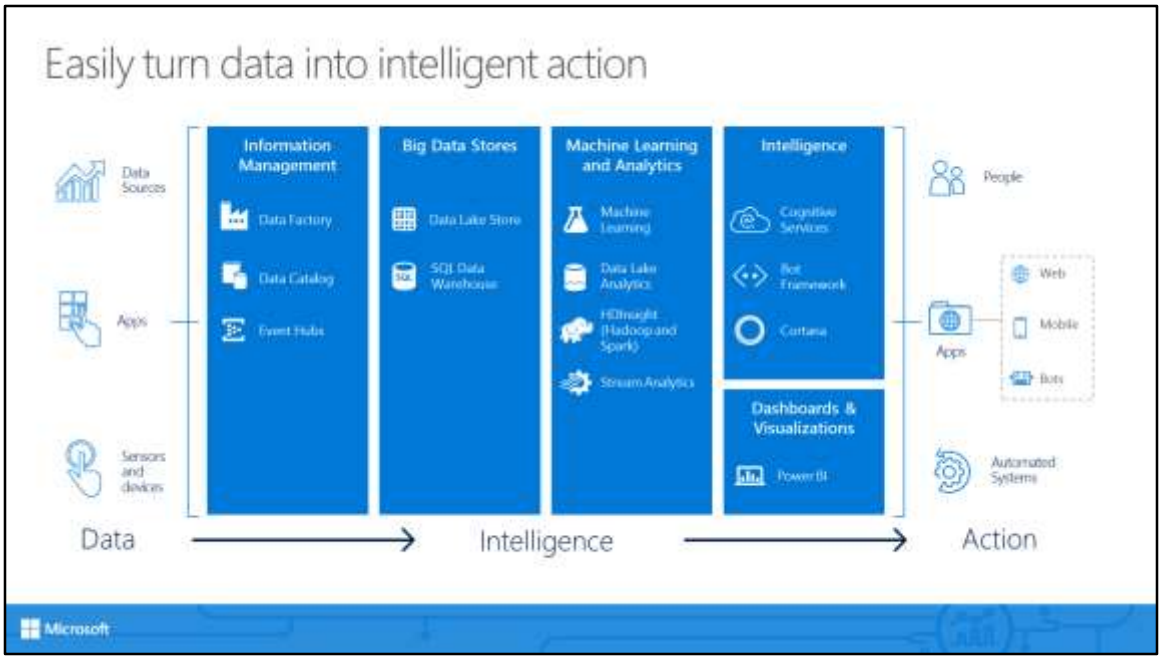
Thanks to the exponential proliferation of small, inexpensive chips and processors, computers are as ubiquitous as the people who use them – from traditional computers, tablets and phones to sensors and wearables. Machines are everywhere, constantly creating, collecting and making sense of the data in our midst. With the magic of machine learning and the limitless computing power of the cloud, this data is giving rise to intelligence that is augmenting human capabilities in exciting new ways.



Cortana Intelligence is Microsoft's fully managed **intelligent, big data and advanced analytics** offering in the cloud, designed to help
It is a comprehensive suite that brings together technologies throughout Microsoft. It provides fast and flexible deployment, with a simple monthly subscription to reduce time and cost challenges.

Cortana Intelligence enables customers to benefit from Microsoft's investment in the intelligent cloud and advanced analytics, spanning our leading cloud platform with easy to use tools and services that integrate with existing infrastructure and enable enterprises to extend business solutions as their needs grow over time.

With Cortana Intelligence, we are taking years of research and innovation – spanning technology & infrastructure for advanced analytics, including capabilities such as machine learning, big data storage and processing in the cloud, intelligence capabilities like vision, face and speech recognition, and integration with Cortana, Microsoft's personal digital assistant, with the goal of helping enterprise customers make better, faster decisions to accelerate their speed of business.



Cortana Intelligence delivers an end-to-end platform with an integrated and comprehensive set of tools and services to help you build intelligent applications that let you easily take advantage of Advanced Analytics and intelligence capabilities.

First, Cortana Intelligence provides services to bring data in, so that you can analyze it. It provides information management capabilities like Azure Data Factory so that you can pull data from any source (relational DB like SQL or non-relational ones like your Hadoop cluster) in an automated and scheduled way, while performing the necessary data transforms (like setting certain data columns as dates vs. currency etc). Think ETL (Extract, Transform, Load) in the cloud. Event Hubs does the same for IoT type ingestion of data that streams in from lots of end points.

The data brought in then can be persisted in flexible big data storage services like Data Lake Store and Azure SQL Data Warehouse.

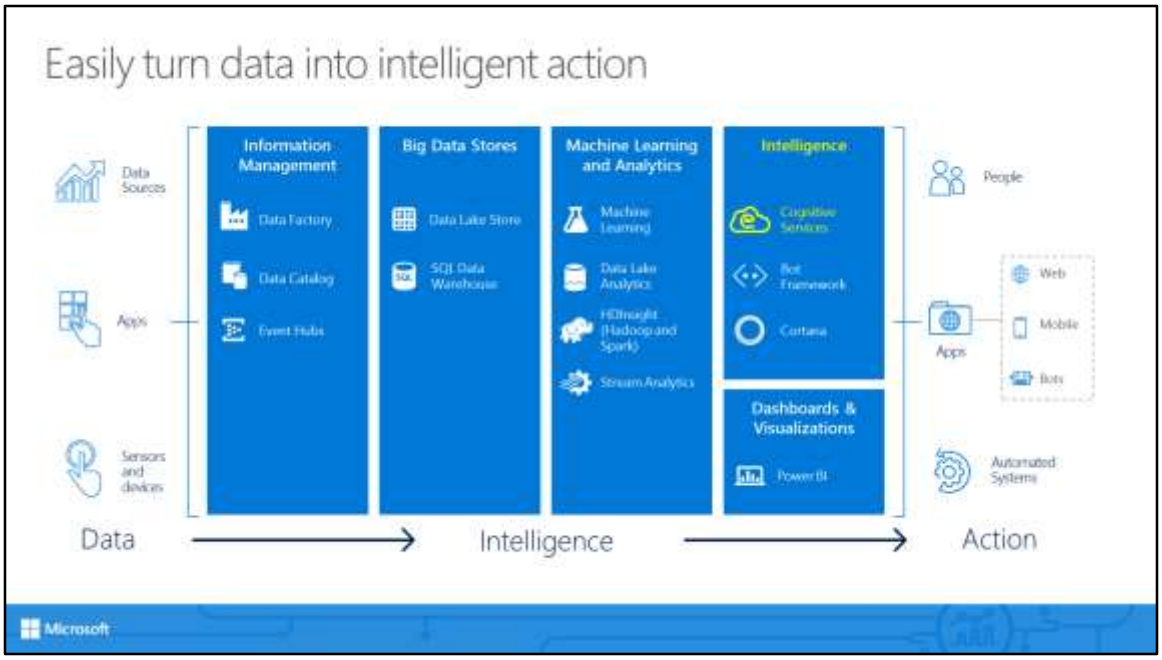
You can then use a wide range of analytics services from Machine Learning to Azure Data Lake Analytics to Azure HDInsight to Azure Stream Analytics to analyze the data stored in the big data storage. This means you can create analytics services and models specific to your business need (say real time demand forecasting).

The resultant analytics services and models created by taking these steps can then be surfaced as interactive dashboards and visualizations via Power BI.

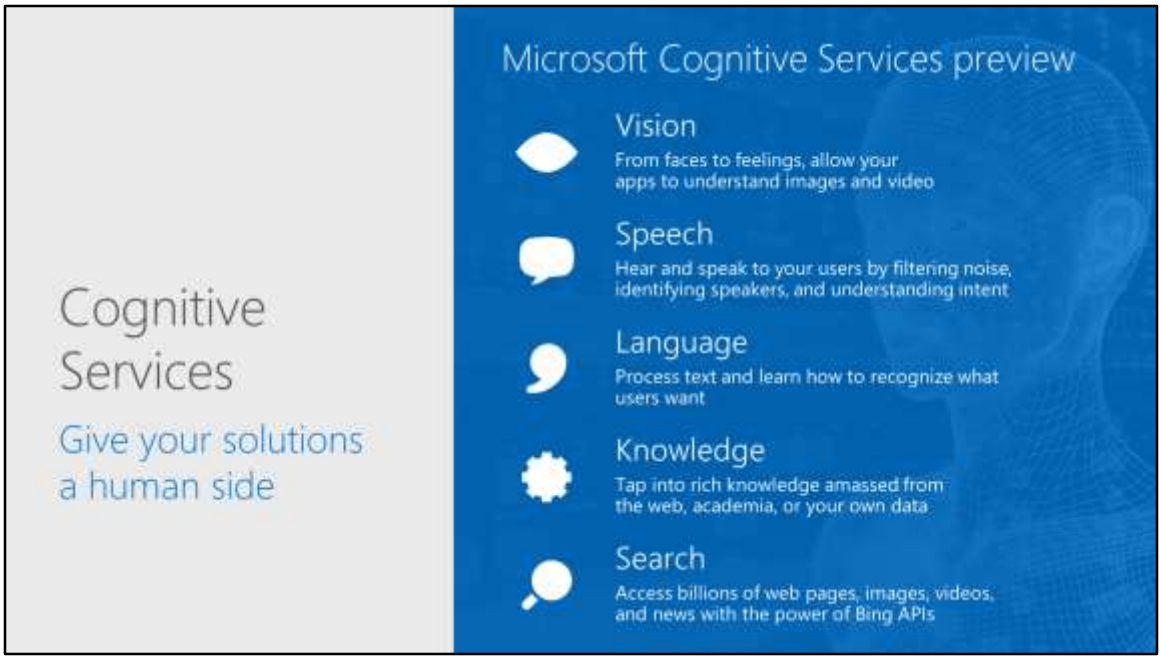
These same analytics services and models created can also be integrated into various different UI (web

apps or mobile apps or rich client apps), or with Cortana, so end users can naturally interact with them via speech etc., and so that end users can get proactively be notified by Cortana if the analytics model finds a new anomaly (unusual growth in certain product purchases- in the case of real time demand forecasting example given above) or whatever deserves the attention of the business users. Similar integration can occur with Cognitive Services or Bot Framework based applications.

At a high level though, Cortana Intelligence capabilities are in three main areas: data, analytics and intelligence.



We're going to detail the Intelligence layer, more specifically the Microsoft Cognitive Services.



What are Cognitive Services? Microsoft Cognitive Services are a new collection of intelligence and knowledge APIs that enable developers to ultimately build smarter apps.
So, what are Cognitive Services? Cognitive Services are a collection of artificial intelligence APIs, and we believe in *democratizing* artificial intelligence. So what that means is, regardless of your skill level -- whether you're a high school student running your first program or working in industry or in a giant enterprise -- that you should be able to use our APIs incredibly quickly in a matter of minutes.

And regardless of your platform -- whether you're on Android or IOS or Windows, or making a website -- all of our APIs are rest APIs, which means you can call them as long as you have an Internet connection. And so that's pretty huge because what we're doing is making it so that everyone can build these smarter, more context-aware applications.

The technology used in our APIs is the same technology that powers our products today. And so, when you think of things like the Bing search APIs, it's the same technology from Bing.

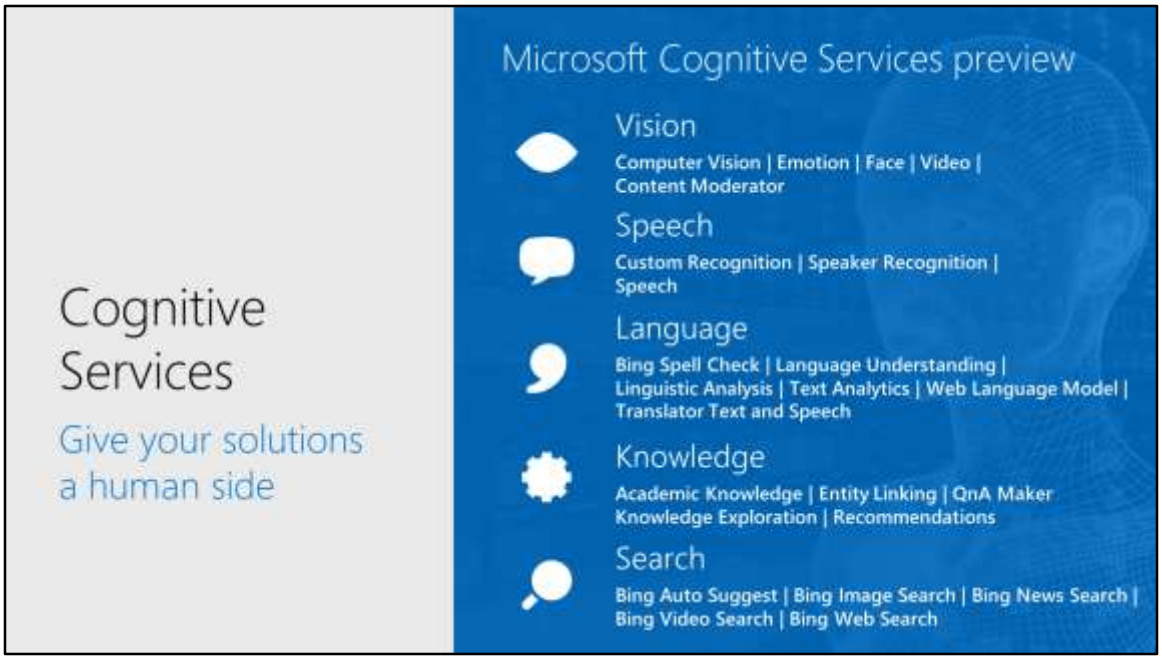
Today I'm going to talk with you about the entire collection spanning vision, speech, language, knowledge, and search.

The other things that I want to point out is that you can get started for free with all of the APIs, but we do have pricing available for a number of them, which are in public preview on Azure.

The other piece is the developer resources. So, all of our documentation is on the website and actually in GitHub as well, so we do welcome community submissions. We have a set of SDKs that are

also available on GitHub where we welcome pull requests and post everything on there. The SDKs vary from API to API, but they are all included in this one repository for people to see.

And then we have three different communities that we support. We have our MSDN forums, our Stack Overflow, and we have User Voice that we use for feedback requests.



At Microsoft, we've been offering APIs for a very long time across the company. In delivering Microsoft Cognitive Services API, we started with 4 last year at /build (2015); added 7 more last December, and today we have 24 APIs in our collection.

Cognitive Services are available individually or as a part of the Cortana Intelligence Suite, formerly known as Cortana Analytics, which provides a comprehensive collection of services powered by cutting-edge research into machine learning, perception, analytics and social bots.

These APIs are powered by Microsoft Azure.

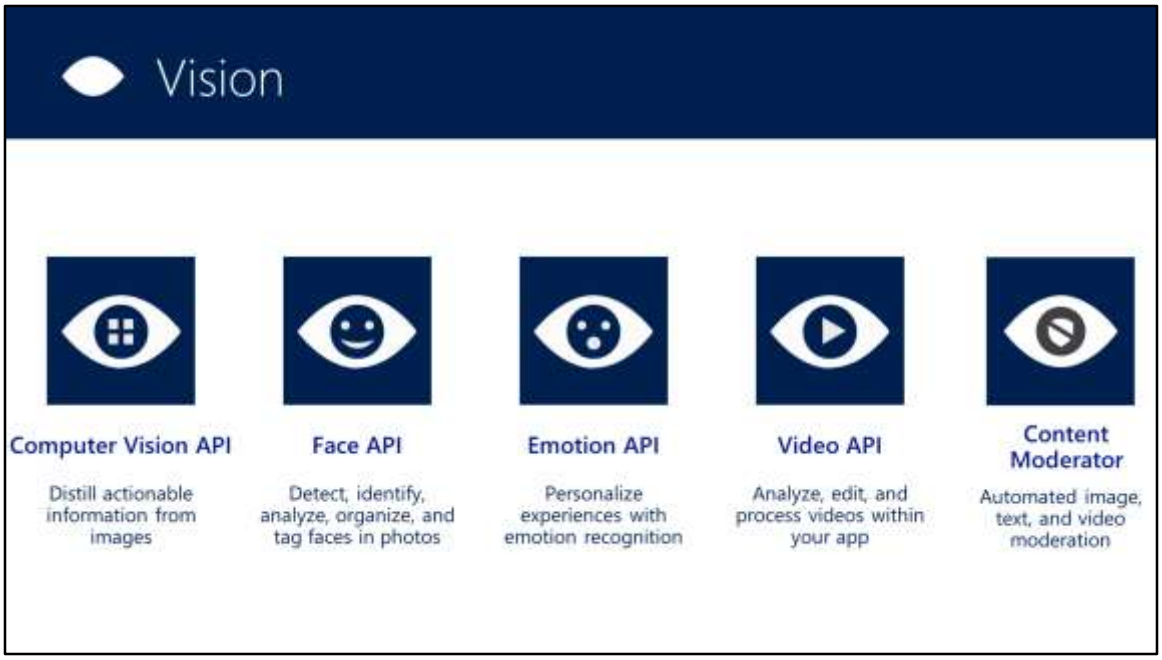
Developers and businesses can use this suite of services and tools to create apps that learn about our world and interact with people and customers in personalized, intelligent ways.

Why choose these APIs? They work, and it's easy.

Easy: The APIs are easy to implement because of the simple REST calls. Being REST APIs, there's a common way to implement and you can get started with all of them for free simply by going to one place, one website, www.microsoft.com/cognitive. (You don't have to hunt around to different places.)

Flexible: We've got a breadth of intelligence and knowledge APIs so developers will be able to find what intelligence feature they need; and importantly, they all work on whatever language, framework, or platform developers choose. So, devs can integrated into their apps—iOS, Android, Windows—using their own tools they know and love (such as python or node.js, etc.).

Tested: Tap into an ever-growing collection of powerful AI algorithms developed by experts. Developers can trust the quality and expertise build into each API by experts in their field from Microsoft's Research organization, Bing, and Azure machine learning and these capabilities are used across many Microsoft first party products such as Cortana, Bing and Skype.



Vision

Computer Vision API: as a free trial on the website microsoft.com/cognitive. There are also SDKs and Samples available on GitHub or through NuGet, Maven, and Cocoapods for select platforms to make development easier. It's important to note here that it's not client side running code, but light wrappers around the REST calls to make integration easy.

A photo app would use this as a way to tag user photos and make it easier for users to search through their collections. An assistive app would use this as a way to describe the surroundings to visually-impaired users. Works really well on both indoor or outdoor images; it can recognize common household objects, and it can describe outdoor scenes. However, we did not train on aerial images (say from drones), or on many close ups (so pictures where we zoomed in extremely on the subject won't do well). We also do really well recognizing celebrities (as long as most of the face is visible, and they were facing the camera).

Face API: Some potential uses for this technology include facial login, photo tagging, and home monitoring. Or attribute detection to know age, gender, facial hair, etc.

Emotion API: is available in the Azure marketplace, as a free trial on the website microsoft.com/cognitive. See Computer Vision description.

Build an app that responds to moods. Using facial expressions, this cloud-based API can detect happiness, neutrality, sadness, contempt, anger, disgust, fear, and surprise. The AI understands these

emotions based on universal facial expressions, and it functions cross-culturally, so your app will work around the world. Some use cases would be an advertising company wants to test user response to an ad, a tv studio wants to track responses to a pilot.

Video API: as a free trial on the website microsoft.com/cognitive. See Computer Vision description.

It brings Microsoft state of the art video processing algorithms to developers. With Video API, developers can analyze and automatically edit videos, including stabilize videos, create motion thumbnails, track faces, and detect motion. Use cases: For Stabilization: If you have multiple action videos, you can use the stabilization algorithm to make them less shaky and easier to watch. You can also use the stabilization algorithm as a first step in performing other video APIs. For Face Tracking: You can track faces in a video to do A/B testing in a retail setting. You can combine Video API Face Tracking with capabilities in Face API to search through surveillance, crime, or media footage to look for certain person. For Motion Detection: Instead of having to watch long clips of surveillance footage, the API will let you know what time motion occurred and its duration. For Video Thumbnail: Take a long video, such as a keynote presentation, and automatically create a short preview clip of the talk. For Face Tracking: Works best for frontal faces. Currently cannot detect small faces, side or partial faces. For Motion Detection: Detects motion on a stationary background (e.g. fixed camera). Current limitations of the algorithms include night vision videos, semi-transparent objects, and small objects. For Video Thumbnail: Take a long video, such as a keynote presentation, and automatically create a short preview clip of the talk.

Content Moderator: With content moderator, perform automated image, text and video moderation.

Image Moderation

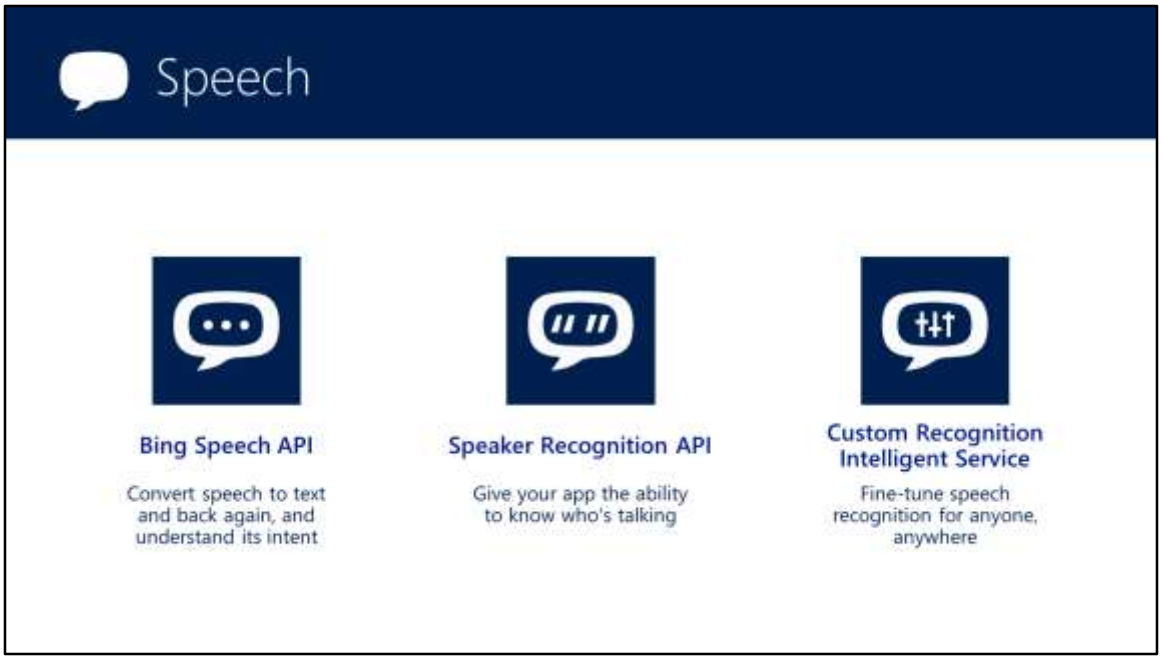
Automatically evaluate images for offensive and unwanted content across differing file types—including altered images. Content Moderator includes optical character recognition (OCR) and face detection to improve the chances of detecting unwanted or exploitive content and implements fuzzy matching against custom blacklists and whitelists.

Text Moderation

Detect profanity in more than 100 languages and match text against your custom lists automatically. Content Moderator also checks for malware and phishing URLS plus personally identifiable information (PII).

Video Moderation

Enable the proactive detection of adult content in videos with moderation handled in the cloud by Azure Media Services.



Speech APIs provide state-of-the-art algorithms to process spoken language powered by Bing. This also includes speech synthesis for a subset of languages supported by speech recognition. With these APIs developers can easily include the ability to add speech driven actions into their applications. In certain cases, the APIs allow for real-time interaction with the user as well. Additional capabilities include voice recognition and speaker identification as well as providing partial transcription, meaning that for supported languages the developer can get partial results before the user has finished speaking. The initial release supports 7 languages.

Bing Speech API: At the time of publication, this data was not available. Please email Rebecca Duffy, reduffy@microsoft.com, if you would like more information.
We also have SDKs available for Speech.

CRIS: The Custom Recognition Intelligent Service (CRIS) enables you to create customized language models and acoustic models tailored to your application and your users. By uploading speech and/or text data to CRIS that reflects your application and your users, you can create custom models that can be used in conjunction with Microsoft's existing state-of-the-art speech models. To customize the acoustic model to a particular domain, a collection of speech data is required. This collection consists of a set of audio files of speech data, and a text file of transcriptions of each audio file. The audio data should be representative of the scenario in which you would like to use the recognizer. If you were building an app to search MSDN by voice, it's likely that terms like "object-oriented" or "namespace" or "dot net" will appear more frequently than in typical voice applications. Customizing the language model will enable the system to learn this. CRIS uses acoustic or language model adaptation to enable

the speech recognizer to learn the characteristics of the customer's data while still getting the benefits of all the data and expertise that went into creating the base models that power the Speech API.

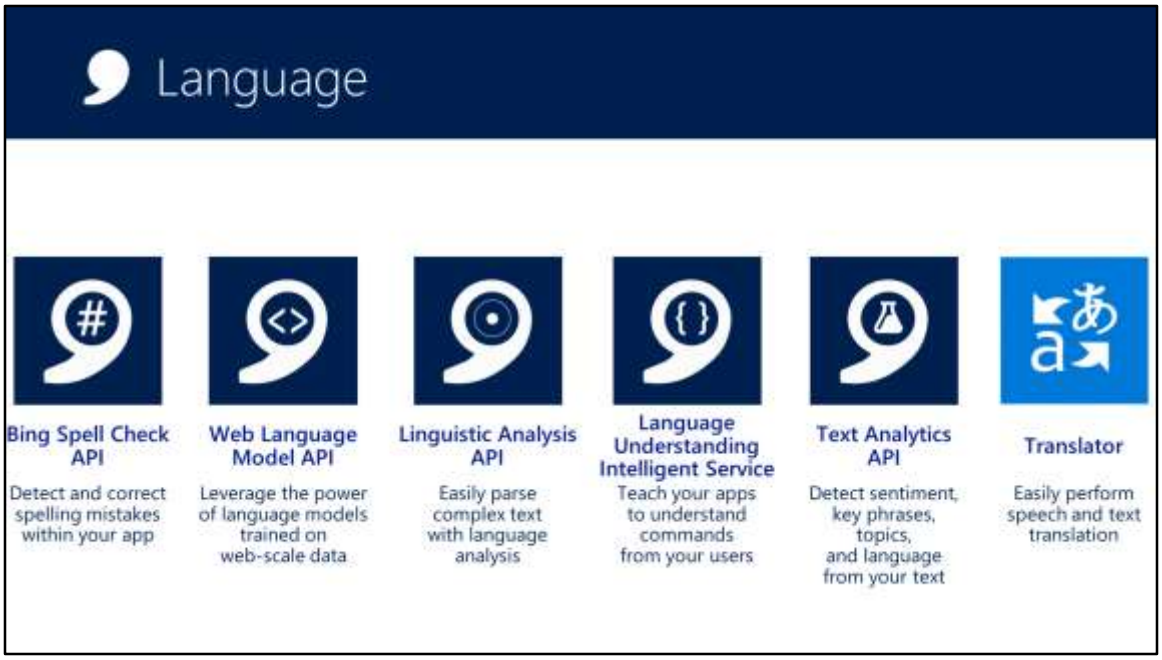
For acoustic model adaptation, the technology is described in this paper:
http://research.microsoft.com/pubs/194346/0007893.pdf

Works well when the data is uploaded to CRIS is truly representative of the user population and the expected usage of the application. For language model adaptation, it works best when the data uploaded reflects what people would actually say. Uploading simply a list of new terms is better than nothing but will not be as effective. For acoustic model adaptation, if you want to adapt to elderly speech, you need to upload the speech from many different elderly users, not just one or two. If you upload just one person's voice, CRIS will learn to do a great job on that voice but will not necessarily learn to generalize to other elderly voices. Similarly, if you want to adapt to a new environment, like a factory, you should upload speech data from many speakers in the factory, not just one.

Speaker Recognition API: Microsoft's state-of-the-art cloud-based speaker recognition algorithms to recognize a human's voice in audio streams. It comprises two components: speaker verification and speaker identification. Speaker Verification can automatically verify and authenticate users from their voice or speech. It is tightly related to authentication scenarios and is often associated with a pass phrase. Hence, we opt for text-dependent approach, which means speakers need to choose a specific pass phrase to use during both enrollment and verification phases. Speaker Identification can automatically identify the person speaking in an audio file given a group of prospective speakers. The input audio is paired against the provided group of speakers, and in case there is a match found, the speaker's identity is returned. It is text-independent, which means that there are no restrictions on what the speaker says during the enrollment and recognition phases. A use case is biometric authentication using voice.

https://blogs.technet.microsoft.com/machinelearning/2015/12/14/now-available-speaker-video-apis-from-microsoft-project-oxford/

We also have SDKs available for Speaker Reco



Bing Spell Check API: Microsoft's state-of-the-art cloud-based spelling algorithms to detect a wide variety of spelling errors and provide accurate suggestions. Using Bing Spell Check, your mobile and PC apps will be powered with state-of-the-art spelling capabilities. Our service is trained on a massive corpus of data gleaned from billions of web pages. There is no need to train your own models. The speller model is updated regularly and incorporates new terms and brands almost as quickly as they appear on the web. This API is available through Microsoft Cognitive Services for customers with low-volume and high-latency jobs. For high-volume and low-latency we have an internal API which may be more suitable.

Use cases: 1) Improve the quality of a website's product search 2) provide spell correction for a keyboard app 3) provide spell correction for text fields in an app or web page 4) detect errors in UI text and user data. See https://blogs.msdn.microsoft.com/msr_er/2010/12/15/building-a-better-speller-bing-and-microsoft-research-offer-prizes-for-best-search-engine-spelling-alteration-services/ The speller is exceptional at common spelling errors with low edit-distance (such as febuary->February) but a lot of other spellers are good at that as well. We Do a very good job with word breaking, proper names in context (try "director stephen spielberg") and fictional character names, just a few examples. Areas that are a challenge are capitalization (we don't know what to do with "March" for example, even with context) and consistency (there are times when we will flag a word only intermittently based on the context).

Web Language Model API: Web Language API indexes the web and Bing queries to allow users to calculate the probabilities of natural language expressions and estimate a list of most likely words to follow an existing sequence of words. Use this API to insert spaces into a string of words without

spaces, like a hashtag or URL. Use this API to rerank machine translation/speech recognition candidate sentences based on probability of the sentence.

Use this API for academic research. http://research.microsoft.com/apps/pubs/default.aspx?id=130762

We also have SDKs available for WebLM

Linguistic Analysis API: The Linguistic Analysis API helps you gain insights from text. Given a natural language parse, it's easy to identify the concepts and entities (noun phrases), actions (verbs and verb phrases), descriptive words, and more. The processed text can provide useful features for classification tasks such as sentiment analysis.

We also have SDKs available for Linguistic Analysis.

LUIS: Language Understanding Intelligent Service (LUIS) allows developers to build a model that understands natural language and commands tailored to their application. Example: You can say "turn down the thermostat in the living room," send it to a LUIS model, and instead of just returning the text that represents what was said, LUIS will return: the action is "turn down," the location is "living room," and the target is "thermostat." LUIS allows developers to iteratively build on these models and take speech or text input and return a structured representation of what the person said. Not only that but by build LUIS will help developers create and train smart conversational bot (Intercom or Slack) with a single button. LUIS will also offer action fulfillment capabilities by simple integration with webhooks. LUIS works pretty well it comes to intents. For the entities, the learning curve is slower especially when the number of entities increases. LUIS only supports 20 intents & 10 entities yet by build each entities can have up to 10 children.

Text Analytics API: Detect sentiment, key phrases, topics, and language from your text.
Sentiment analysis : The API returns a numeric score between 0 and 1. Scores close to 1 indicate positive sentiment and scores close to 0 indicate negative sentiment. Sentiment score is generated using classification techniques. The input features of the classifier include n-grams, features generated from part-of-speech tags, and word embeddings. English, French, Spanish and Portuguese text are supported.
Key phrase extraction : The API returns a list of strings denoting the key talking points in the input text. We employ techniques from Microsoft Office's sophisticated Natural Language Processing toolkit. English, German, Spanish, and Japanese text are supported.
Topic detection : This is a newly released API that returns the detected topics for a list of submitted text records. A topic is identified with a key phrase, which can be one or more related words. This API requires a minimum of 100 text records to be submitted, but is designed to detect topics across hundreds to thousands of records. Note that this API charges 1 transaction per text record submitted. The API is designed to work well for short, human-written text such as reviews and user feedback.
Language detection : The API returns the detected language and a numeric score between 0 and 1. Scores close to 1 indicate 100% certainty that the identified language is true. A total of 120 languages are supported.

Microsoft Translator: Add speech translation, for any of the 9 supported languages, and text translation, for any of the 60 supported languages, to your app. Grow your potential user base by localizing your app and its content with clear translations.

Academic Knowledge API: The Academic Knowledge API enable developers to interpret user queries for academic intent and retrieve rich entity information about research papers, authors, journals, conferences, and universities from the Microsoft Academic Graph (MAG). 1. Developers can use this API to build search features such as the knowledge-based query auto-suggest and search results at http://academic.microsoft.com.
2. Universities can retrieve analytics data about their researchers' publications, topics, and venues. 3. Conference organizers can analyze the citation patterns of their conference papers. 4. Data scientists and computer science researchers can develop new ranking and analysis approaches over a large heterogeneous network.

A publication about our approach can be found here: http://research.microsoft.com/apps/pubs/default.aspx?id=246609 The underlying data graph (Microsoft Academic Graph) is constructed over discovered academic papers on the web. The data is largely unstructured, of variable quality, and ambiguous. We are constantly working to improve this data quality and to correctly aggregate the multiple instances of authors, papers, etc. into a single representative entity in the graph.

Knowledge Exploration Service API: Enable interactive search experience over structured data via natural language. Indexes customer's structured data (BYOD) with support for prefix completion. Generates annotated interpretations/completions of natural language queries. Publishers/libraries can use this to create interactive search over their publications similar to academic.microsoft.com. Merchants can create interactive search experience to help users find and discover products. Data owners can create systems that answer natural language user questions. It

works best when the structured data is clean and the natural language structure is simple and predictable. Otherwise, customers will have to invest a bit of work to generate the structured data and author the grammar. We are working on future components to simplify both authoring aspects.

Entity Linking Service API: Given a specific paragraph of text within a document, the Entity Linking will recognize and identify each separate entity based on the context and linking the entity to wikipedia. Use cases: A news agency would use this to analysis their news article to create relations between articles, a news agency would use this to generate tags for article and make recommendation for reader, a company would use this to track the PR articles mentioned it and product comments to track customer feedback. We also have SDKs available for Entity Linking.

Recommendations API: With Recommendations API, provide personalized product recommendations for your customer and improve sales in your store.

Frequently Bought Together (FBT) recommendations : Learn from your previous transactions. When a customer visits a particular item, the recommendations engine suggests additional items that are likely to be purchased together in the same transaction.

Item to item recommendations : This is the "Customers who liked this product also liked these other products" scenario. Increase the discoverability of items in your catalog by showing relevant products to your customers.

Personalized user recommendations : Using a customer's prior activity, personalize their experience by recommending items that they might be interested in. For example, using a customer's viewing history for movies, it's possible to recommend additional movies and shows of interest.

QnA Maker: With QnA Maker, extract all possible pairs of questions and answers from user provided content – FAQ URLs, documents and editorial content

Test, train and publish:Edit, remove or add pair before testing and training the knowledge base and publishing your knowledge base as an API endpoint

Integrates with other APIs and solutions : Use QnA Maker with Cognitive Services such as LUIS & create something as elegantly simple as a chat bot that answers FAQs, or as complex as an interactive virtual guide.

The Search APIs provide access to the search technology that power Bing.com and a long list of 1st-party (Office, Cortana, Xbox, Edge) and 3rd-party (AOL, Apple, Amazon, Yahoo etc.) partners. In total, we have 4 Search APIs for web, image, video and news search. In addition we provide access to our Autosuggest (type-ahead) and Spell Check services.

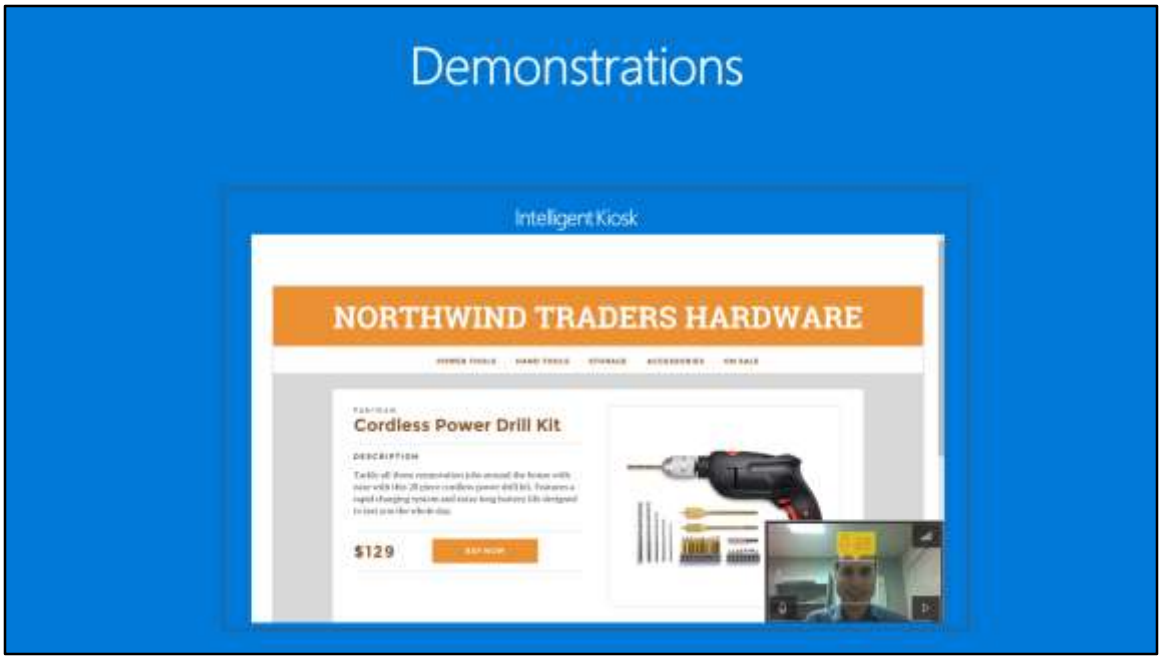
Bing Web Search API: is the main Search API. With one programmatic call, the user can get back relevant webpage, image, video, and news results. It's equivalent to searching in the web vertical in bing.com. The Search APIs provide the power of the Bing Search engine to developers. You get access to many of the latest and greatest capabilities the bing.com site has to offer, in the form of an API. It's the same architecture stack so it's a powerful way to bring the knowledge and intelligence of the search engine to your own experience. The API is built directly on top of the entire Bing stack- you get the quality, relevance, performance and continuous improvements that the rest of the site gets. Similar to Bing.com- tail queries, or obscure terms may have limited results. We're always working to improve the edge cases though and API users will benefit from that.

Bing Autosuggest API: At the time of publication, this data was not available. Please email Rebecca Duffy, reduffy@microsoft.com, if you would like more information.

Bing Image Search API: At the time of publication, this data was not available. Please email Rebecca Duffy, reduffy@microsoft.com, if you would like more information.

Bing Video Search API: At the time of publication, this data was not available. Please email Rebecca Duffy, reduffy@microsoft.com, if you would like more information.

Bing News Search API: At the time of publication, this data was not available. Please email Rebecca Duffy, reduffy@microsoft.com, if you would like more information.



You can also find the following interactive demonstrations in the Cognitive Services Site :

Vision

- Computer Vision
- Content Moderator
- Emotion
- Face
- Video

Speech

- Bing Speech
- Custom Recognition
- Speaker Recognition

Language

- Bing Spell Check
- Language Understanding
- Linguistic Analysis
- Text Analytics
- Translator
- WebLM

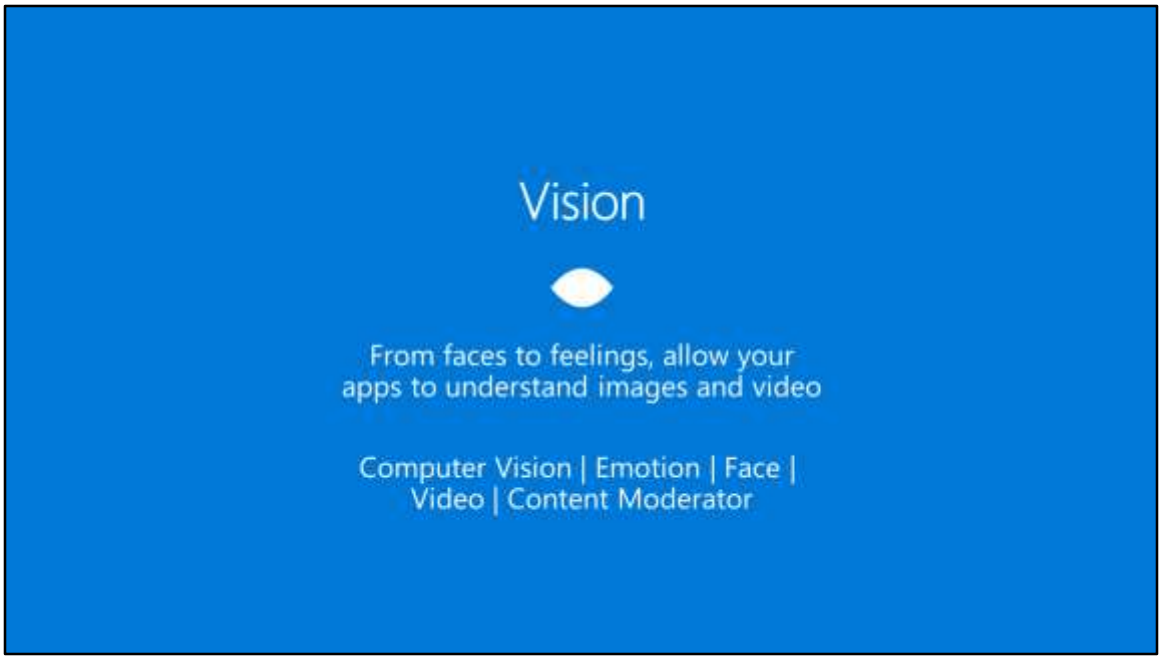
Knowledge

- Academic
- Entity Linking
- Knowledge Exploration
- QnA Maker

Recommendations

Search

Bing Autosuggest
Bing Image Search
Bing News Search
Bing Video Search
Bing Web Search



Do you need an API that gives you actionable information about images used in your app? The Computer Vision API gives you the tools to understand the contents of any image. Create tags identifying objects, beings, or actions present in the image, and then craft coherent sentences to describe it. Whether you want to execute better image search, or you want to create an assistive app for the visually impaired, the Computer Vision API helps get the job done.

Analyze image

Type of image

Clip Art Type	0 Non-clipart
Line Drawing Type	0 Non-Line Drawing
Black & White Image	False

Content of image

Categories	[{ "name": "people_swimming", "score": 0.099609375 }]
Adult Content	False
Adult Score	0.18533889949321747
Faces	[{ "age": 27, "gender": "Male", "faceRectangle": {"left": 472, "top": 258, "width": 199, "height": 199}}]

Image colors

Dominant Color Background	White
Dominant Color Foreground	Grey
Dominant Colors	White
Accent Color	

OCR

Good at

- Scanned documents
- Photos with text
- Fine grained location information


```
{
  "language": "en",
  "orientation": "Up",
  "regions": [
    {
      "boundingBox": "41,77,723,89",
      "lines": [
        {
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          "words": [
            {
              "boundingBox": "41,102,225,64",
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              "text": "IS"
            },
            {
              "boundingBox": "539,77,225,64",
              "text": "LIKE"
            }
          ]
        }
      ]
    }
  ]
}
```
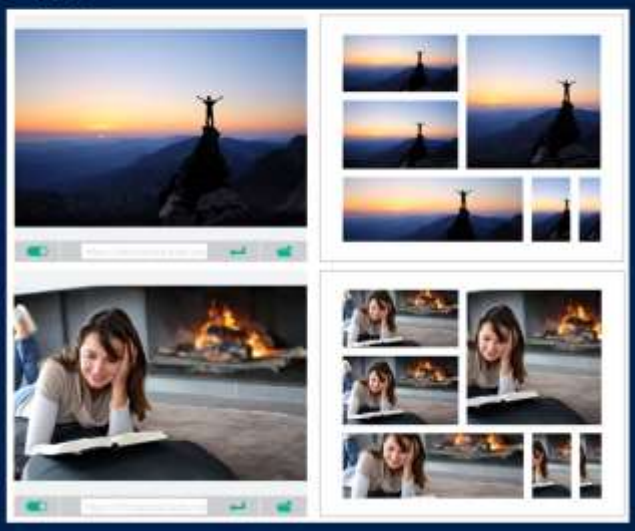
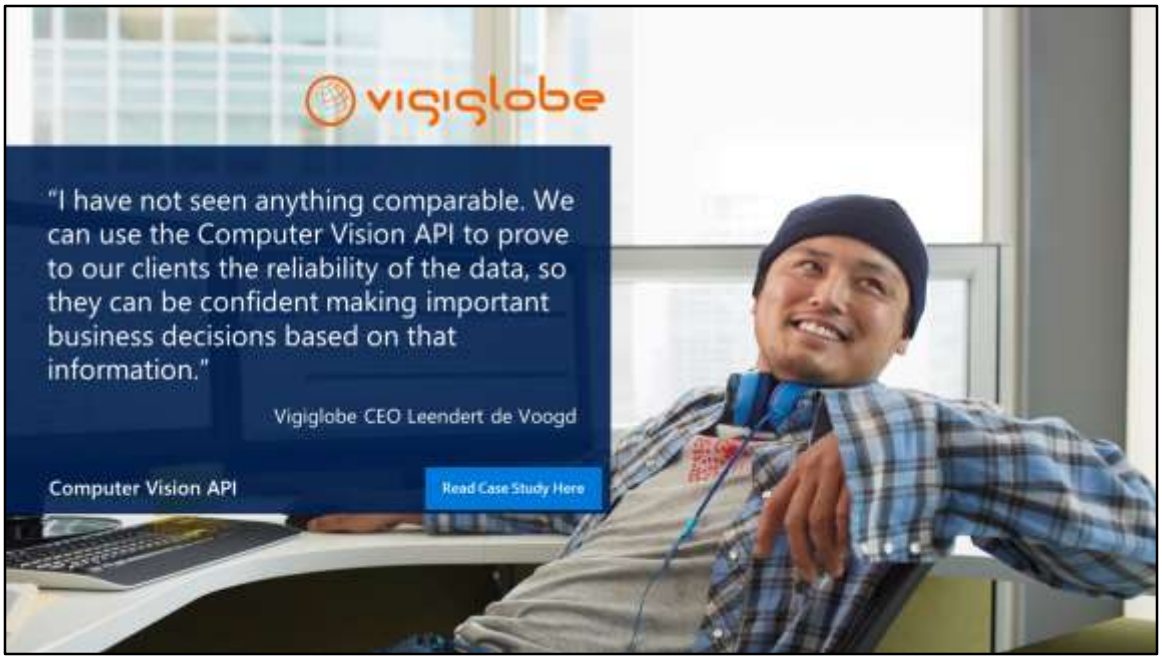

Smart thumbnail

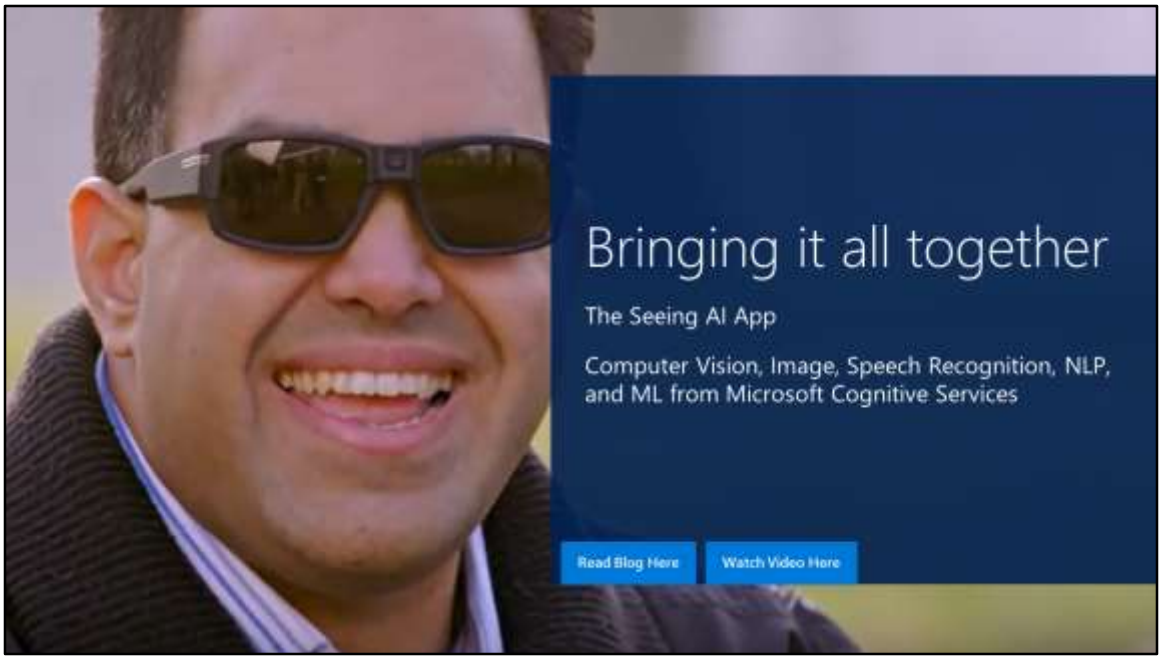
Smart cropping **off**





Vigiglobe

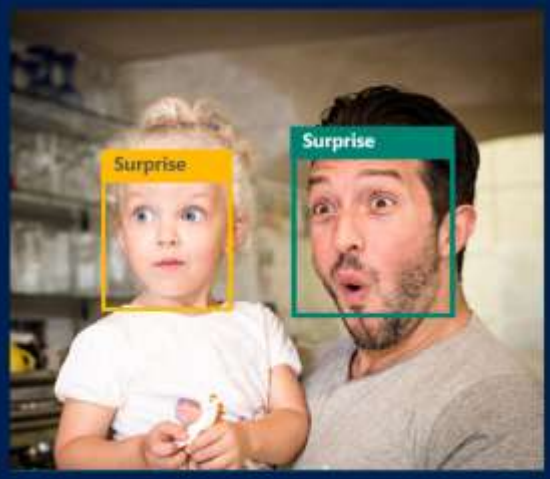
Vigiglobe saw an opportunity to analyze not only what was being said on social media, but also the context in which it was being discussed. The team created proprietary algorithms to accurately interpret and contextualize social media messages in real time. Using the Computer Vision API of Microsoft



How are you feeling? Can your app tell? With the Emotion API, you can build an app that recognizes emotions according to facial expressions—giving you the capability to provide an amazing, personalized experience.

Using facial expressions, this cloud-based API can detect happiness, neutrality, sadness, contempt, anger, disgust, fear, and surprise. The AI understands these emotions based on universal facial expressions, and it functions cross-culturally, so your app will work around the world.

Emotion APIs



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": 9.38888746e-7,
            "surprise": 0.9952837}
```

Lab

Consuming Emotion API

Go through Emotion python notebook at https://notebooks.azure.com/library/python-cognitive

Detect human faces and compare similar ones, organize people into groups according to visual similarity, and identify previously tagged people in images.

Face APIs

Detection

```
"faceRectangle": {"width": 193, "height": 193, "left": 326, "top": 204}
```

…

Feature attributes

```
"attributes": { "age": 42, "gender": "male",
                "headPose": { "roll": "8.2", "yaw": "-37.8", "pitch": "0.0" }}
```

Grouping

Identification

Jasper Williams

Intelligent video processing produces stable video output, detects motion, creates intelligent thumbnails, and detects and tracks faces.

Stabilization

The Stabilization API provides automatic video stabilization and smoothing for shaky videos

This API uses many of the same technologies found in Microsoft Hyperlapse

Best For:
Small camera motions, with or without rolling shutter effects
(e.g., holding a static camera, walking with a slow speed)

Face detection and tracking

High precision face location detection and tracking

Can detect up to 64 human faces in a video (no smaller than 24x24 pixels)

Detected and tracked faces are returned with coordinates and a Face ID to track throughout the video

Time (sec)	Face ID	x, y	Width, height
0	0	0.59, 0.23	0.09, 0.16
0	1	0.38, 0.15	0.07, 0.12
1	0	0.54, 0.25	0.09, 0.15
1	1	0.23, 0.18	0.07, 0.12

Motion detection

Indicates when motion occurs against a fixed background (e.g., surveillance video)

Trained to reduce false alarms, such as lighting and shadow changes

Start time	End time	In region
1.9	3.6	0
5.2	15.1	0

Powered by intelligent machine learning, Microsoft Content Moderator automatically filters out offensive content in images, text, and video across platforms and includes human review tools for more nuanced cases.

Image moderation API

Automatically evaluate images for offensive and unwanted content across differing file types—including altered images. Content Moderator includes optical character recognition (OCR) and face detection to improve the chances of detecting unwanted or exploitive content and implements fuzzy matching against custom blacklists and whitelists.

Text moderation API

Detect profanity in more than 100 languages and match text against your custom lists automatically. Content Moderator also checks for malware and phishing URLS plus personally identifiable information (PII).

Video moderation API

Enable the proactive detection of adult content in videos with moderation handled in the cloud by Azure Media Services.

Human review tool beta

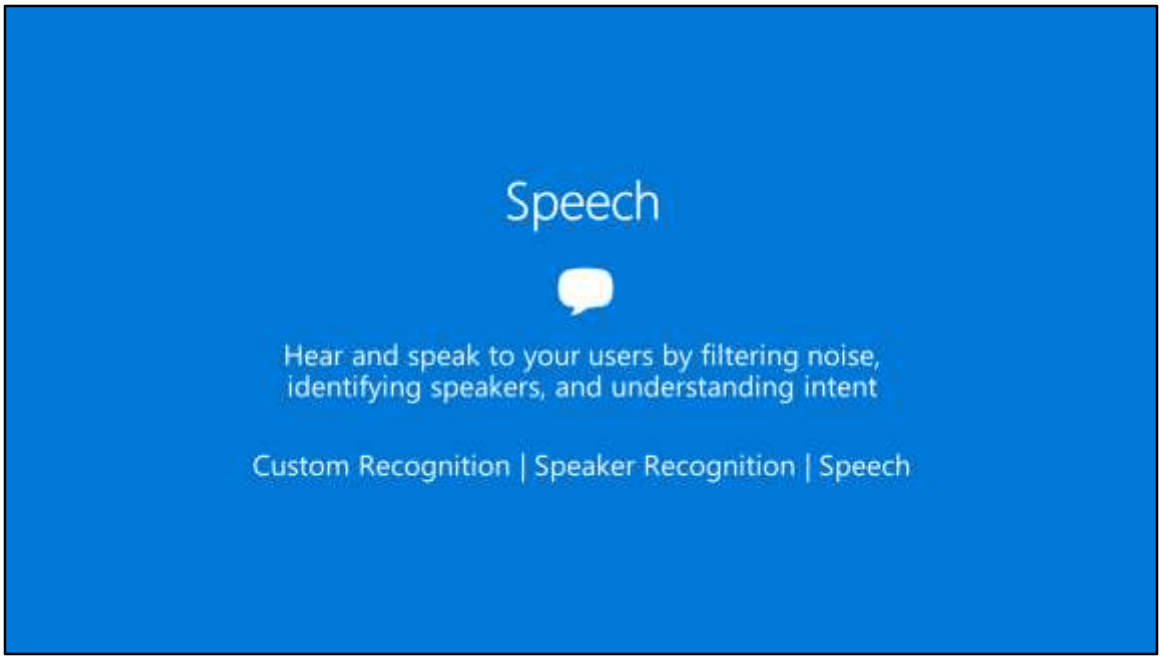
Enjoy the freedom and control of human oversight while still benefiting from automated moderation. Review tools let you review automated results with your team and approve or change tags to override the automated results. Thanks to machine learning and custom lists, your moderation process gets smarter the more you use it.

Try the review tool beta

Lab

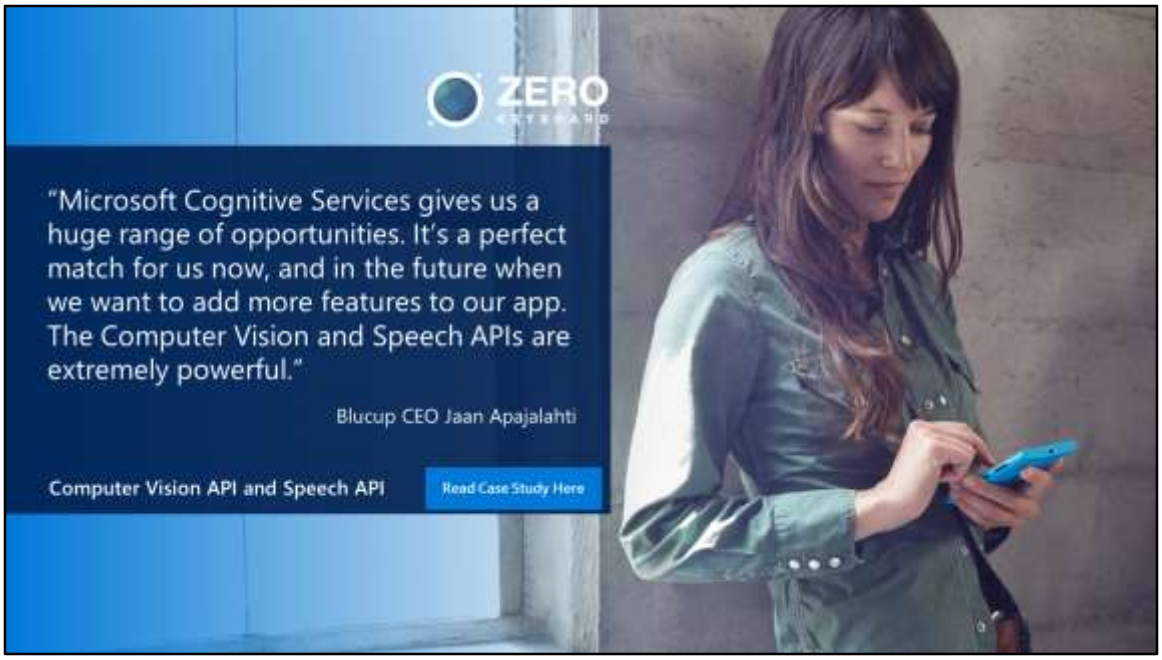
Consuming Computer Vision API

Go through Computer Vision python notebook at https://notebooks.azure.com/library/python-cognitive



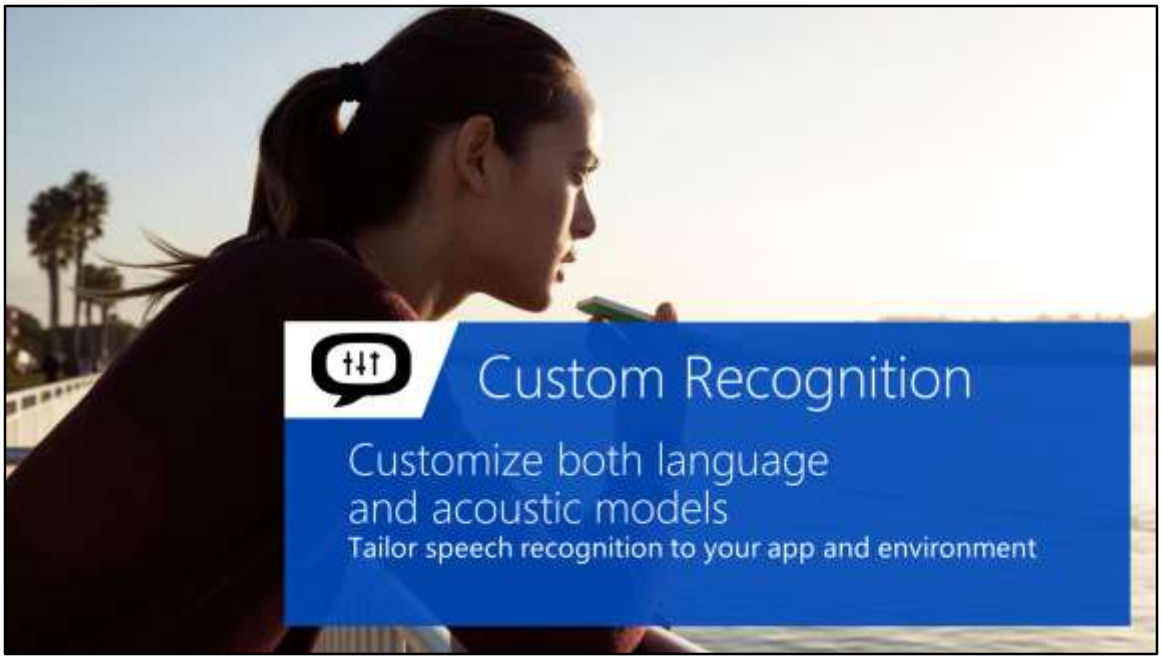
Convert audio to text, understand intent, and convert text back to speech for natural responsiveness.

Speech Intent Recognition can, in addition to returning recognized text from audio inputs, also return structured information about the speech to apps that parse the intent of the speaker and drive further actions by the app. Models trained by LUIS service are used to generate the intent.

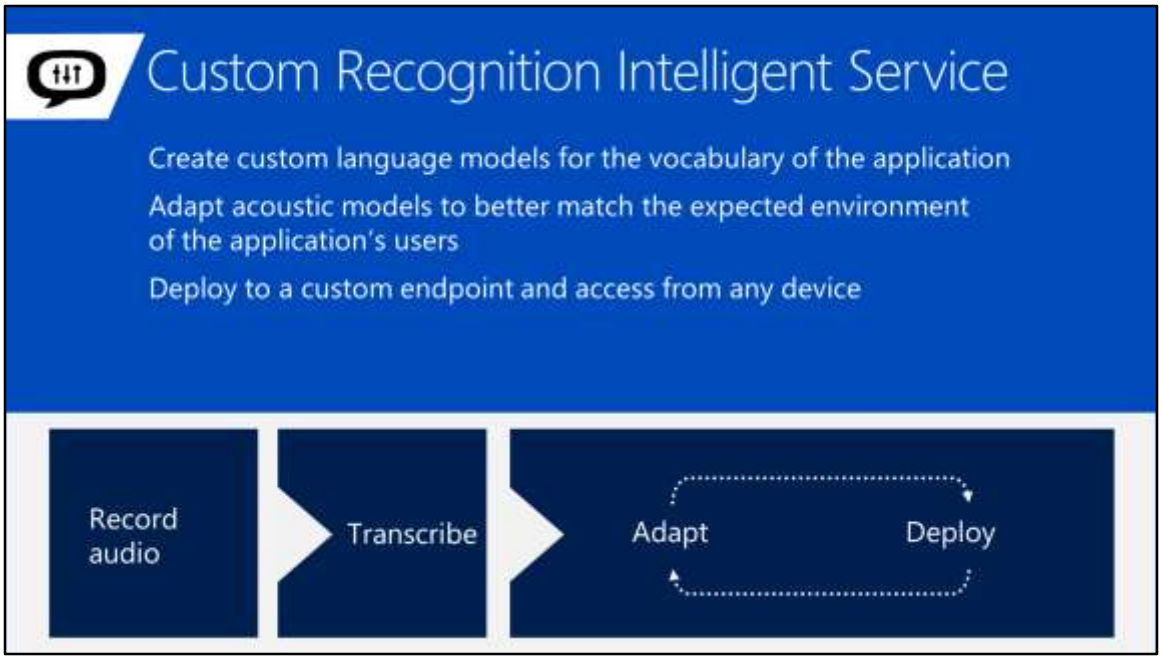


Blucup

Finland-based Blucup was on a mission to solve a common problem: how can salespeople capture data while on the go? The company developed the Zero Keyboard app, which sales reps could use to record customer information quickly and add it automatically to their customer relationship management (CRM) systems using touch gestures, voice, and pictures. Using the Speech and Computer Vision APIs from Microsoft Cognitive Services, Blucup provides customers with accurate results and rich features—all while speeding development internally.



Eliminate speech recognition barriers like speaking style, background noise, and vocabulary.
Does your speech recognition work with varied user populations, vocabularies, or with background noise? The Custom Recognition Intelligent Service (CRIS) helps you create custom speech recognition endpoints—so accents and environments are features, not challenges.
Customize your speech recognition by vocabulary and speaking style, create custom acoustic models to match the expected environment of your users, and tap into the API's powerful intelligence to create speech recognition endpoints customized to your app's needs. Turn language barriers into features with CRIS.


Custom Recognition Intelligent Service
Create custom language models for the vocabulary of the application
Adapt acoustic models to better match the expected environment of the application's users
Deploy to a custom endpoint and access from any device
Record audio
Transcribe
Adapt
Deploy

Your users' voices are their passports with the Speaker Recognition API. Your app can authenticate identities by using someone's voice, giving your users the capability to interact securely through speech.

Speaker recognition APIs

Enrollment

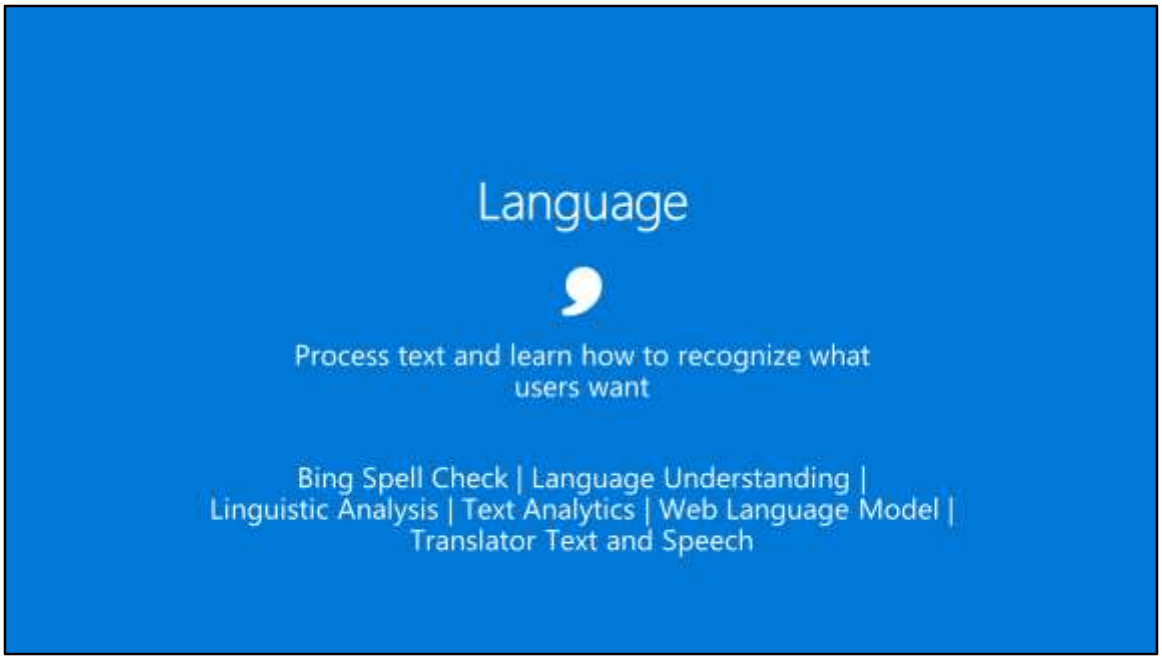
Create a unique voiceprint for a profile

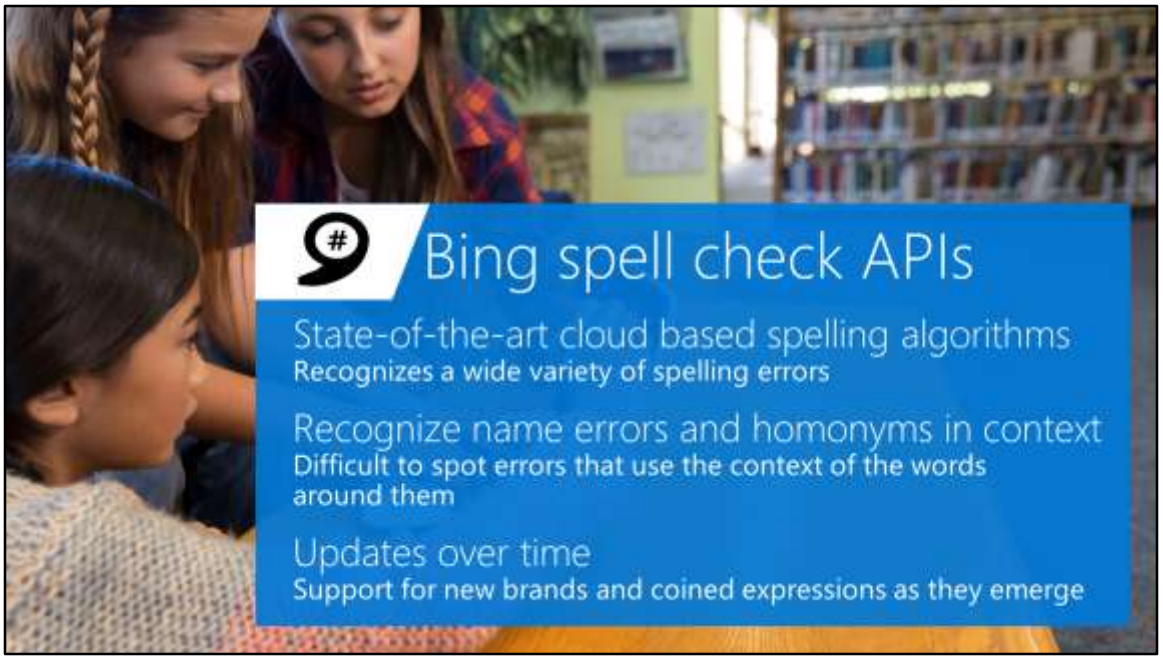
Recognition

After enrolling one or more voices, identify who is speaking from an audio clip

Verification

Confirm if a voice belongs to a previously enrolled profile





The Bing Spell Check API corrects spelling errors, contextually recognizes names and slang, understands homonyms, and supports brand names.

Bing spell check APIs

Check a single word or a whole sentence

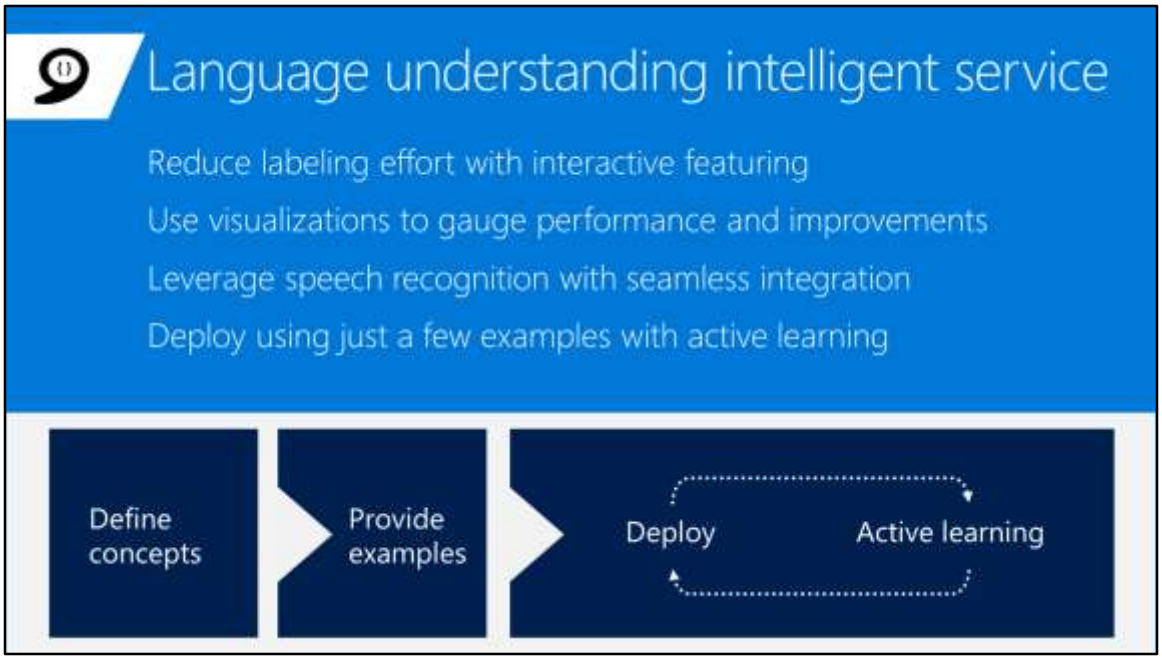
"Our engineers developed this **four** you!"

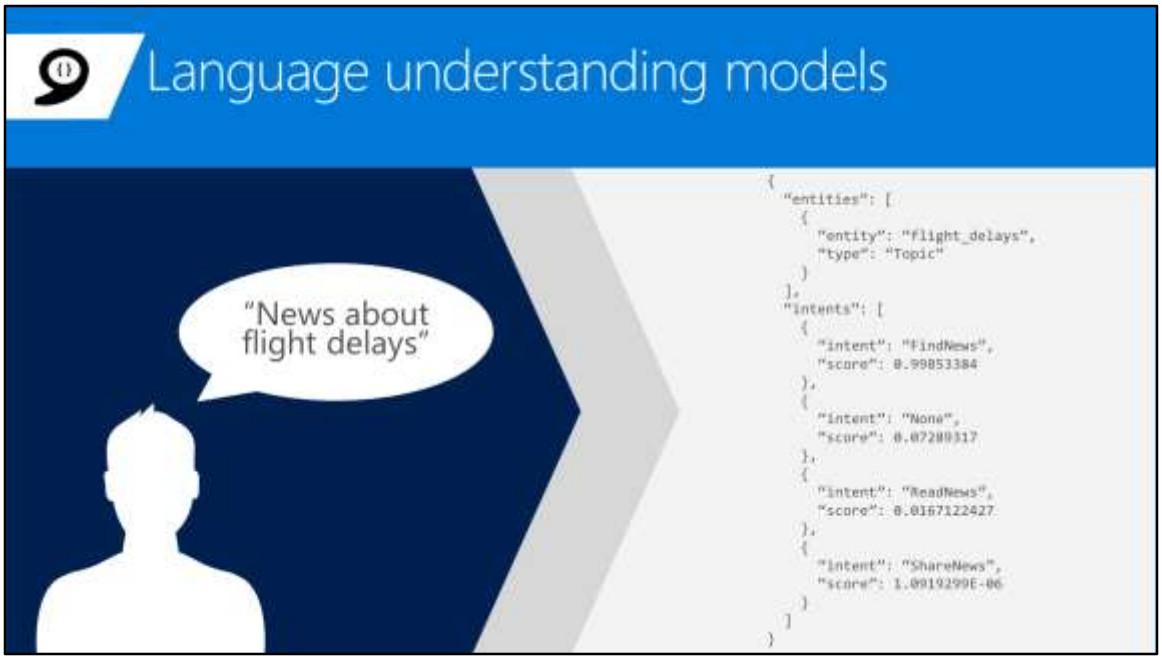
Corrected Text: "four" → "for"

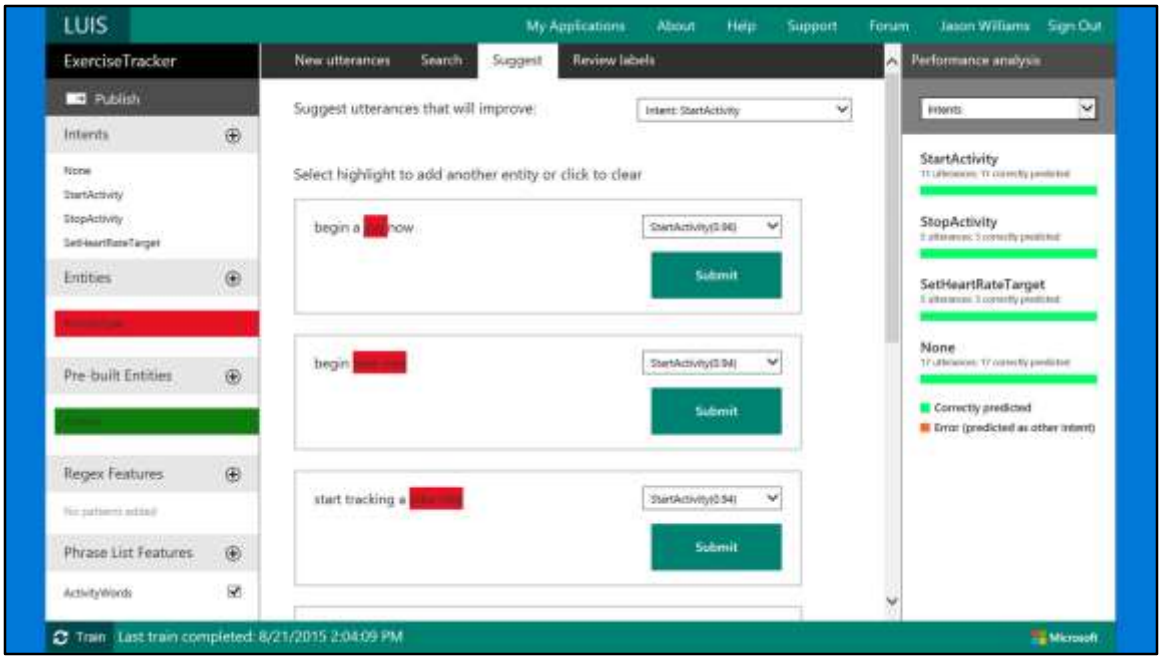
Identify errors and get suggestions

```
"spellingErrors": [
   {
      "offset": 5,
      "token": "gona",
      "type": "UnknownToken",
      "suggestions": [
           { "token": "gonna" }
   ] }
```

Understand language contextually, so your app communicates with people in the way they speak.
Do your apps understand language in the way people speak it—contextually? With the Language Understanding Intelligent Service (LUIS) API, you can integrate language models that understand your users quickly and easily. And if one of our preexisting models won't work, it will guide you through building your own.
Prebuilt models will recognize places, times, numbers, and temperatures, and handle common requests like "set an alarm for 8 AM." LUIS supports dialogue and action fulfillment, so your users can carry on a conversation with your app. For example, the input "schedule a meeting with Allison" results in the question "when?," allowing the user to respond "3 PM," and the meeting gets scheduled.


Language understanding intelligent service
Reduce labeling effort with interactive featuring
Use visualizations to gauge performance and improvements
Leverage speech recognition with seamless integration
Deploy using just a few examples with active learning
Define concepts
Provide examples
Deploy
Active learning


Language understanding models
"News about flight delays"
{
"entities": [
{
"entity": "flight_delays",
"type": "Topic"
}
],
"intents": [
{
"intent": "FindNews",
"score": 0.99853384
},
{
"intent": "None",
"score": 0.07280317
},
{
"intent": "ReadNews",
"score": 0.0167122427
},
{
"intent": "ShareNews",
"score": 1.0919299E-06
}
]
}

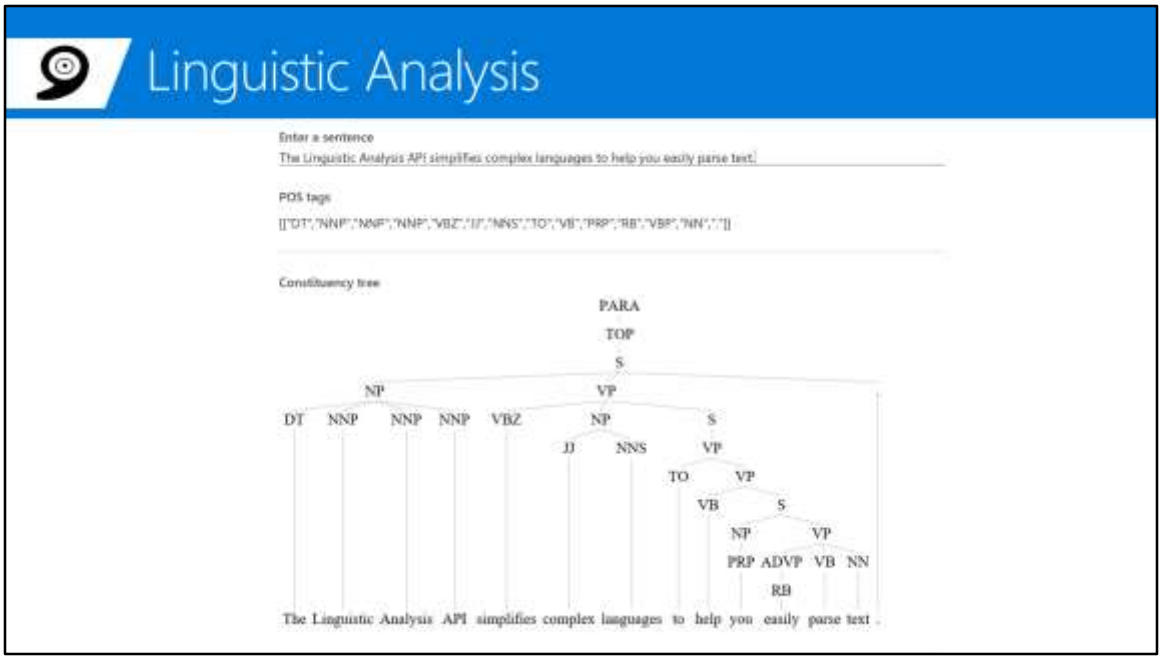

LUIS
My Applications
About
Help
Support
Forum
Jason Williams
Sign Out
ExerciseTracker
New utterances
Search
Suggest
Review labels
Performance analysis
Publish
Intents
None
StartActivity
StopActivity
SetHeartRateTarget
Entities
Pre-built Entities
Regex Features
Phrase List Features
ActivityWords
Suggest utterances that will improve:
Intent: StartActivity
Select highlight to add another entity or click to clear
begin a
now
Submit
begin
Submit
start tracking a
Submit
Intents
StartActivity
StopActivity
SetHeartRateTarget
None
Correctly predicted
Error (predicted as other intent)
Train
Last train completed: 8/21/2015 2:04:09 PM
Microsoft

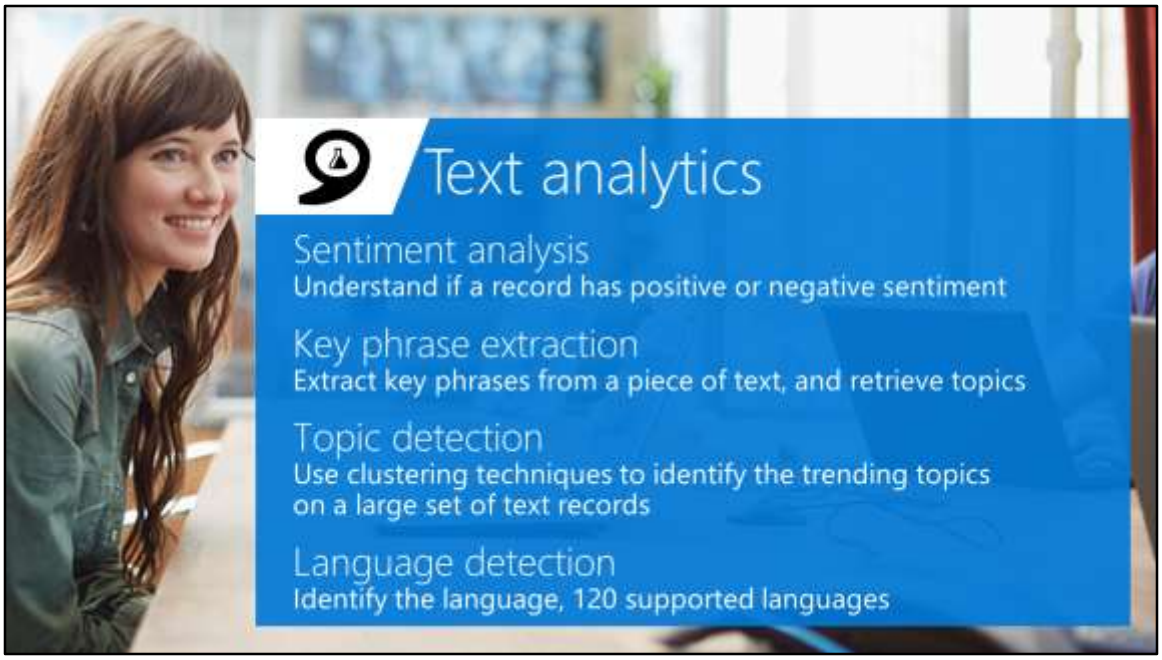
Lab

Create a LUIS app

https://luis.ai

You know what your users are saying, but do you know what it means? The Linguistic API uses advanced linguistic analysis tools for natural language processing, giving you access to part-of-speech tagging and parsing. These tools allow you to hone in on important concepts and actions. The API can tap into traditional linguistic analysis tools that allow you to identify the concepts and actions in your text with part-of-speech tagging, and find phrases and concepts using natural language parsers. Whether you're mining customer feedback, interpreting user commands, or consuming web text, understanding the structure of the text is a critical first step. Try it out below!


Linguistic Analysis
Enter a sentence
The Linguistic Analysis API simplifies complex languages to help you easily parse text.
POS tags
[["DT","NNP","NNP","NNP","VBZ","JJ","NNS","TO","VB","PRP","RB","VBP","NN","."]]
Constituency tree
PARA
TOP
S
NP
VP
DT NNP NNP NNP VBZ NP S
JJ NNS VP
TO VP
VB S
NP VP
PRP ADVP VB NN
RB
The Linguistic Analysis API simplifies complex languages to help you easily parse text .

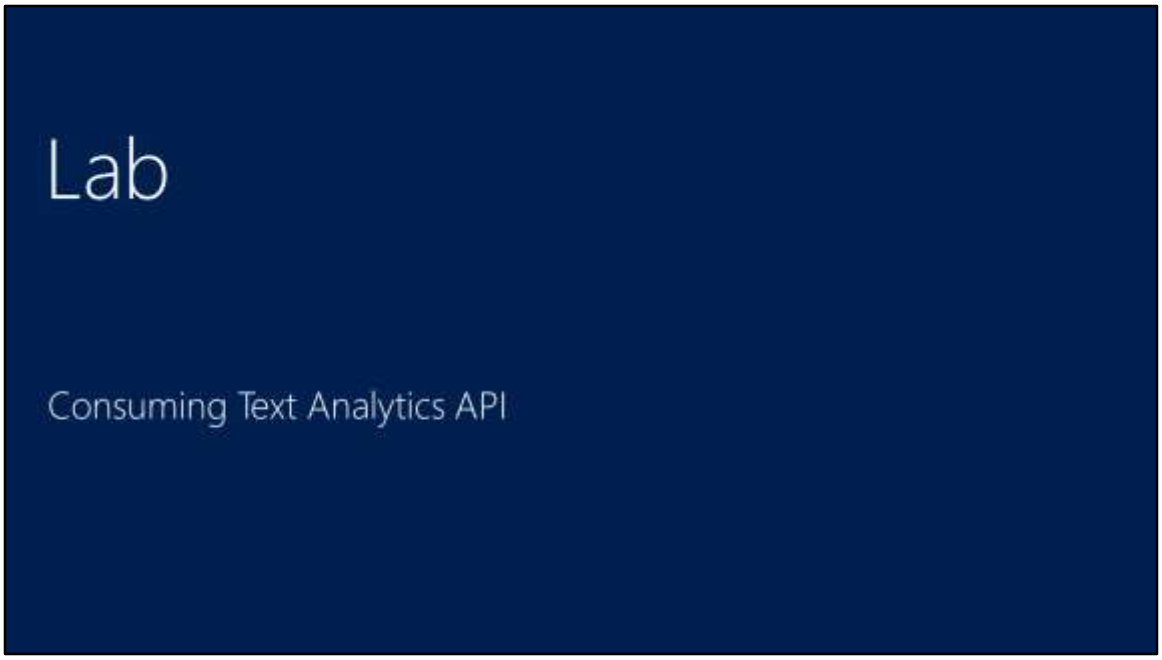


Understanding and analyzing unstructured text is an increasingly popular field and includes a wide spectrum of problems such as sentiment analysis, key phrase extraction, topic modeling/extraction, aspect extraction and more.

Lab

Text Analytics Key and API Reference

Follow https://github.com/Azure/bot-education/blob/master/Student-Resources/Labs/CSharp/CognitiveServicesLab_API_ref.md



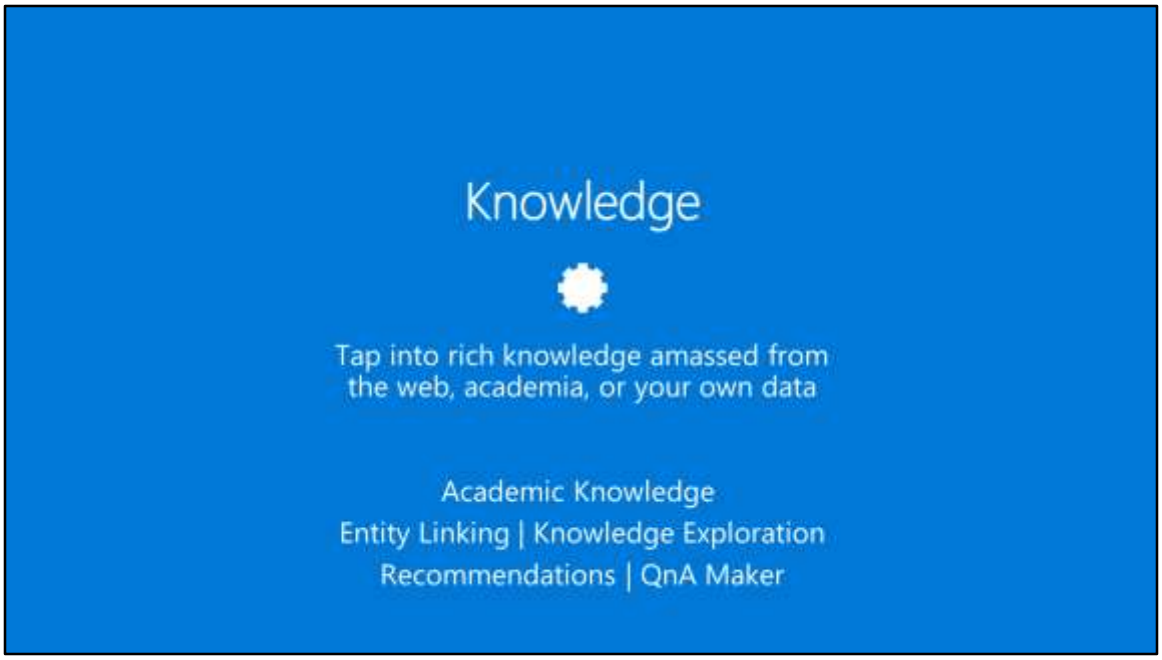
Go through Text Analytics python notebook at https://notebooks.azure.com/library/python-cognitive

Case study coming soon

Automate a variety of standard natural language processing tasks using state-of-the-art language modeling APIs.
Do you need to know how frequently certain words appear together? Or figure out which words a user might type next? Or how to break a hashtag into individual words? The Web Language Model API lets your app do all of this quickly and accurately.

. Try now the Speech Translator demo App on :
https://github.com/MicrosoftTranslator/SpeechTranslator
. Try now the Document Translator demo, translating (batches of) Word or pdf documents while preserving the formatting : https://www.microsoft.com/en-us/translator/doctranslator.aspx

Language detection
The Translator Text API automatically detects the language of the text that's sent before translating it. If your application simply needs to know what language the text is in, you can also call the API to detect the language of any text string.
Translation
Add speech translation, for any of the 9 supported languages, and text translation, for any of the 60 supported languages, to your app. Grow your potential user base by localizing your app and its content with clear translations.
Custom translation system
Build a custom translation system, using as little as 1,000 parallel sentences or start out simply by providing a dictionary of company specific words.
Collaborative Translation Framework (CTF)
Improve translations by creating a specific user group that provides suggestions to improve the translations. Users suggest translations and designated approvers either approve or deny changes. These updated translations can then be used for the company's specific Hub to further improve its custom system.



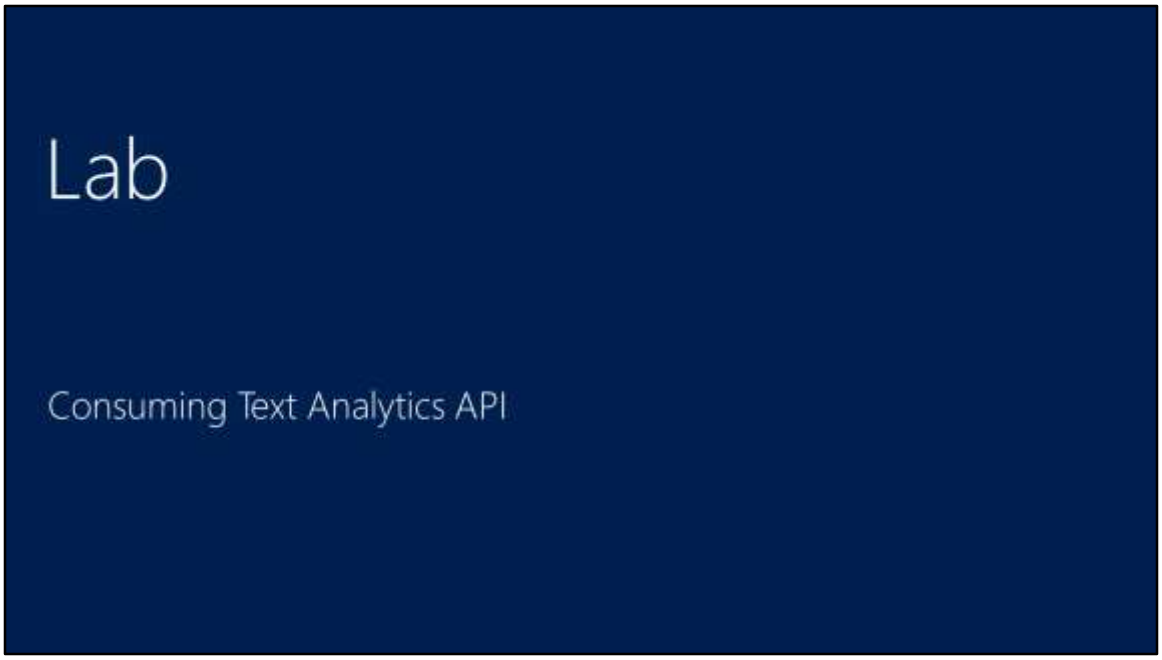
Tap into the wealth of academic content in the Microsoft Academic Graph using the Academic Knowledge API.

Do your users know who the top scholars have been in machine learning over the last three years? What about every paper authored by an expert like Li Deng from Microsoft? The Academic Knowledge API answers these and other questions by applying the Knowledge Exploration Service to the Microsoft Academic Graph. Users can start from natural language queries, or you can ping the graph directly through structured query expressions.

Additionally, the Academic Knowledge API can auto-complete natural language queries and return entity results, helping users narrow research results faster.

It can also create a histogram of attribute values for academic entries returned by a query—for example, the distribution of papers by year for an author.

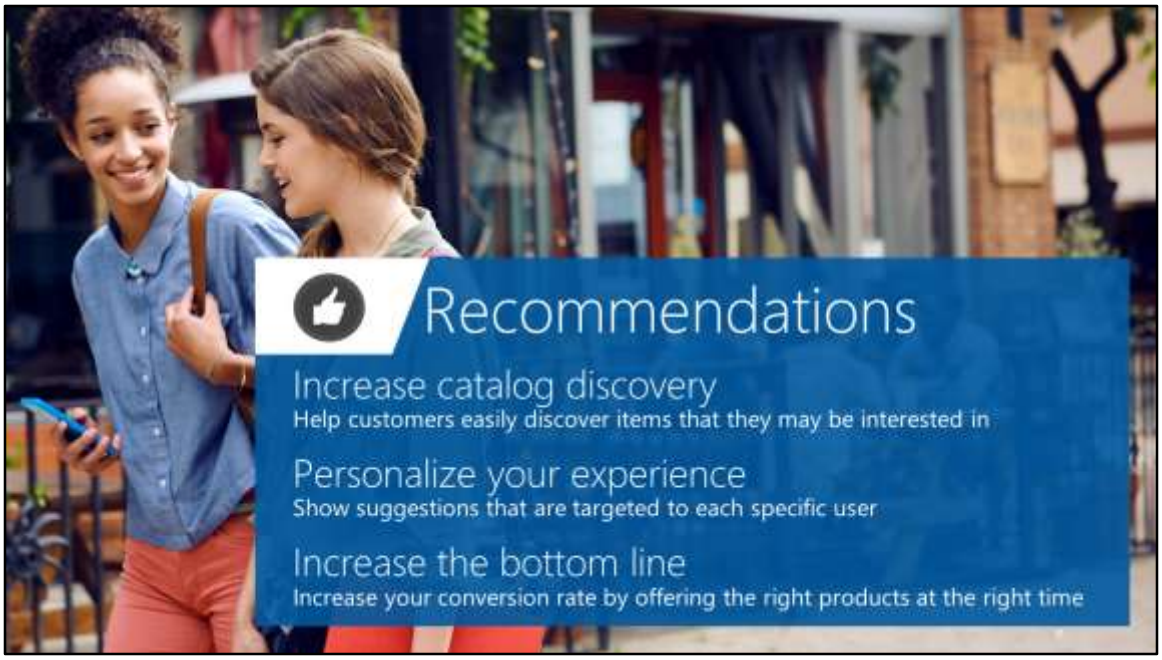
Provide better user experiences by adding the Entity Linking Service to your app so that it can provide additional knowledge and facts from the web to supplement the text in context. The Entity Linking Service uses a prebuilt knowledge base to build links, and the option to acquire knowledge from your own data.
For example, your app may need to understand that "London, the capital" is the city of London in the United Kingdom and not London, Ontario, or Jack London, the author.
The Entity Linking Service provides this information quickly and within context, offering a faster, more intelligent user experience.



Go through Entity Linking python notebook at https://notebooks.azure.com/library/python-cognitive

Do you have structured data for users to explore via natural language? The Knowledge Exploration Service takes structured data and linguistic resources you provide and creates a service that enables interactive search.

For example, as your users enter queries in a search box, the Knowledge Exploration Service offers auto-complete suggestions and semantic annotations. You can retrieve the top matching objects from the data, and you can create histograms of attribute values among the matches.



The Recommendations API helps your customer discover items in your catalog.
Customer activity in your digital store is used to recommend items and to improve conversion in your digital store.
The recommendation engine may be trained by uploading data about past customer activity or by collecting data directly from your digital store. When the customer returns to your store you will be able to feature recommended items from your catalog that may increase your conversion rate.

"By leveraging Cortana Intelligence **Recommendations capabilities** combined with Azure Machine Learning processing power, we have enabled retailers with a Personalized Commerce Experience, allowing them to grow shopper engagement and conversions across all channels."

Frank Kouretas,
Chief Product Officer at Orckestra
Orckestra.com

Orckestra

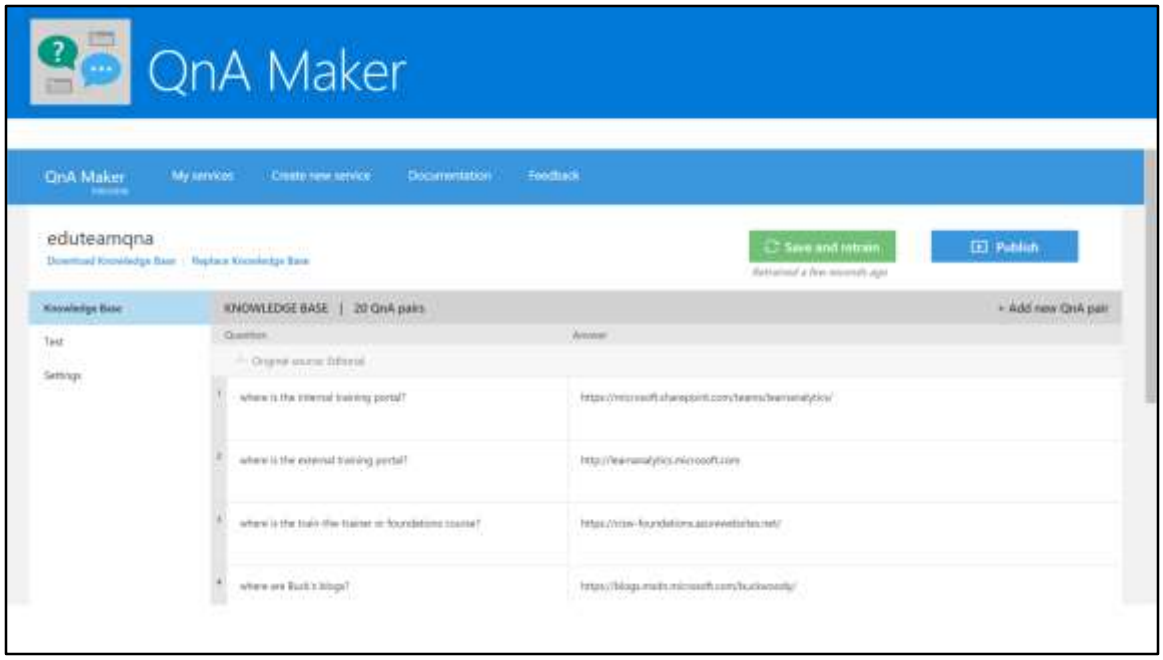
*The **Recommendations API** allows Allrecipes.com to harness billions of user-shared experiences to deliver highly personalized recipe solutions that answer busy families most pressing question, 'What's for dinner tonight?'*

We are able to do this with minimal investment due to the proven capabilities of the Cortana Analytics platform. This helps us further realize our vision of providing highly personalized cooking inspiration for home cooks.

John Keane
CTO, Allrecipes.com

allrecipes.com

QnA Maker is primarily meant to provide a FAQ data source which you can query from your Bot/Application. Although developers will find this useful, content owners will especially benefit from this tool. QnA Maker is a completely no-code way of managing the content that powers your Bot/Application.

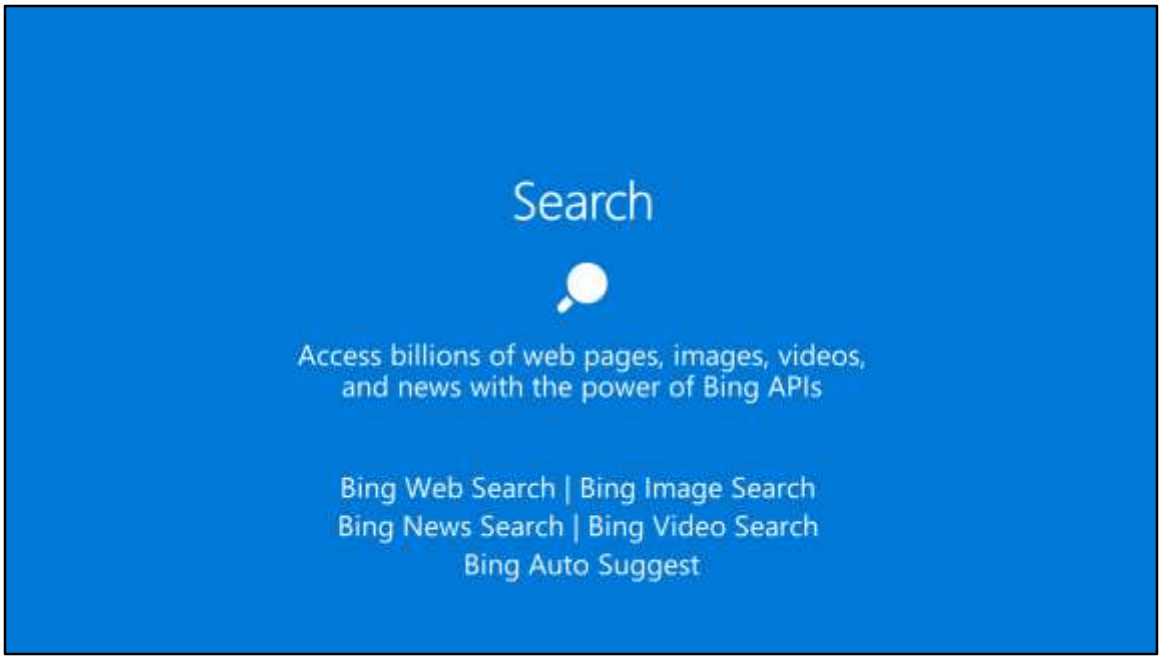


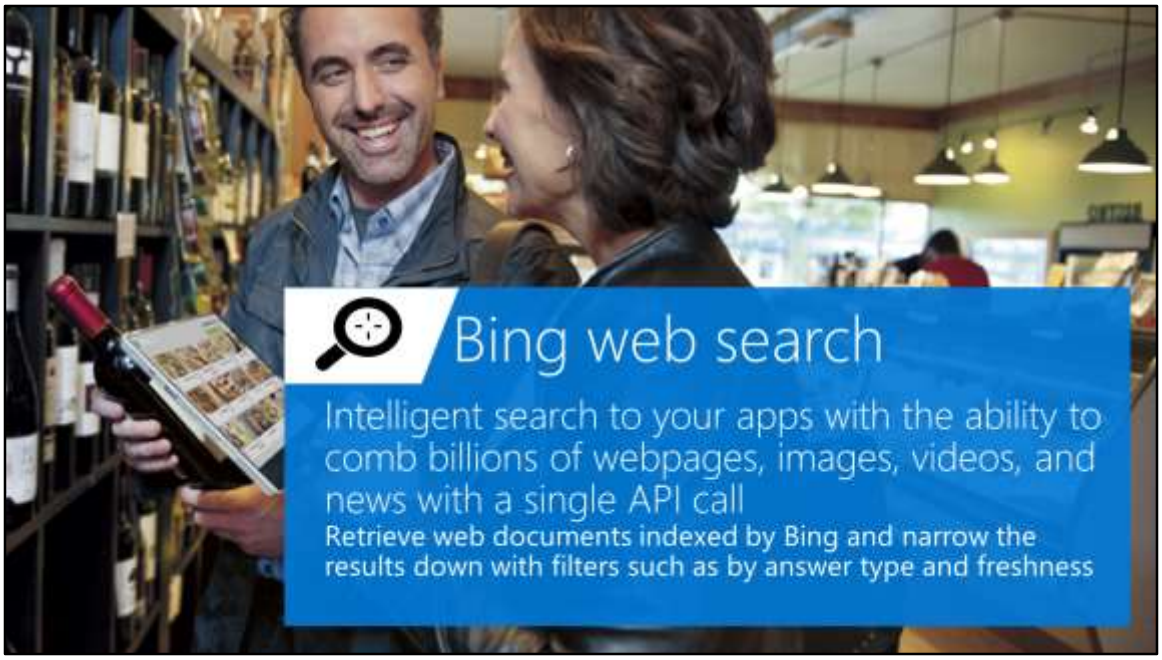
Editing the QnA Maker Knowledge Base
Showing, one of “My services” at https://qnamaker.ai or you can “Create a new service” here as well.

Lab

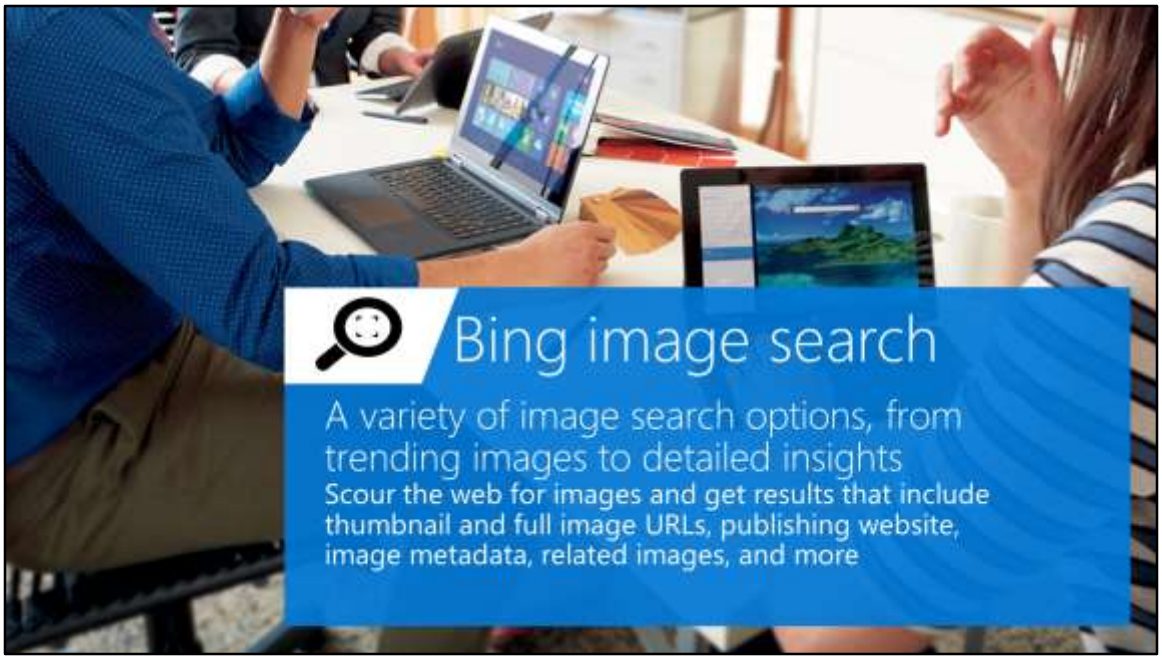
Create a knowledge base in the QnA Maker

https://qnamaker.ai



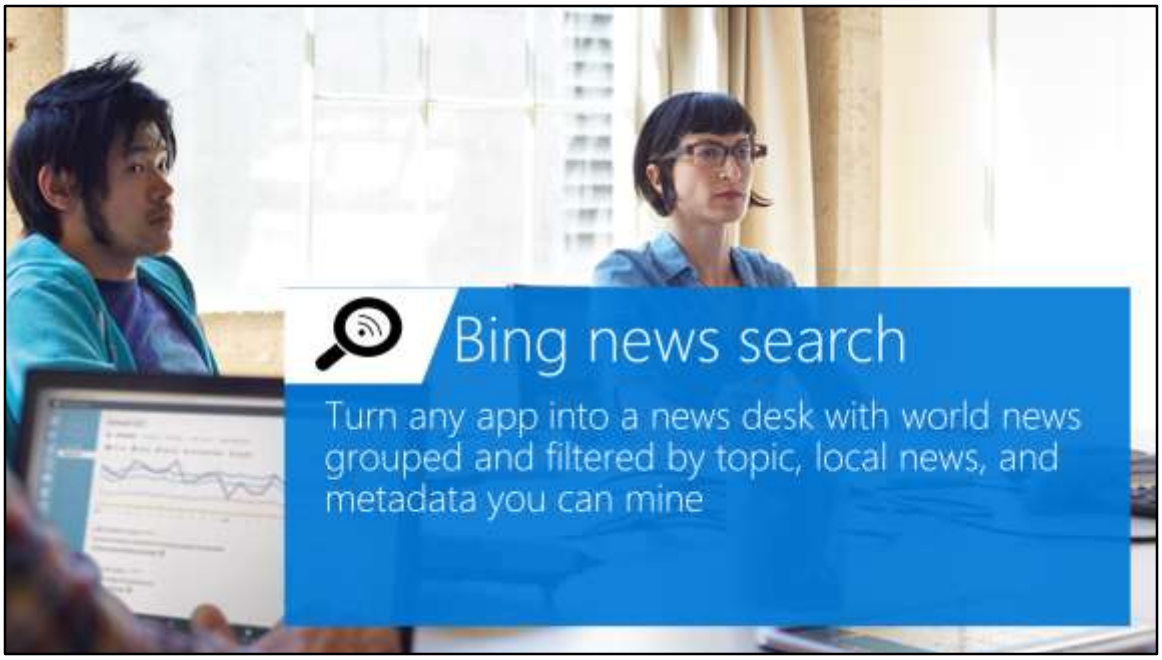


The Bing Search API adds intelligent search to your app, combing hundreds of billions of webpages, images, videos, and news to provide relevant results with no ad requirements. The results can be automatically customized to your users' locations or markets, increasing relevancy by staying local.



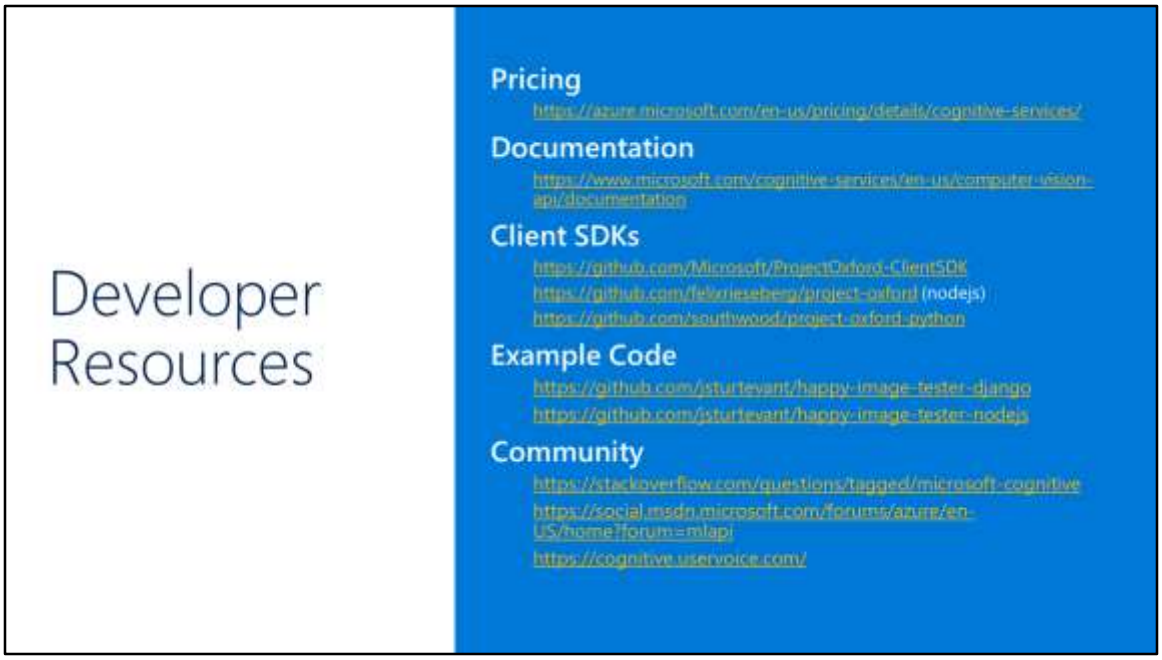
The Bing Image Search API gives you powerful image searching tools with a single call. You can tap into trending images of people, places, and things from around the world, and filter results by image style, size, layout, date added, and license type.

The Bing Video Search API offers robust video searching features with a single API call. You can receive information from around the world about trending videos, updated on a daily basis. Search results can be returned by either a static image or a motion thumbnail, allowing you to customize how your users see what they're looking for.



The Bing News Search API can help turn your app into an up-to-date news center. Results from a single call bring trending news from around the world, which is updated in near-real time, so users can be kept up to date on whatever's happening in their neighborhood—or across the globe.

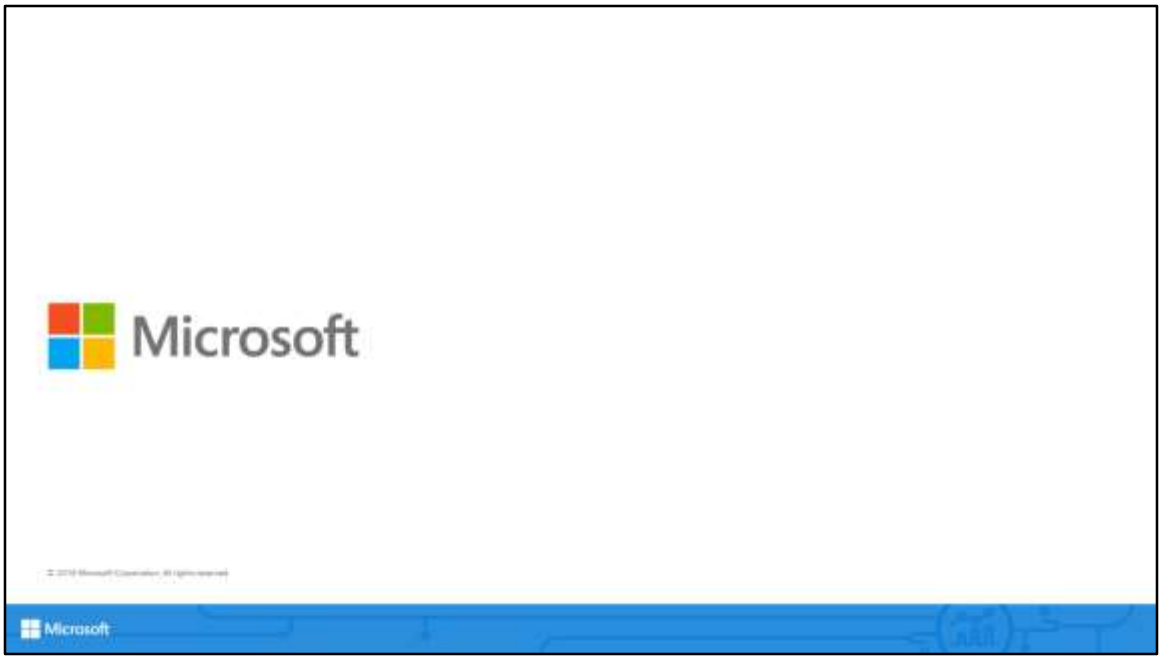
Whether you're searching the web, a local set of data, or just asking users to enter an input into your app, the Bing Autosuggest API helps narrow the search quickly by allowing your users to see suggestions for popular search terms. It can correct perceived mistakes, and returns detailed contextual suggestions according to other searches people have found useful.



Access to strong documentation, sample code and community resources is critical for developers to be able to understand and become users of Cognitive Services. Customize these links based on your own resources or use the ones listed here.

Q&A

https://www.microsoft.com/cognitive-services/en-us/kes/documentation/GettingStarted


Microsoft
Microsoft

Appendix

So, what are Cognitive Services? Cognitive Services are a collection of artificial intelligence APIs, and we believe in *democratizing* artificial intelligence. So what that means is, regardless of your skill level -- whether you're a high school student running your first program or working in industry or in a giant enterprise -- that you should be able to use our APIs incredibly quickly in a matter of minutes.

And regardless of your platform -- whether you're on Android or IOS or Windows, or making a website -- all of our APIs are rest APIs, which means you can call them as long as you have an Internet connection. And so that's pretty huge because what we're doing is making it so that everyone can build these smarter, more context-aware applications.

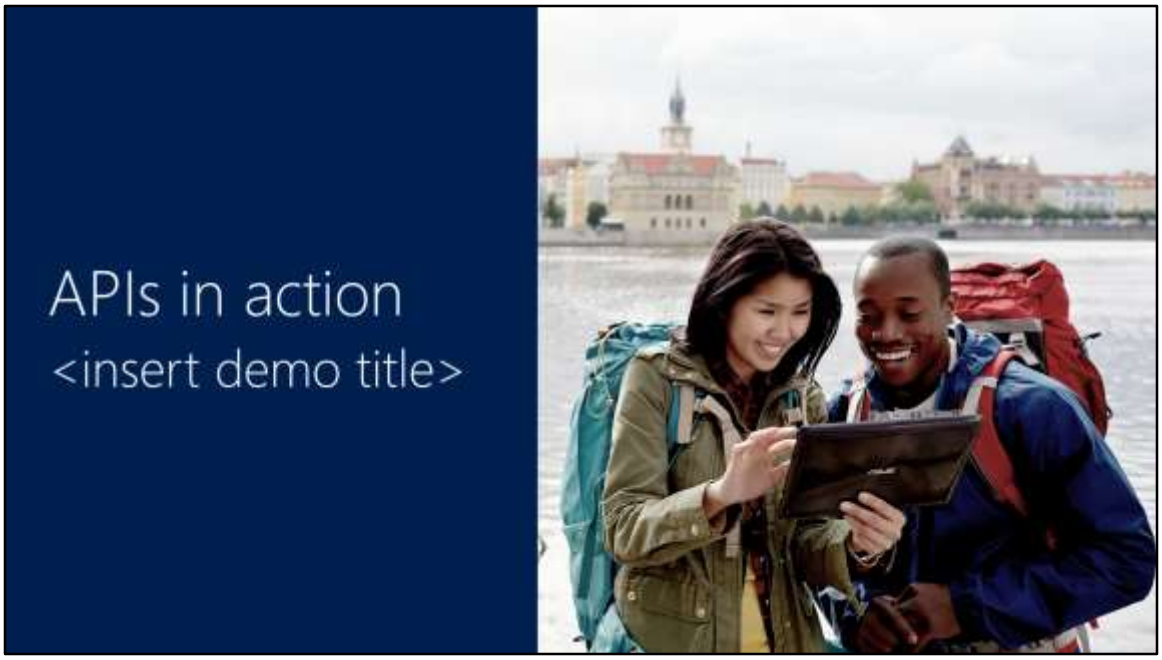
The technology used in our APIs is the same technology that powers our products today. And so, when you think of things like the Bing search APIs, it's the same technology from Bing.

Today I'm going to talk with you about the entire collection spanning vision, speech, language, knowledge, and search.

The other things that I want to point out is that you can get started for free with all of the APIs, but we do have pricing available for a number of them, which are in public preview on Azure.

The other piece is the developer resources. So, all of our documentation is on the website and actually in GitHub as well, so we do welcome community submissions. We have a set of SBKs that are also available on GitHub where we welcome poll requests and post everything on there. The SBKs vary from API to API, but they are all included in this one repository for people to see.

And then we have three different communities that we support. We have our MSDN forums, our Stack Overflow, and we have User Voice that we use for feedback requests.



A question that you will get is to demo the APIs. This is a good place to show a demo from our website www.microsoft.com/cognitive or do show one that you create using your favorite APIs.

In conclusion, why should you try Microsoft Cognitive Services?