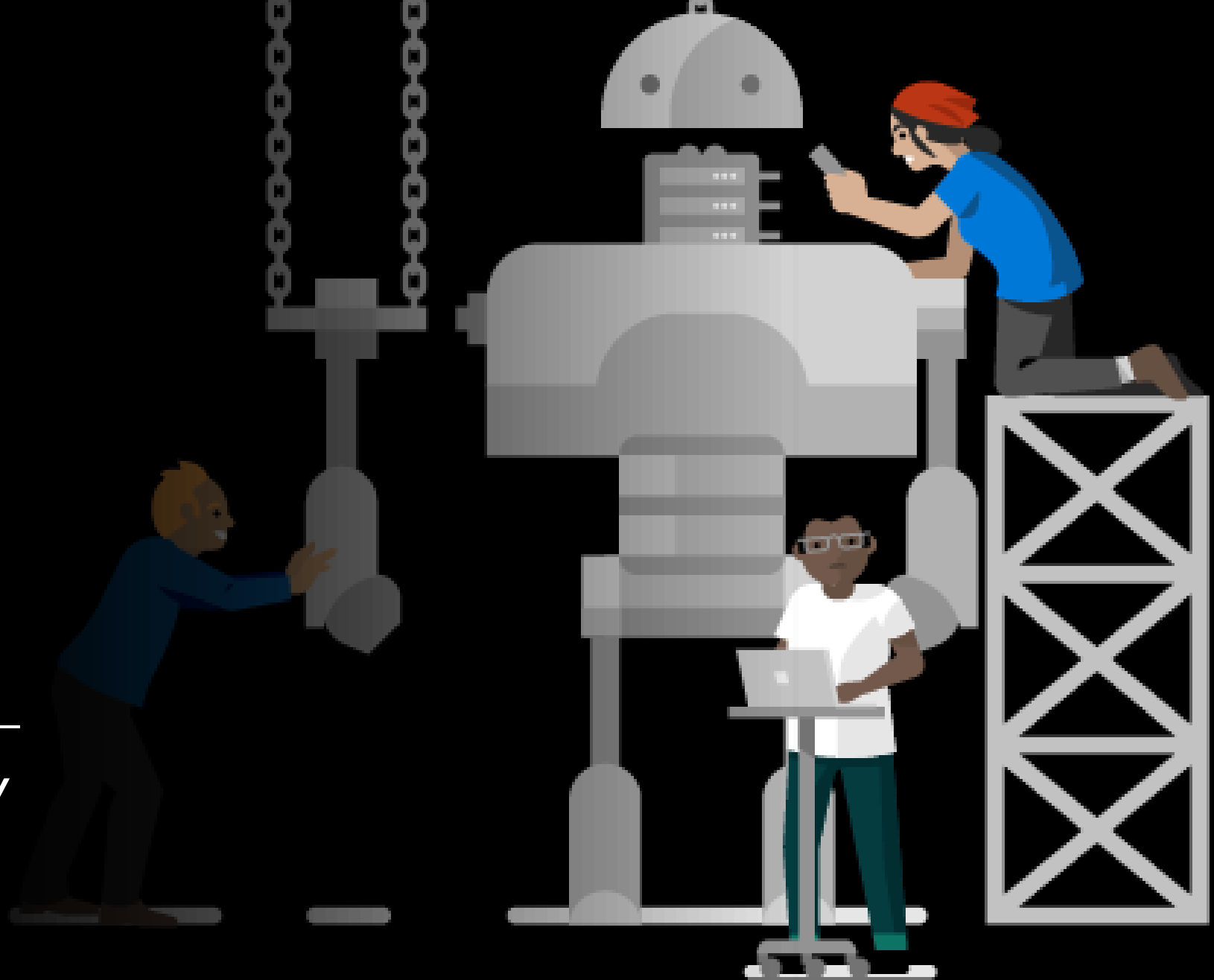




Microsoft Certified Professionals

2ND COMMUNITY
MEETUP



AI-900

Mastering the basics with the Azure AI Fundamentals exam



Georgia Kalyva
Microsoft AI MVP, MCP
Web Applications Developer @ ITT Inc.

About me.



Microsoft MVP in AI

Microsoft Learn Ambassador

Web Applications Developer @ ITT Inc.

Blogger

Traveler

Speaker



www.codestories.gr



fb.com/CodeStoriesgr



[georgiakalyva](https://in.linkedin.com/in/georgiakalyva)



[GeorgiaKalyva](https://github.com/GeorgiaKalyva)



[@GeorgiaKalyva](https://twitter.com/GeorgiaKalyva)

Today's Agenda

- Exam Overview
- What is Artificial Intelligence?
- What is Machine Learning?
- Azure Machine Learning
- Azure Cognitive Services
- Computer Vision
- Natural Language Processing
- Azure Bot Services
- Studying for the exam



AI-900 Exam Modules

- Artificial Intelligence workloads and considerations (15-20%)
- Fundamental principles of machine learning on Azure (30-35%)
- Features of computer vision workloads on Azure (15-20%)
- Features of Natural Language Processing (NLP) workloads on Azure (15-20%)
- Features of conversational AI workloads on Azure (15-20%)





Artificial Intelligence.

Artificial Intelligence

Software that imitates human capabilities

- Making decisions based on data and experience
- Recognizing abnormal events
- Interpreting visual input
- Understanding written and spoken language
- Engaging in dialogs and conversations



Artificial Intelligence

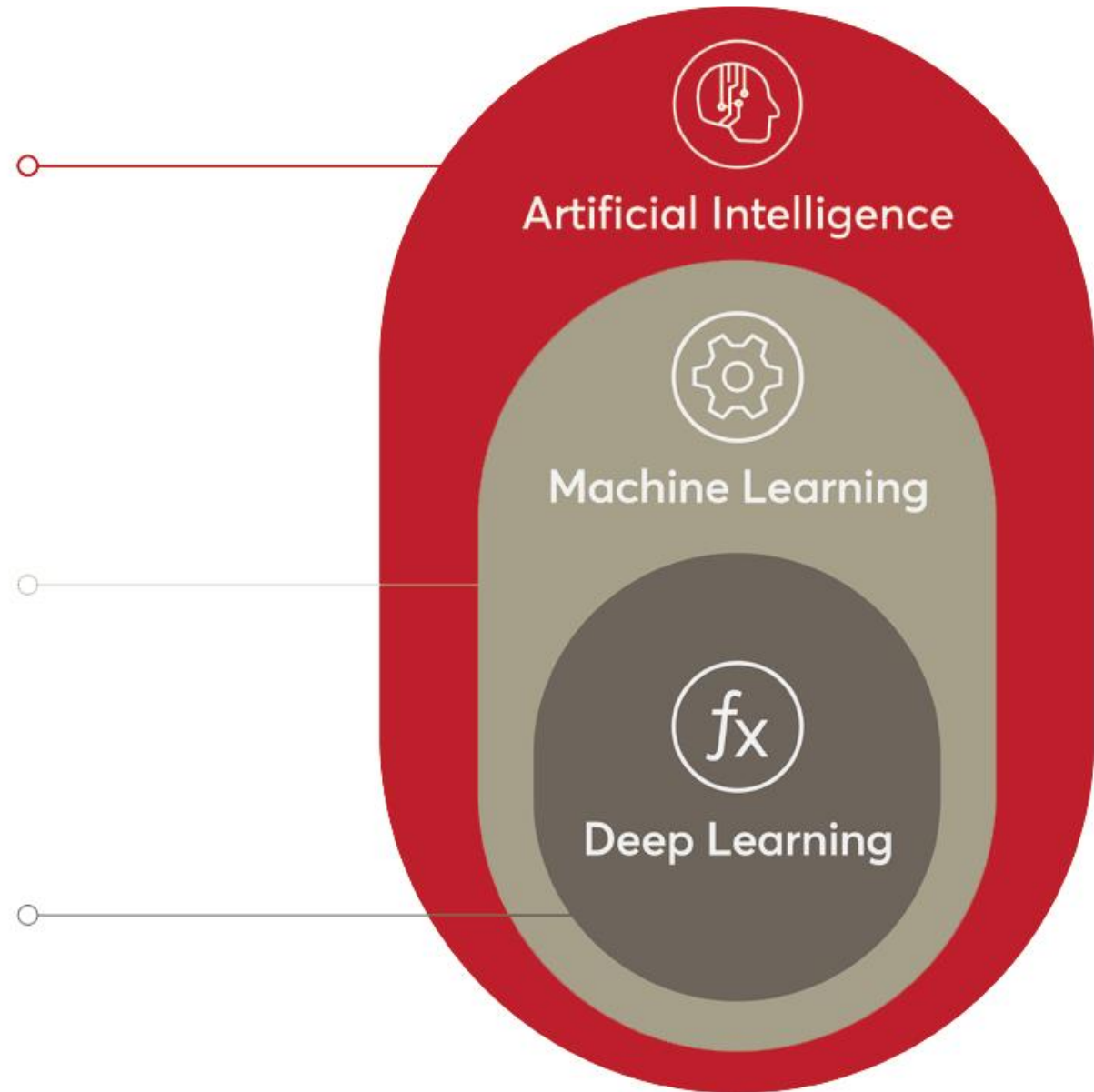
Any technique which enables computers to mimic human behavior

Machine Learning

Subset of AI techniques which use Statistical methods to enable machines to improve with experiences

Deep Learning

Subset of ML which makes the computation of multi-layer neural networks feasible



Common Artificial Intelligence Workloads



Machine Learning

Predictive models based on data and statistics – the foundation for AI



Anomaly Detection

Systems that detect unusual patterns or events, enabling pre-emptive action



Computer Vision

Applications that interpret visual input from cameras, images, or videos



Natural Language Processing

Applications that can interpret written or spoken language



Conversational AI

AI agents, (or *bots*), that can engage in dialogs with human users

Artificial Intelligence in Microsoft Azure

Scalable, reliable cloud platform for AI

- Data storage
- Compute
- Services



Azure Machine Learning

A platform for training, deploying, and managing machine learning models



Cognitive Services

A suite of services developers can use to build AI solutions

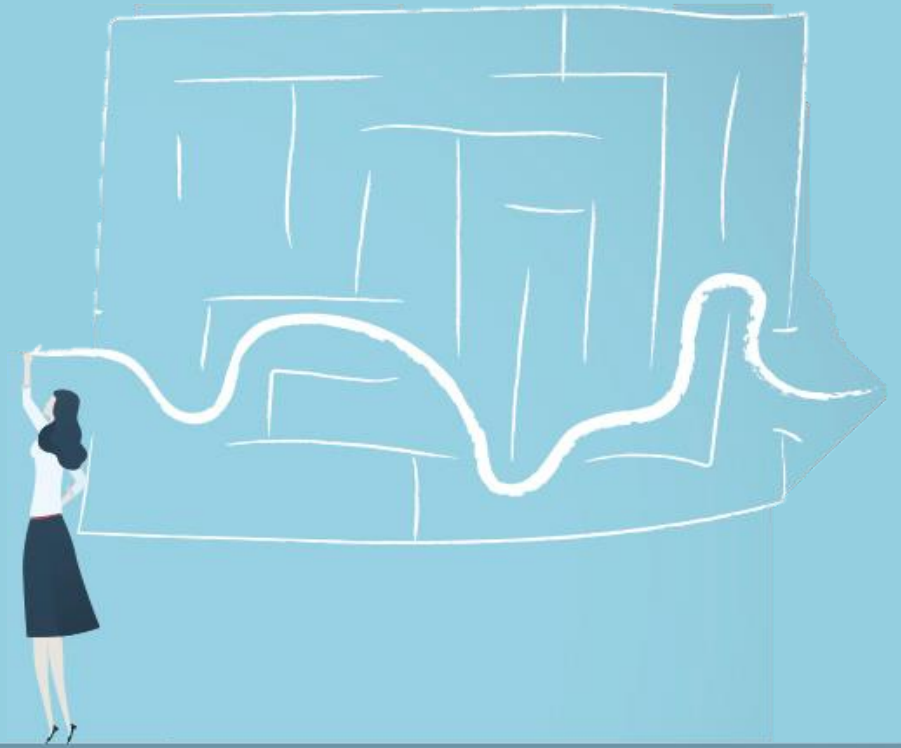


Azure Bot Service

A cloud-based platform for developing and managing bots

Challenges and Risks with AI

- Bias can affect results
- Errors may cause harm
- Data could be exposed
- Solutions may not work for everyone
- Users must trust a complex system
- Who's liable for AI-driven decisions?



Principles of Responsible AI



Fairness



Reliability & Safety



Privacy & Security



Inclusiveness



Transparency



Accountability

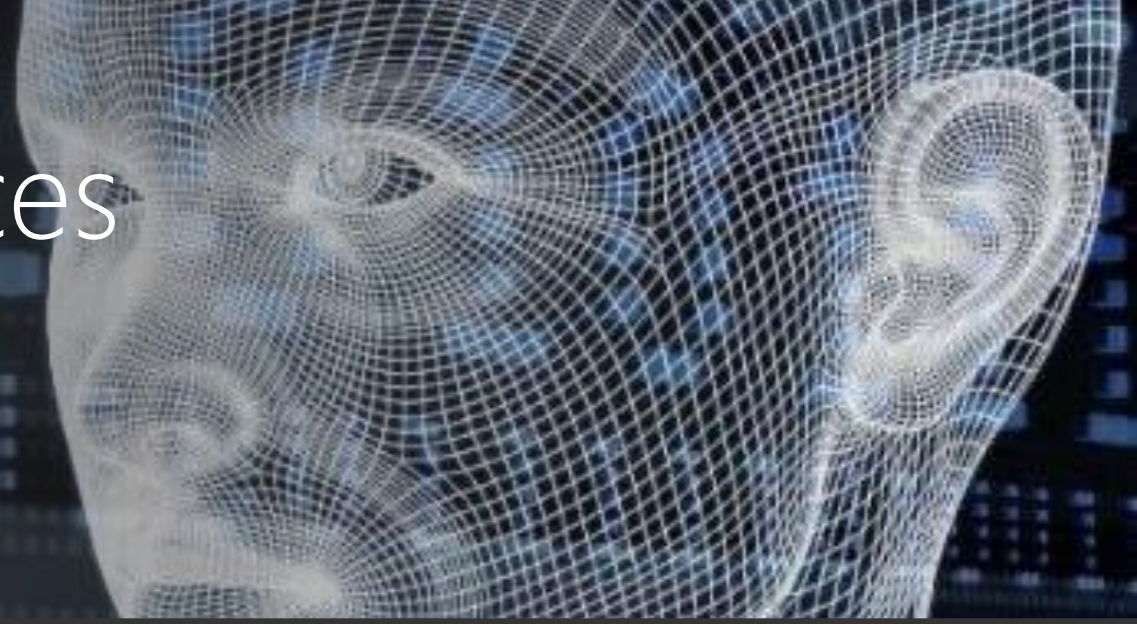
<https://www.microsoft.com/ai/responsible-ai>



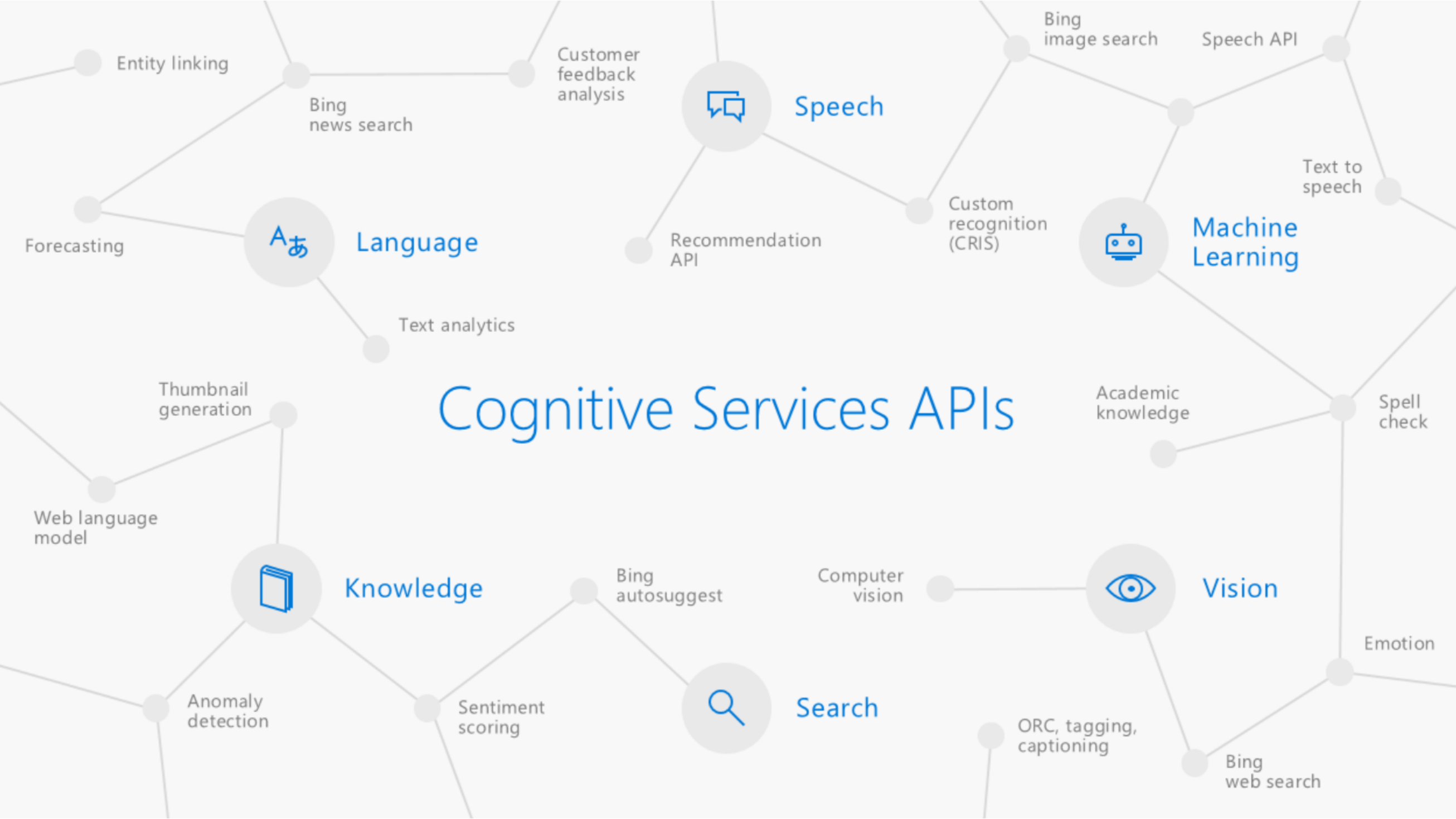
Cognitive Services.

Microsoft Cognitive Services

Give your apps a human side

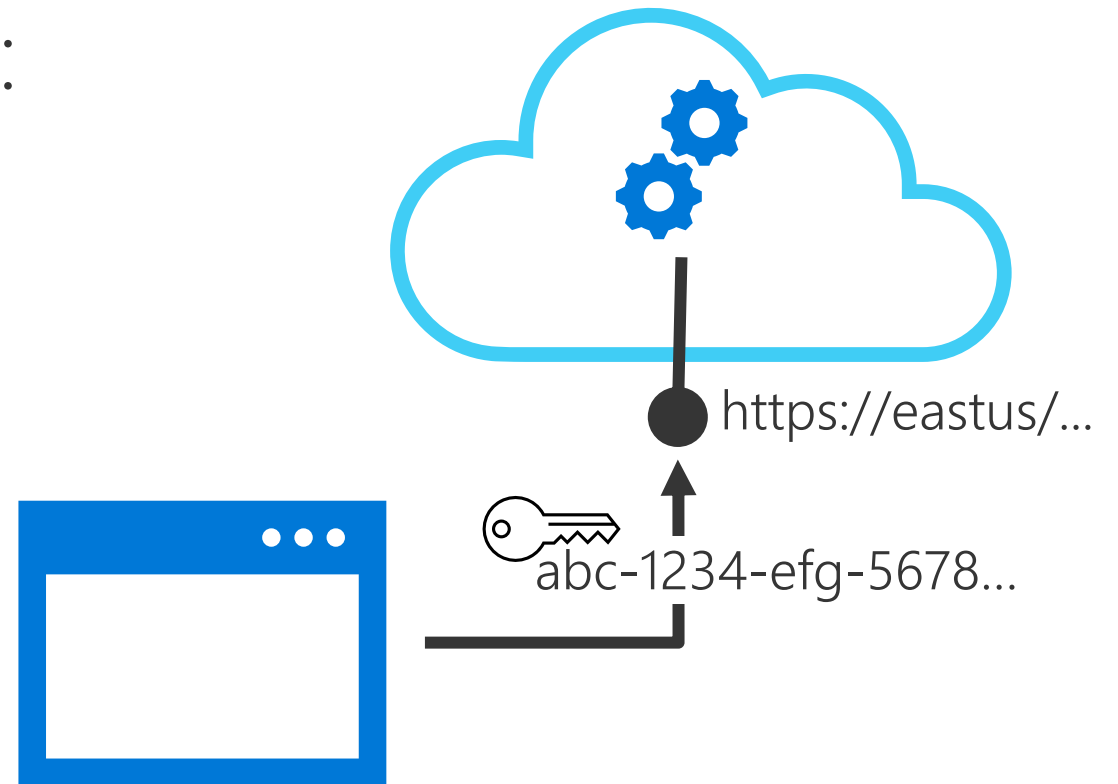


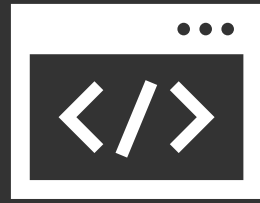
A set of ready to use APIs for every developer to use without requiring machine-learning expertise



Cognitive Services

- AI application resources in an Azure subscription:
 - Standalone resources for specific services
 - General *Cognitive Services* resource for multiple services
- Consumed by applications via:
 - A REST endpoint (`https://` address)
 - An authentication key
- You will explore cognitive services using an online environment named Visual Studio Codespaces





Demo.



Machine Learning.

Machine Learning

“Programming the UnProgrammable”

Machine Learning creates a

$f(x)$

Model

using this data



Face



Face

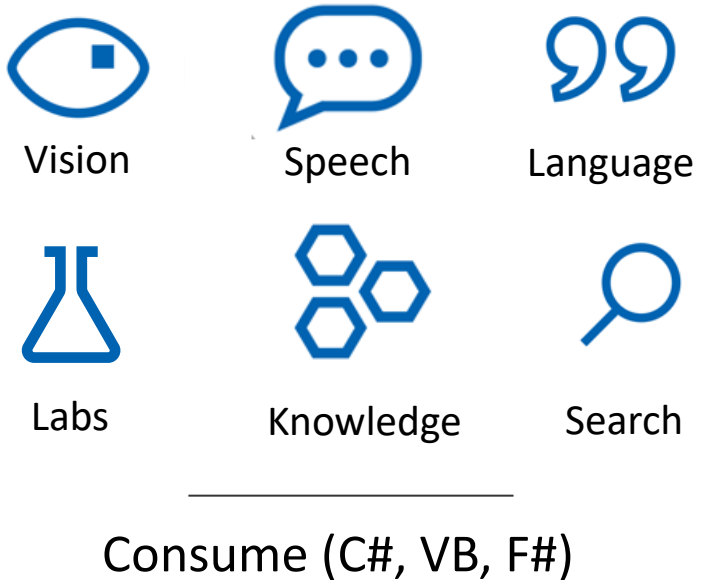


Not a face



Not a face

Pre-built machine learning models (i.e. Azure Cognitive Services)



e.g. Sentiment Analysis using Azure Cognitive Services

```
TextAnalyticsAPI client = new TextAnalyticsAPI();
client.AzureRegion = AzureRegions.Westus;
client.SubscriptionKey = "1bf33391DeadFish";

client.Sentiment(
    new MultiLanguageBatchInput(
        new List<MultiLanguageInput>()
            {
                new MultiLanguageInput("en", "0",
                    "This is a great vacuum cleaner")
            }
    ));
```

😊 96% positive

Machine Learning Types



#1

Supervised
learning



#2

Unsupervised
learning

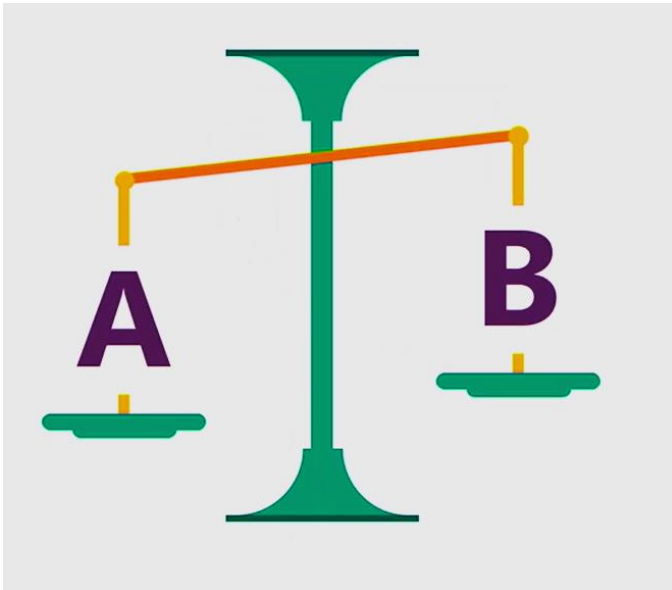


#3

Reinforcement
Learning

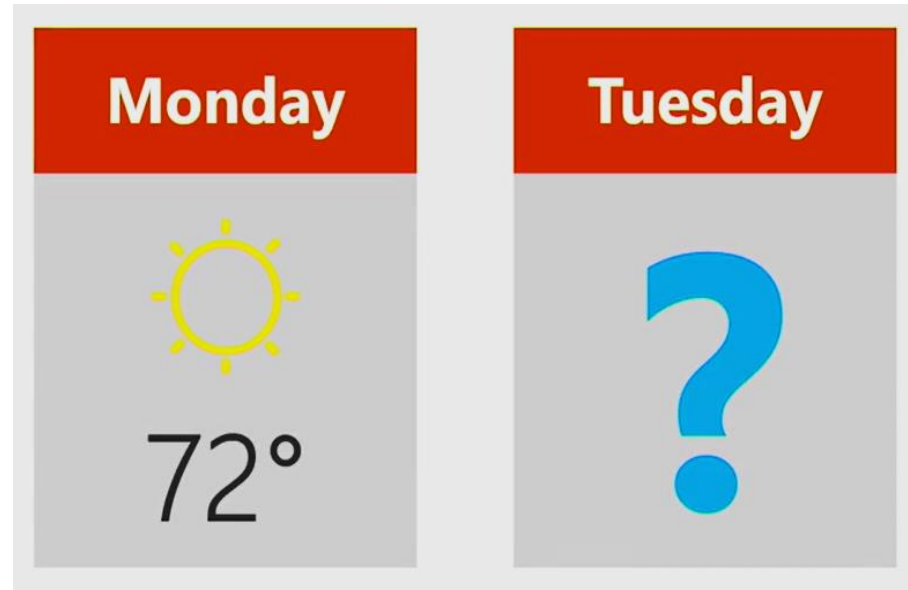
Machine Learning Algorithms

Is this A or B?



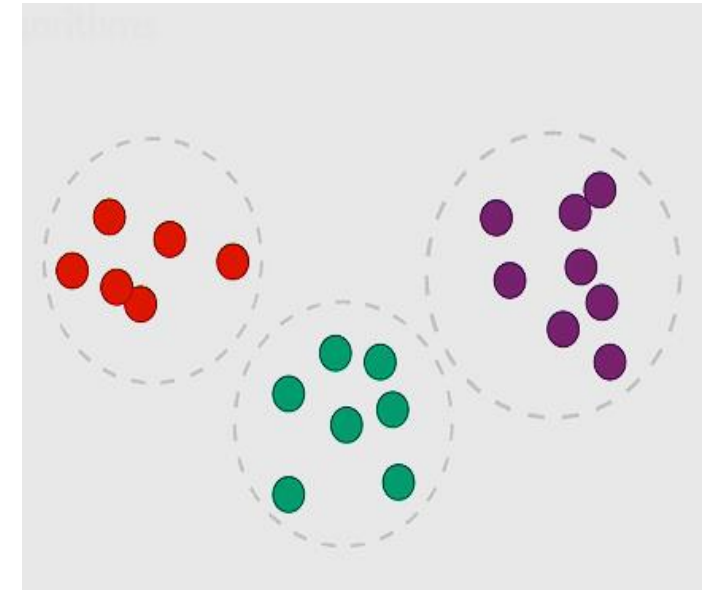
Classification

How much? How many?



Regression



How is this organized?

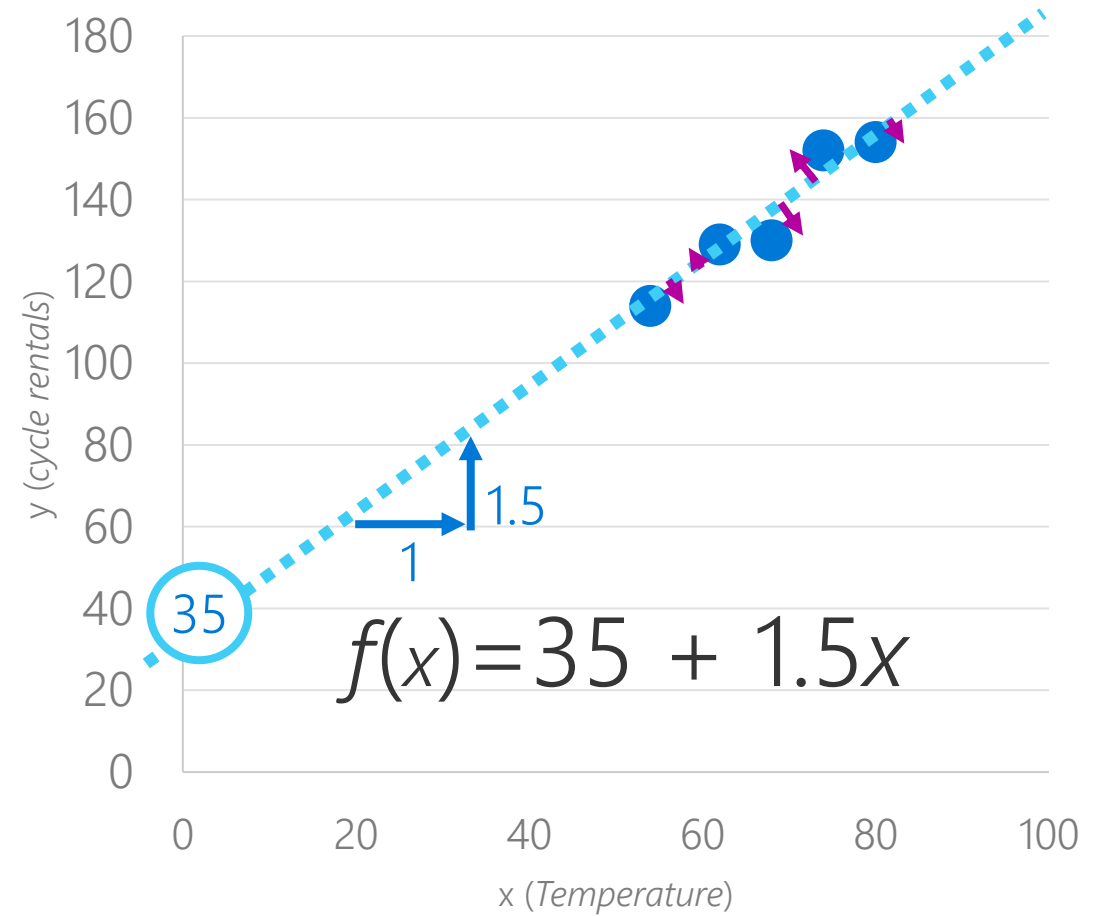


Clustering



And more...

Regression

	 x	 y	
Training	56	115	
	61	126	
	67	137	
	72	140	
	76	152	
Validation	82	156	$f(x)$
	54	114	\hat{y}
	62	129	116
	68	130	128
	74	152	137
	80	154	146
			155



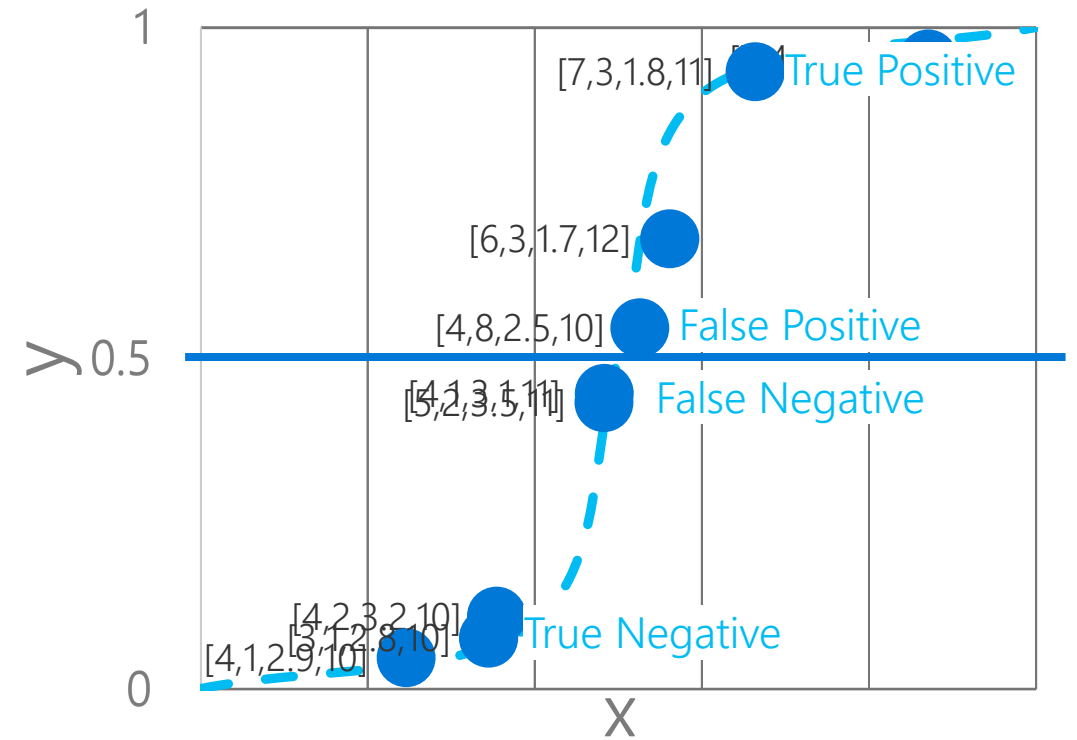
Classification

		
	x	y
Training	[4,2,3.2,10]	0
	[6,3,1.7,12]	1
	[5,2,3.5,11]	0
	[4,1,2.9,10]	0
	[7,4,2.1,11]	1
Validation	[3,1,2.8,10]	0
	[7,3,1.8,11]	1
	[4,8,2.5,10]	0
	[4,1,3,1,11]	1









Actual

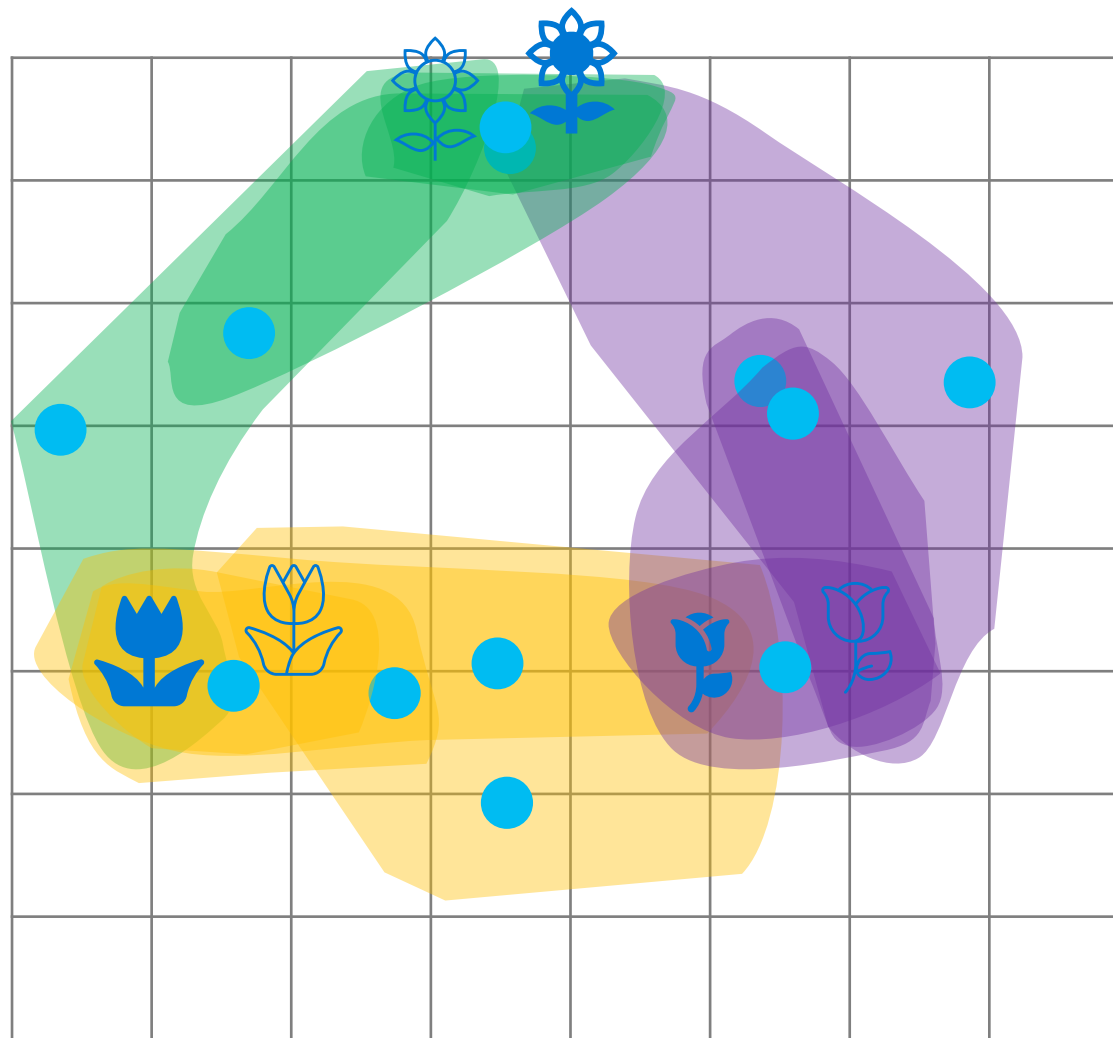
	1	0
Predicted 1	126	21
Predicted 0	7	119

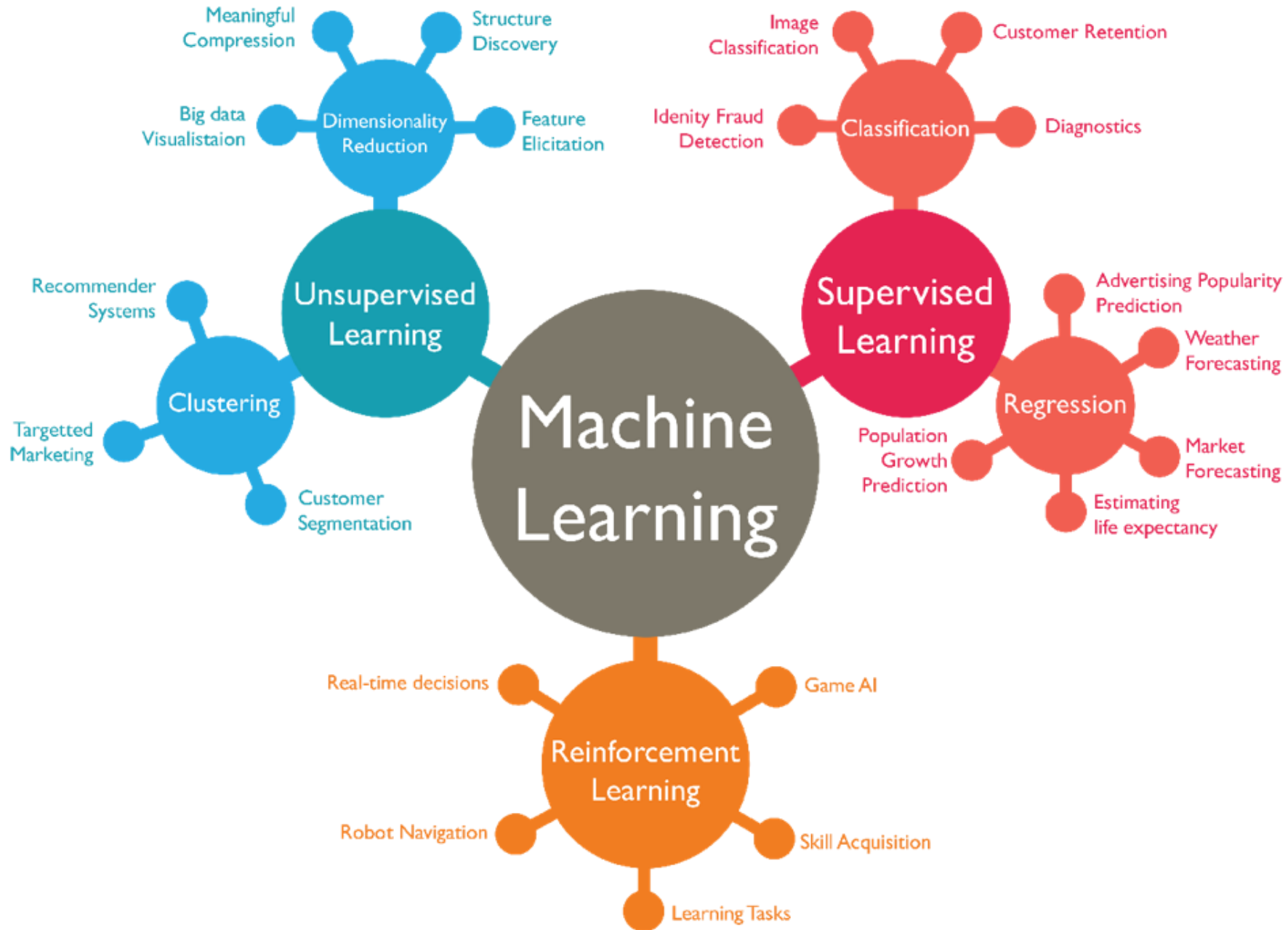
	P(1)	P(0)	\hat{y}	
	0.2	0.8	0	✓
	0.9	0.1	1	✓
	0.6	0.4	1	✗
	0.3	0.7	0	✗



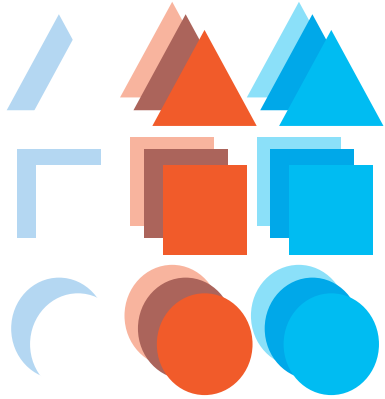
Clustering

		
	6	3
	5	3
	2	3
	1	3
	3	8
	4	8

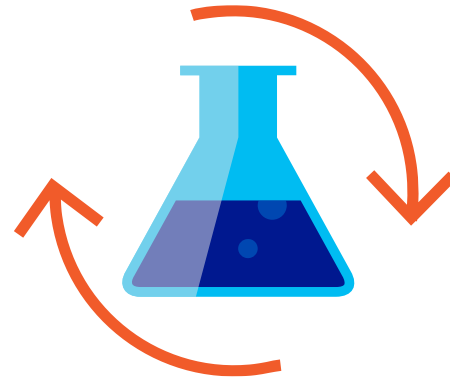




Building custom machine learning models



Prepare Your Data



Build & Train



Run



Azure Machine Learning.

Azure Machine Learning

A cloud-based environment you can use to train, deploy, automate, manage, and track ML models



Scalable,
on-demand
compute



Data
storage and
connectivity



ML workflow
orchestration



Model
registration
and
management

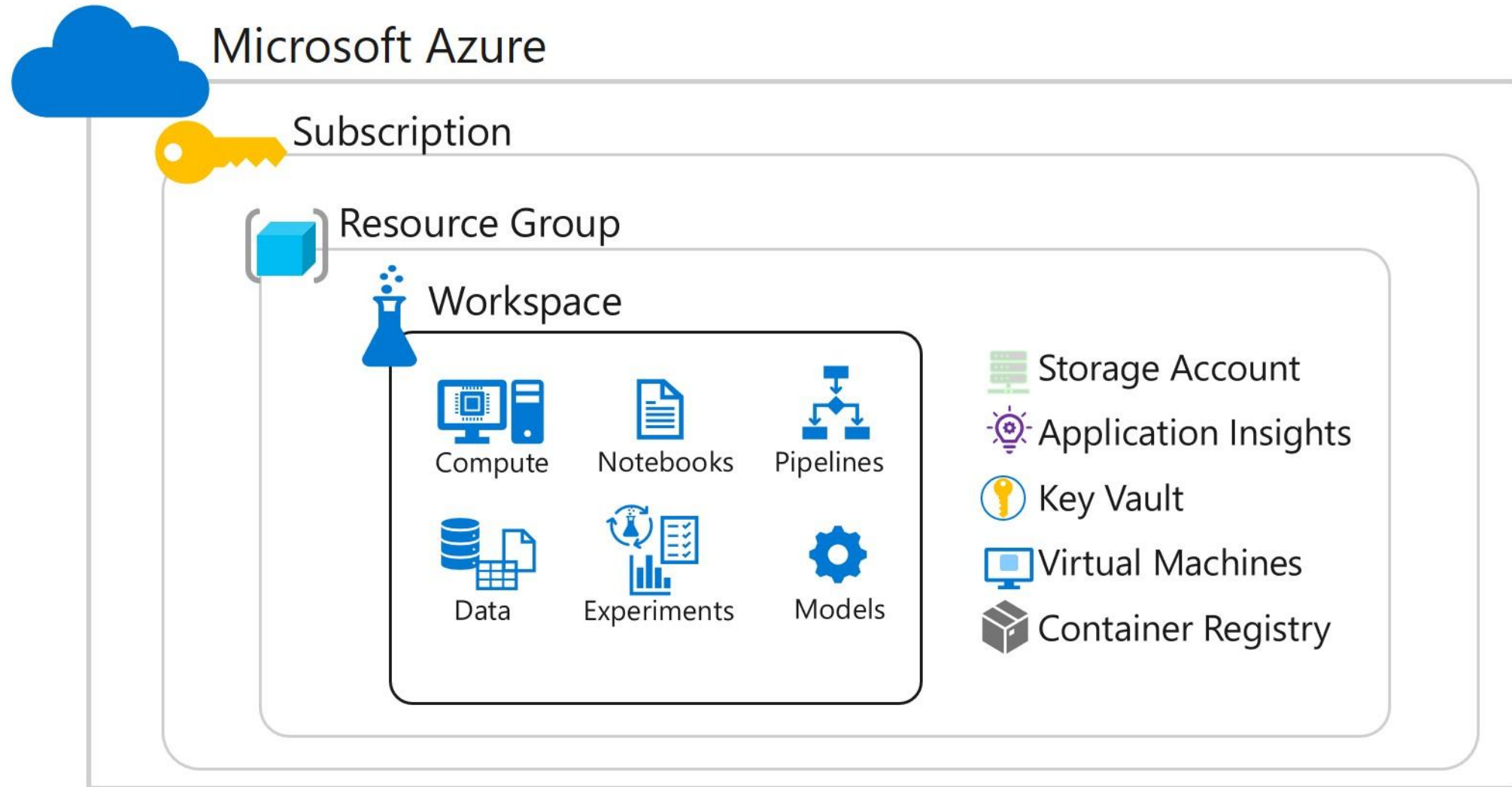


Metrics and
monitoring



Model
deployment

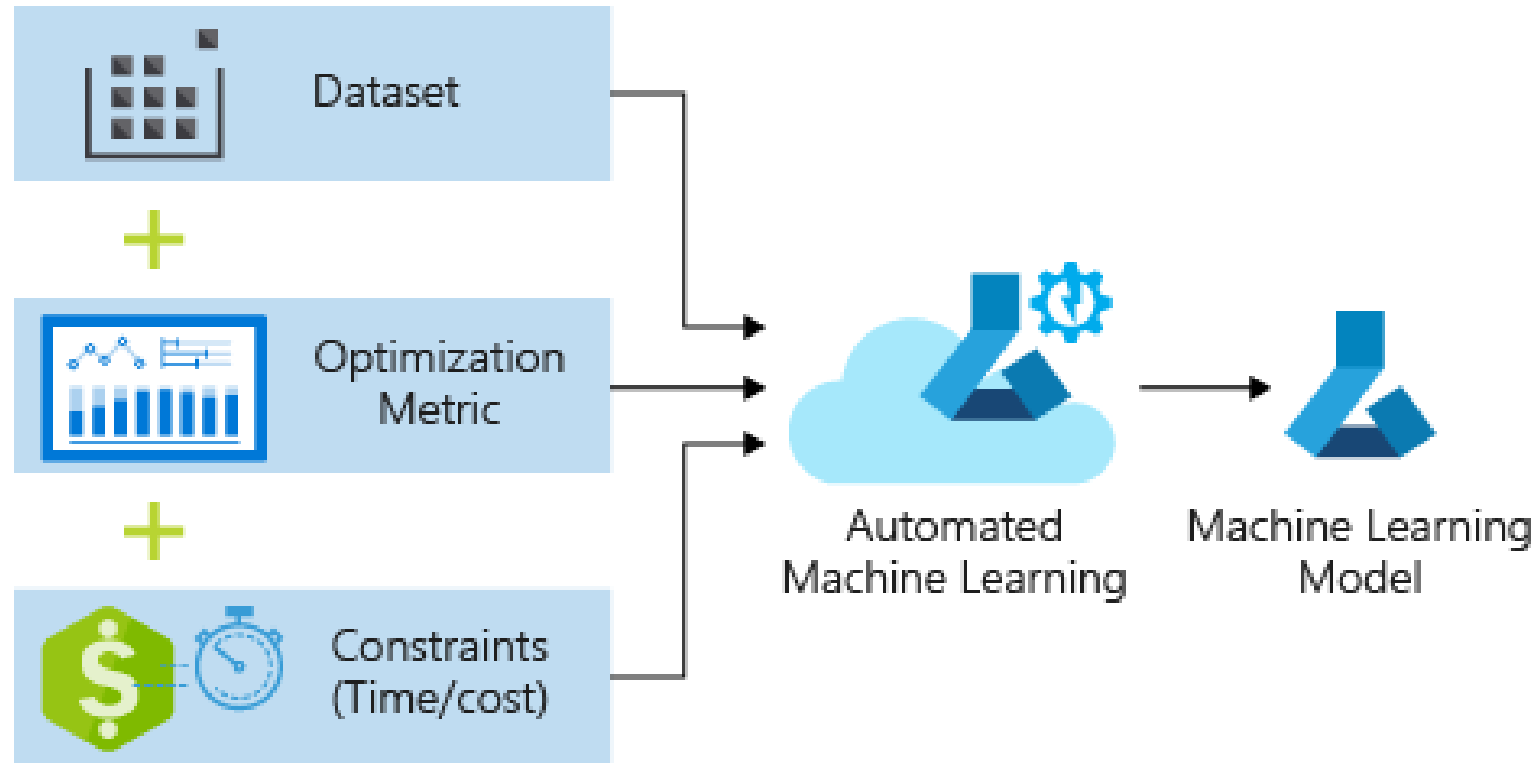
Azure ML Workspaces



Automated ML

Takes the hard work out of machine learning

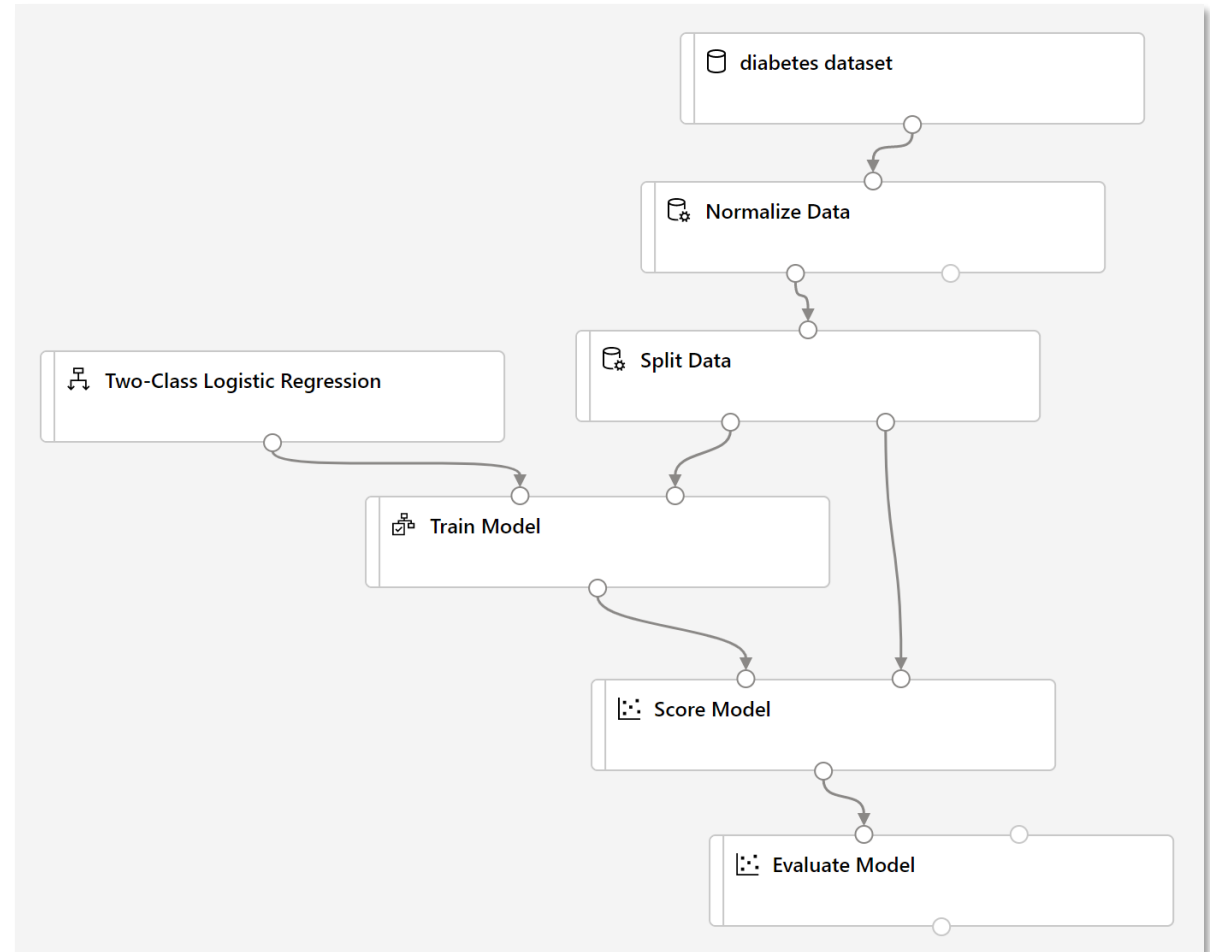
Supply the data and desired model type, and let Azure Machine Learning find the best model



Azure Machine Learning *designer*

- Visual tool for creating a machine learning *pipeline*

1. Use a *training pipeline* to train and evaluate a model
2. Create an *inference pipeline* to predict labels from new data
3. Deploy the inference pipeline as a *service* for apps to use



Tools



Azure Machine Learning studio



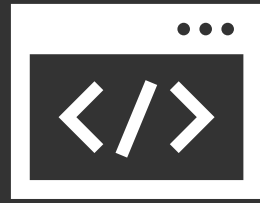
The Azure Machine Learning SDK (Python/R)



The Azure Machine Learning CLI Extension



Visual Studio Code

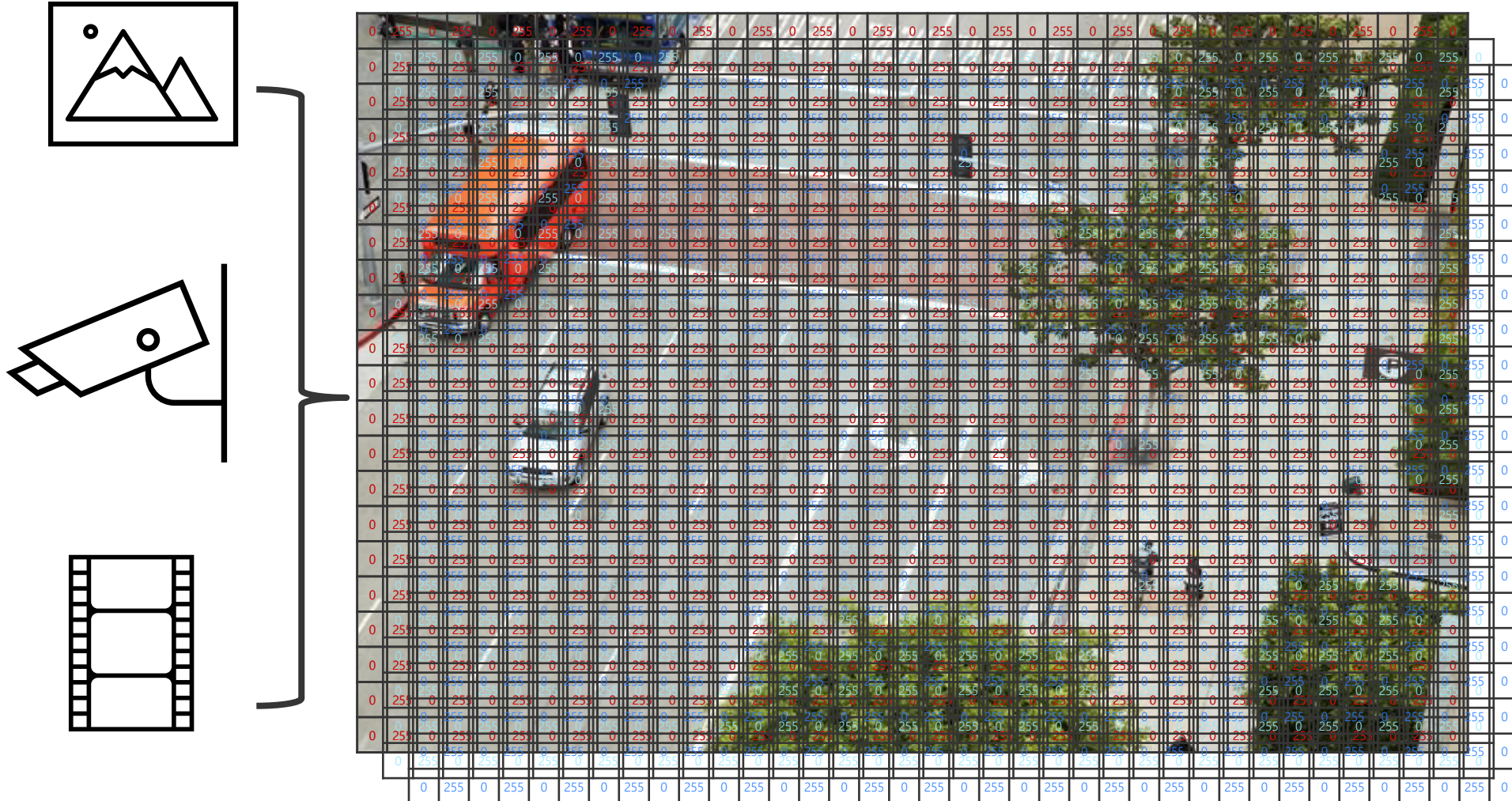


Demo.



Computer Vision.

What is Computer Vision?

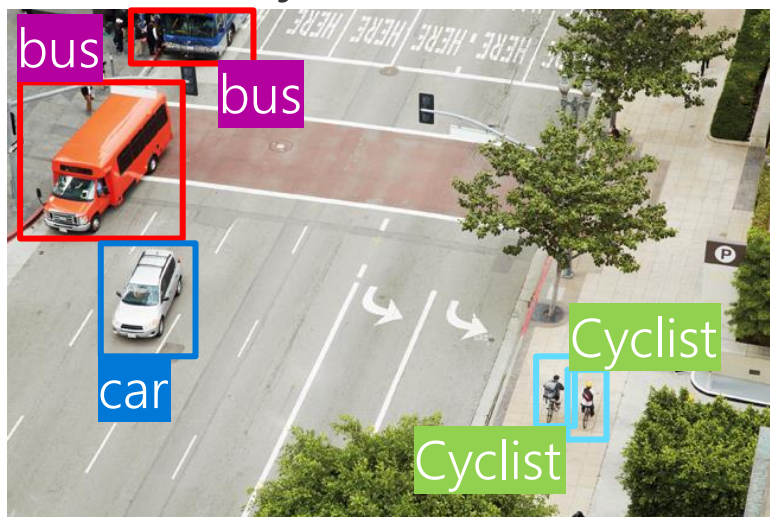


Applications of Computer Vision

Image Classification



Object Detection



Semantic Segmentation

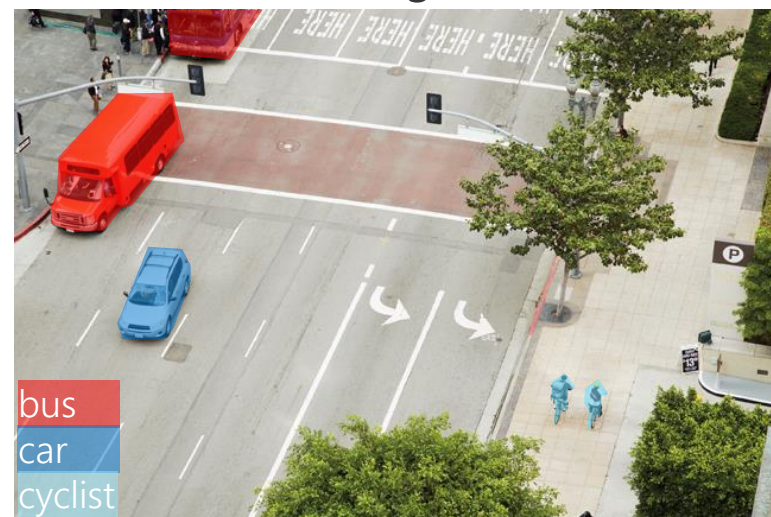
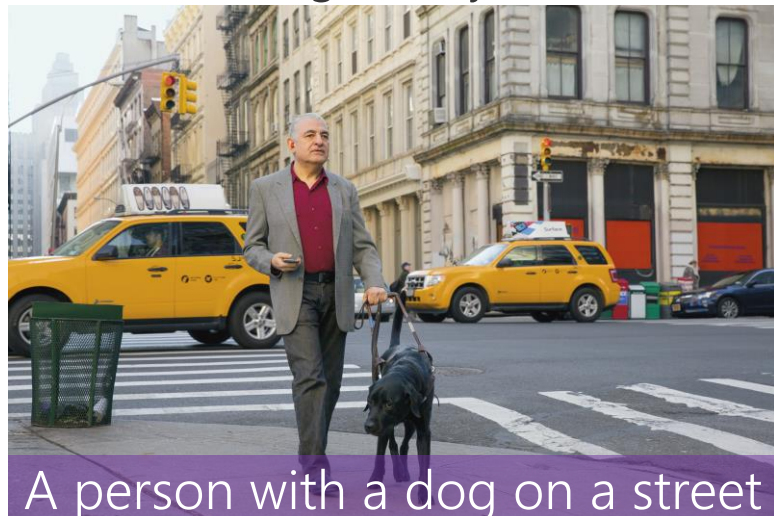
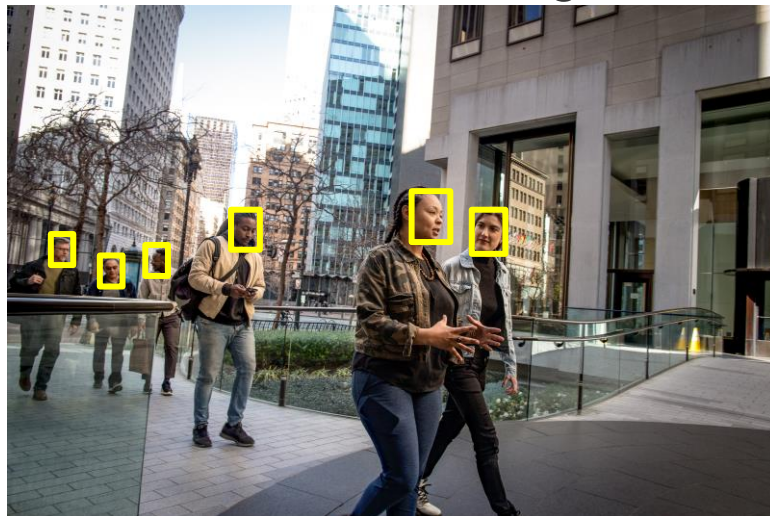


Image Analysis



Face Detection & Recognition

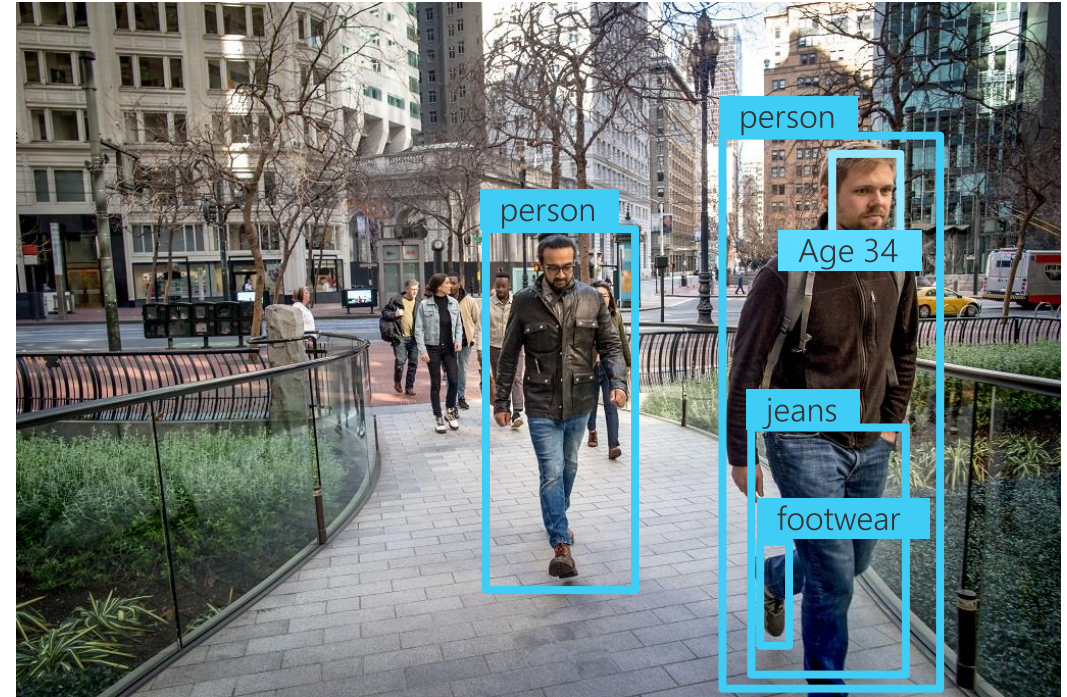


Optical Character Recognition



Image Analysis with the *Computer Vision* Service

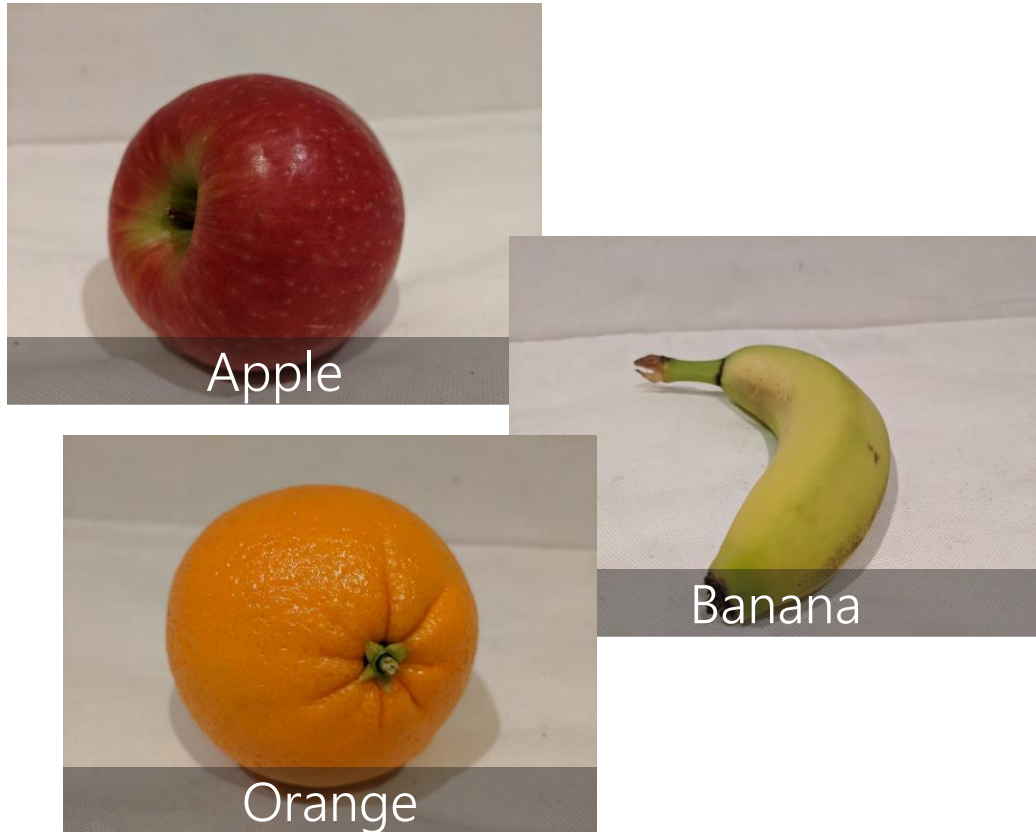
- Pre-trained computer vision model
- Object detection for over 10,000 predefined classes
- Image description and tag generation
- Face detection and analysis
- Content moderation
- Text detection and OCR



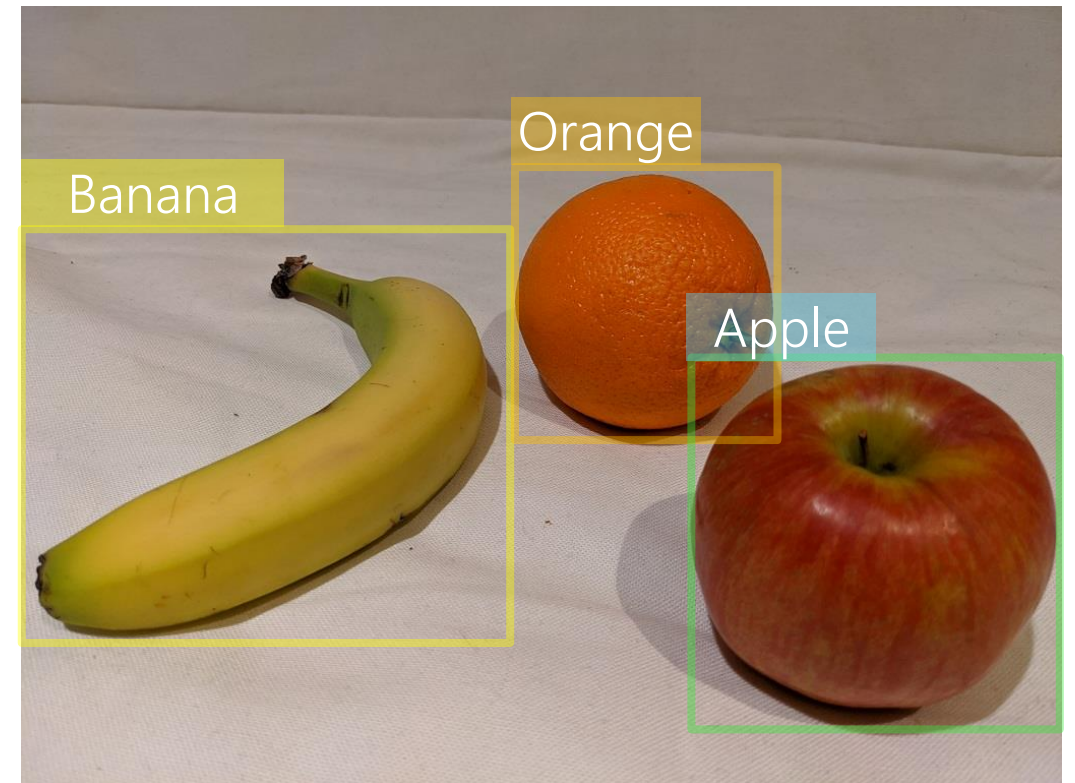
Caption: a group of people walking on a sidewalk
Tags: building, jeans, street, outdoor, jacket, city, person
Ratings: Adult: False, Racy: False, Gore: False

Training Models with the *Custom Vision* Service

Image Classification

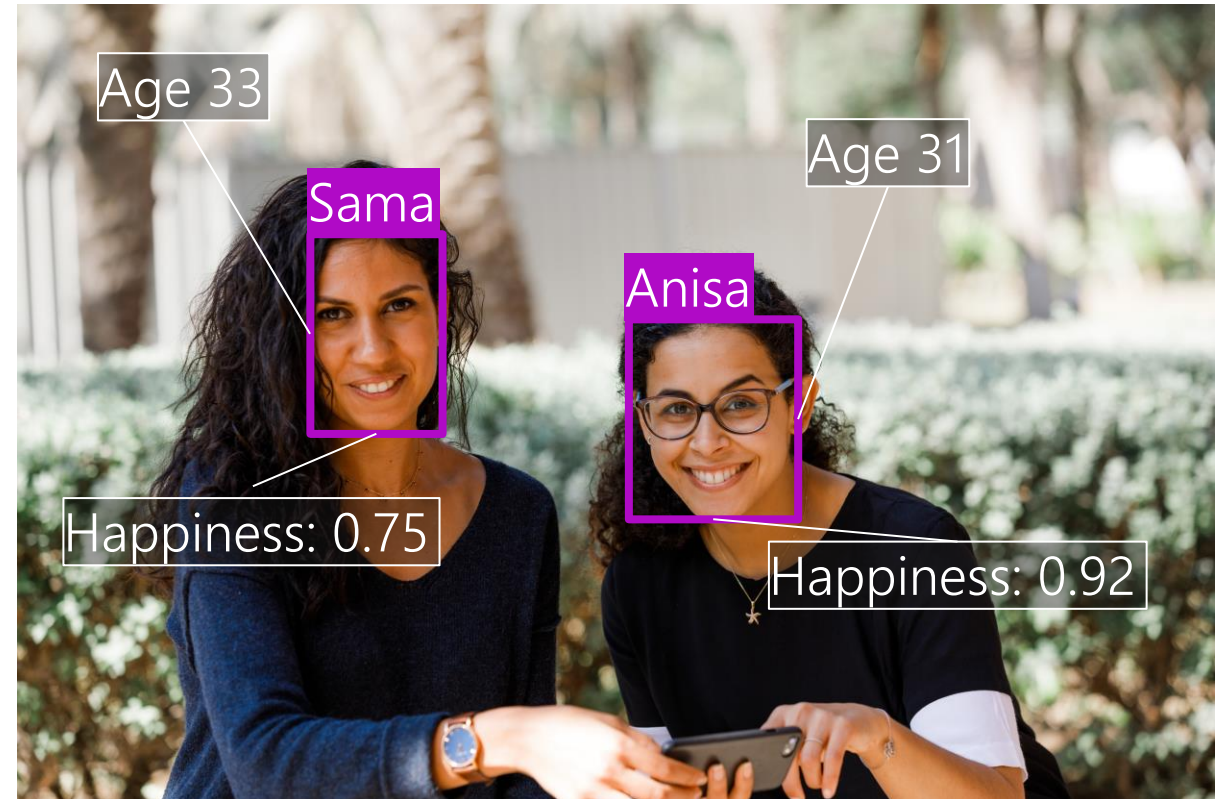


Object Detection



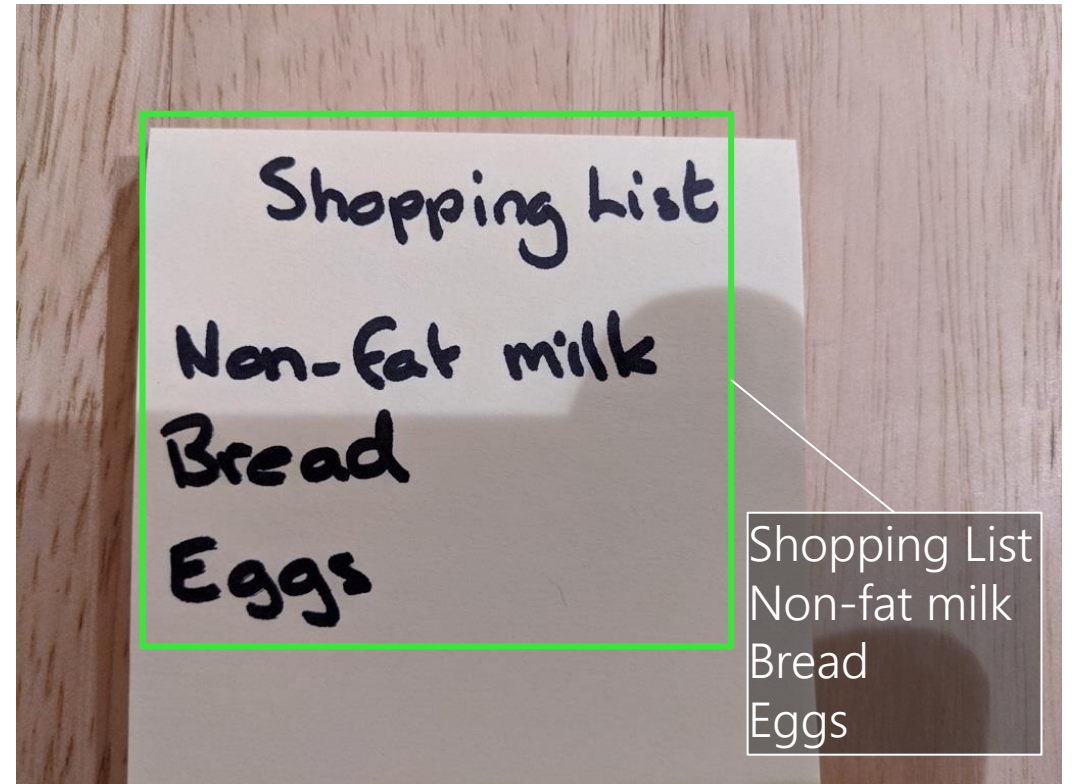
Analyzing Faces with the *Face* Service

- More facial analysis functionality than the *Computer Vision* service, including:
 - Facial attributes:
 - Age
 - Emotions
 - Facial recognition:
 - Similarity matching
 - Identity verification



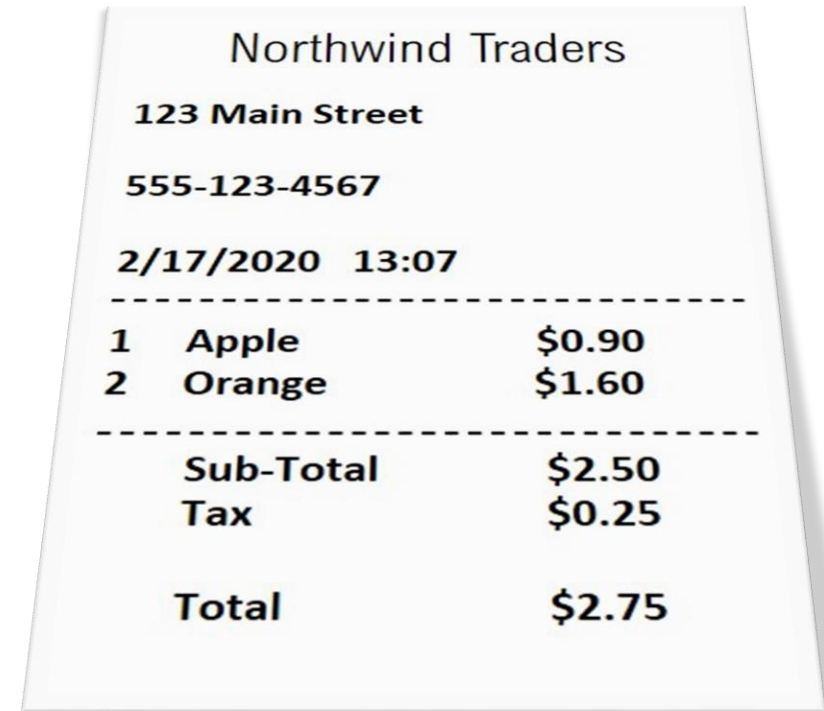
Reading Text with the *Computer Vision* Service

- Detect the location of text:
 - Printed
 - Handwritten
- Options for quick text extraction from images, or asynchronous analysis of larger scanned documents



Analyzing Forms with the *Form Recognizer* Service

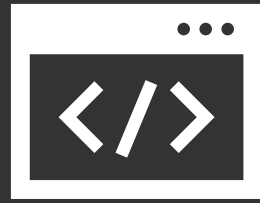
- Extract information from scanned forms in image or PDF format
 - Train a custom model using your own forms
 - Use the pre-trained receipt model
- Models perform semantic recognition of form fields – not just text extraction



Northwind Traders
123 Main Street
555-123-4567
2/17/2020 13:07

1	Apple	\$0.90
2	Orange	\$1.60

Sub-Total	\$2.50
Tax	\$0.25
Total	\$2.75



Demo.



Natural Language Processing.

What is Natural Language Processing?



Text analysis and entity recognition



Sentiment analysis



Speech recognition and synthesis



Machine translation



Semantic language modeling

Natural Language Processing in Azure



Cognitive Services

Text Analytics

- Language detection
- Key phrase extraction
- Entity detection
- Sentiment analysis

Speech

- Text to speech
- Speech to text
- Speech translation

Translator Text

- Text translation

Language Understanding

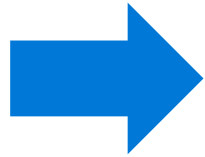
- Custom language modeling

Text Analytics

I had a wonderful vacation in France.

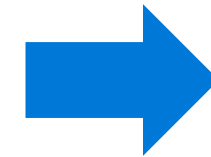
- **Predominant Language:** English
- **Sentiment:** 88% (positive)
- **Key Phrases:** "wonderful vacation"
- **Entities:** France

Speech Recognition and Synthesis

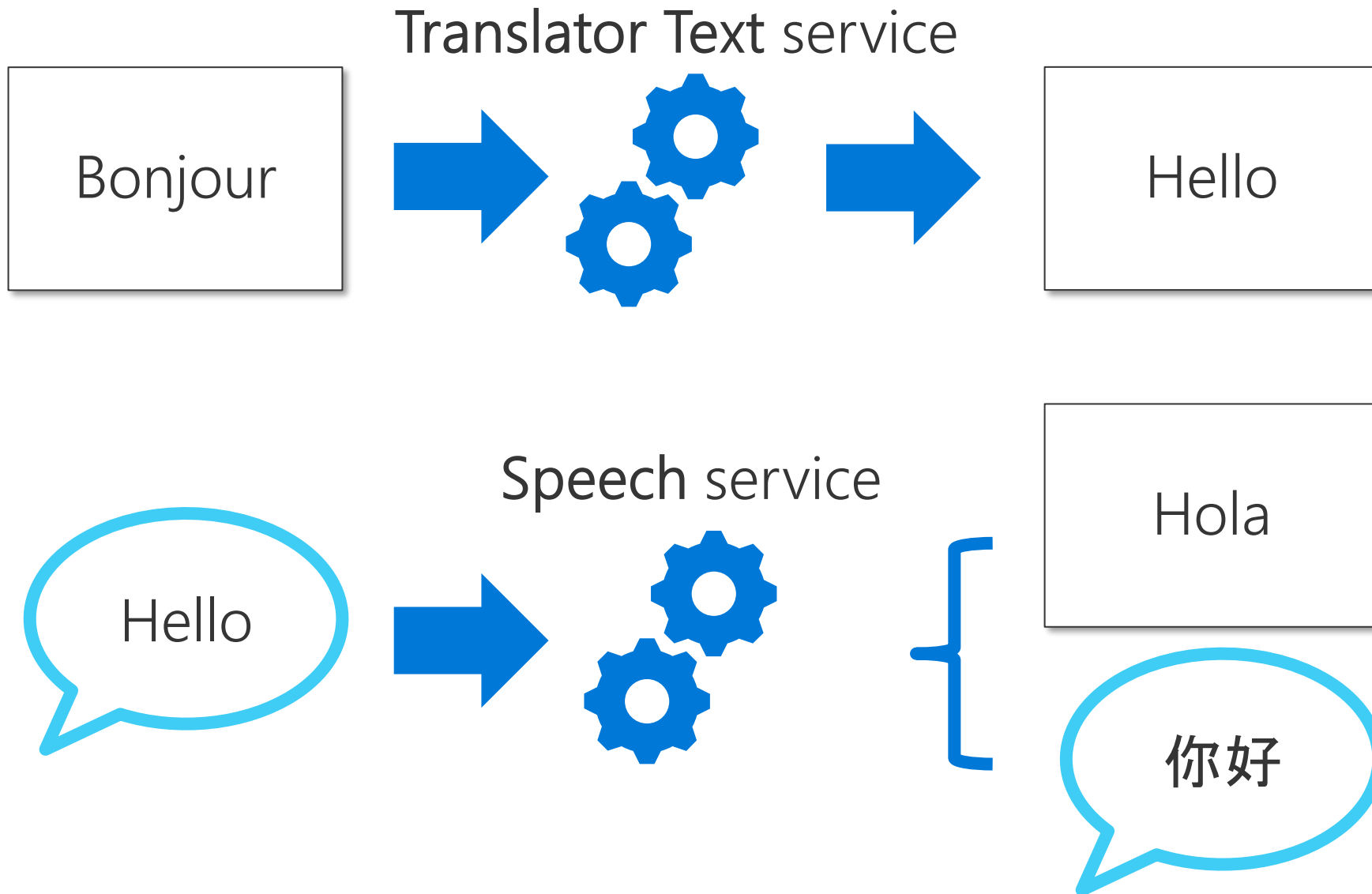


Use the *speech-to-text* capabilities of the **Speech** service to transcribe audible speech to text

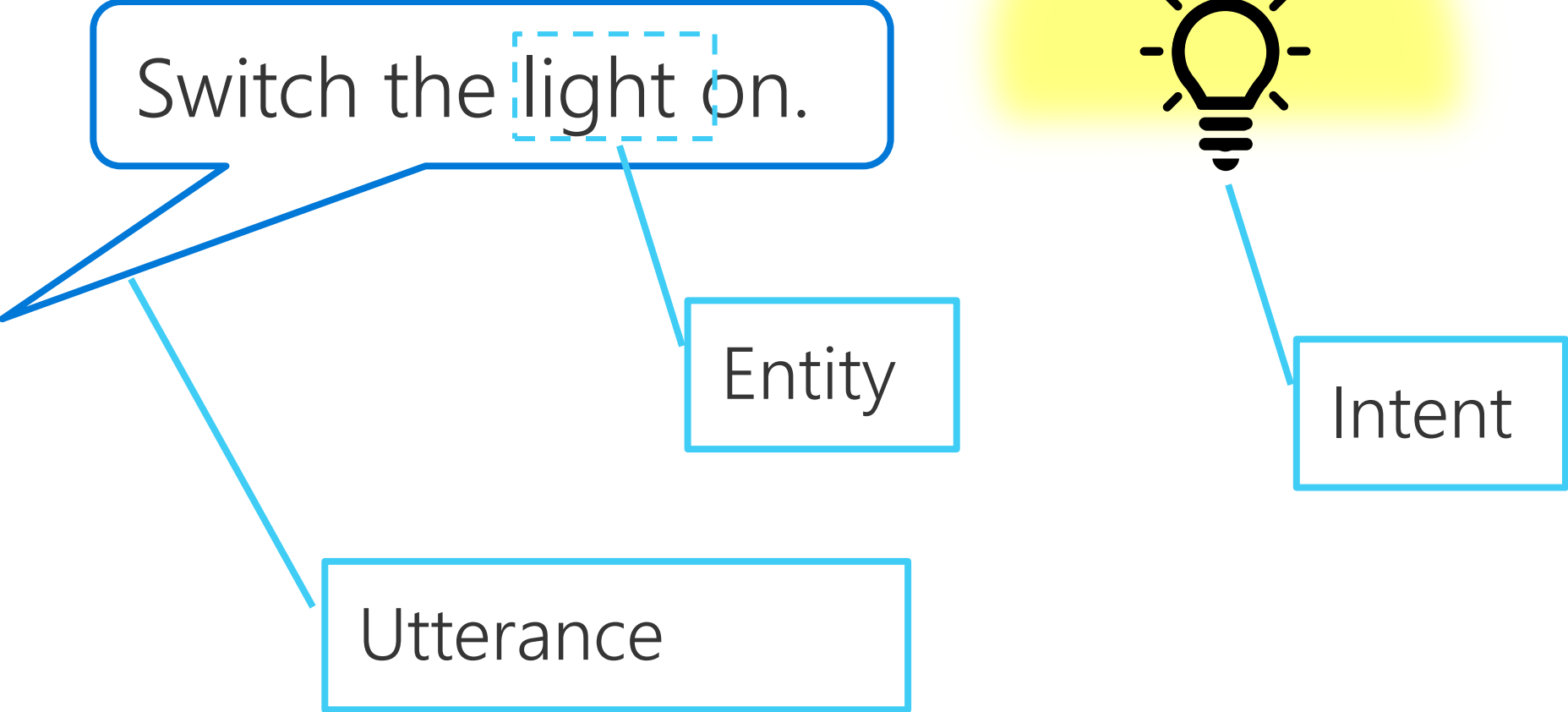
Use the *text-to-speech* capabilities of the **Speech** service to generate audible speech from text

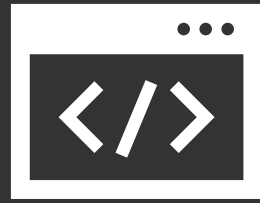


Translation



Language Understanding





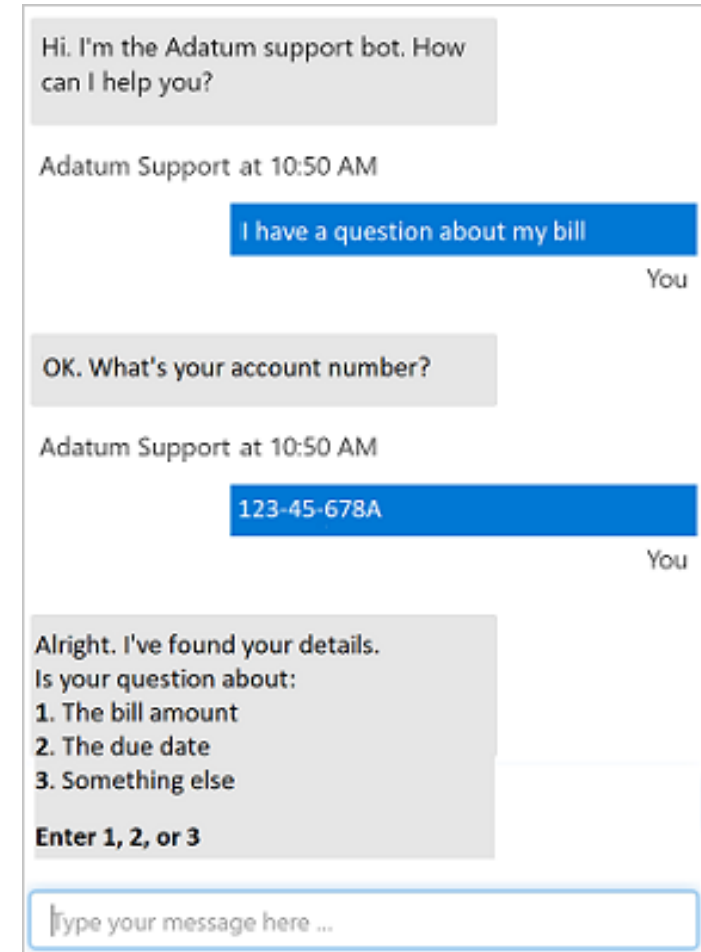
Demo.



Conversational AI.

What is Conversational AI?

- A solution that enables a dialog between an AI agent and a human
- Generically, conversational AI agents are known as *bots*
- Bots can engage over multiple *channels*:
 - Web chat interfaces
 - Email
 - Social media platforms
 - Voice

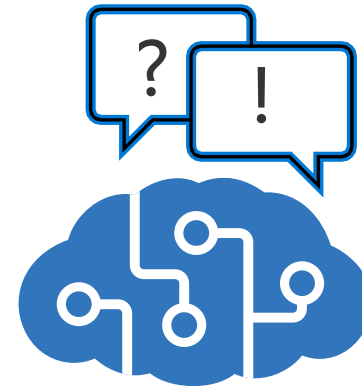


Responsible AI Guidelines for Bots

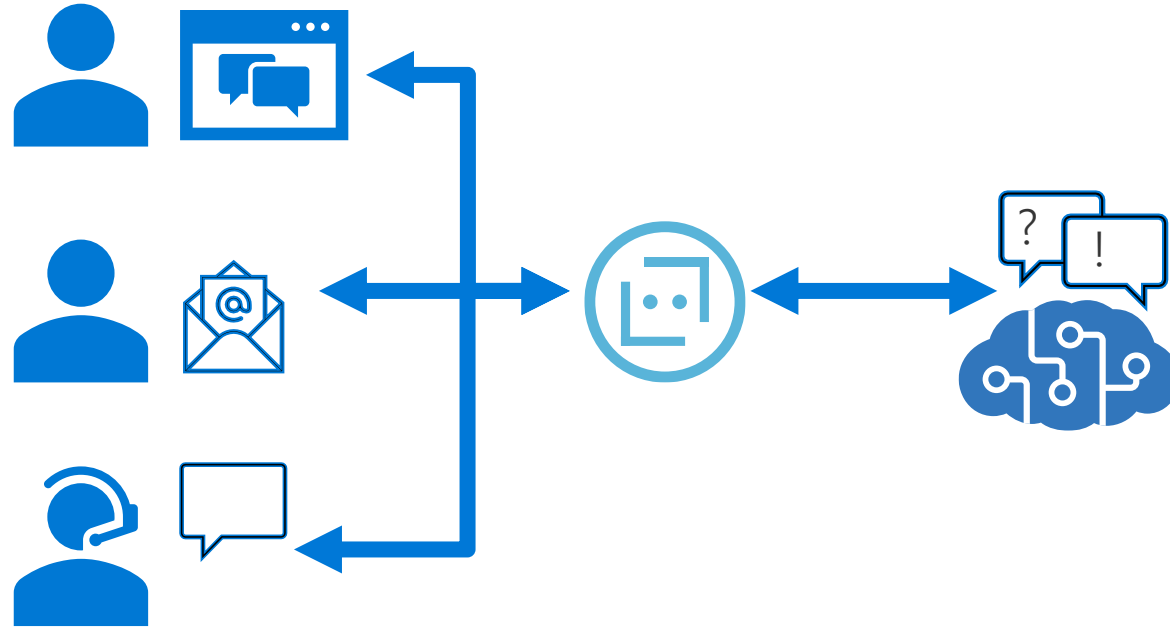
1. Be transparent about what the bot can (and can't) do
2. Make it clear that the user is communicating with a bot
3. Enable the bot to seamlessly hand-off to a human if necessary
4. Ensure the bot respects cultural norms
5. Ensure the bot is reliable
6. Respect user privacy
7. Handle data securely
8. Ensure the bot meets accessibility standards
9. Assume accountability for the bot's actions

The QnA Maker Service

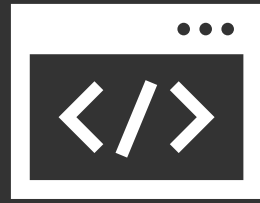
- Define a *knowledge base* of question and answer pairs:
 - By entering questions and answers
 - From an existing FAQ document
 - By using built-in *chit-chat*
- Consume the knowledge base from client apps, including bots



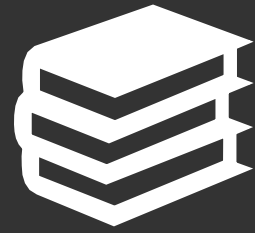
Azure Bot Service



- Cloud-based platform for developing and managing bots
- Integration with LUIS, QnA Maker, and others
- Connectivity through multiple channels



Demo.



Studying for the exam.

Microsoft Learn Learning Paths



Get started with artificial intelligence on Azure



Create no-code predictive models with Azure Machine Learning



Explore computer vision in Microsoft Azure



Explore natural language processing



Explore conversational AI

Microsoft Virtual Training Days

Virtual events

Are you an IT professional or a developer looking to skill-up on the latest technologies, add to your toolbox, or help drive change in your organization?

These 1 and 2 day virtual events will give you the opportunity to learn about the latest technologies, Microsoft Power Platform. Find out how Microsoft is

Microsoft 365, Microsoft Dynamics 365, or

Azure

Event Name
VIRTUAL: Microsoft Azure Virtual Training Day: Fundamentals
VIRTUAL: Microsoft Azure Virtual Training Day: AI and ML
VIRTUAL: Microsoft Azure Virtual Training Day: AI and ML
VIRTUAL: Microsoft Azure Virtual Training Day: Microsoft Dynamics 365
VIRTUAL: Microsoft Azure Virtual Training Day: AI and ML
VIRTUAL: Microsoft Azure Virtual Training Day: AI and ML

Business Applications

Event Name
VIRTUAL: Microsoft Dynamics 365 Virtual Training Day: Fundamentals

Microsoft 365

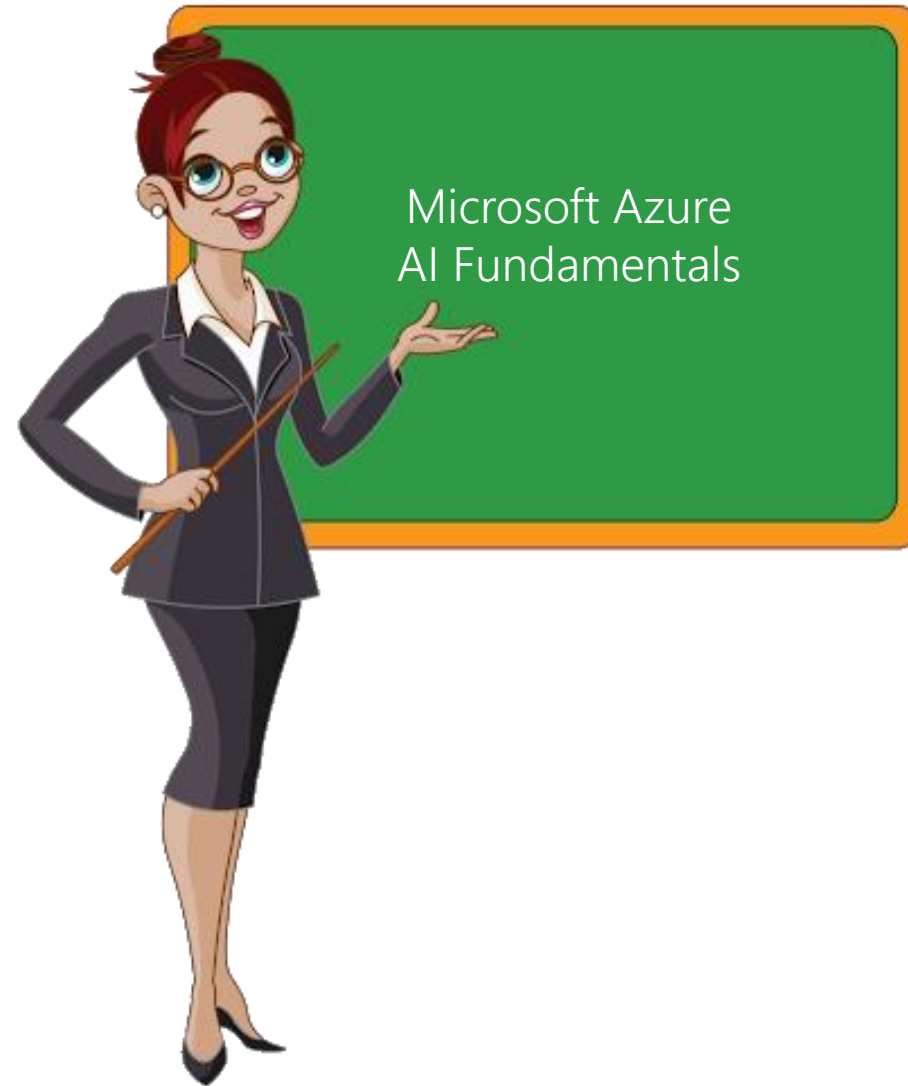
Event Name
VIRTUAL: Microsoft 365 Virtual Training Day: Securing Your Organization
VIRTUAL: Microsoft 365 Virtual Training Day: Building Microsoft Teams Integrations and Workflows
VIRTUAL: Microsoft 365 Virtual Training Day: Meeting Organizational Compliance Requirements
VIRTUAL: Microsoft 365 Virtual Training Day: Enable Remote Work with Microsoft Teams



Link
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<https://www.microsoft.com/en-us/trainingdays>

Instructor-led training



References

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<https://aka.ms/explore-computer-vision>

<https://aka.ms/explore-nlp>

<https://aka.ms/explore-bots>

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<https://www.luis.ai/>

<https://www.qnamaker.ai/>

<https://dev.botframework.com/>

<https://eu.healthbot.microsoft.com/>



Questions?



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