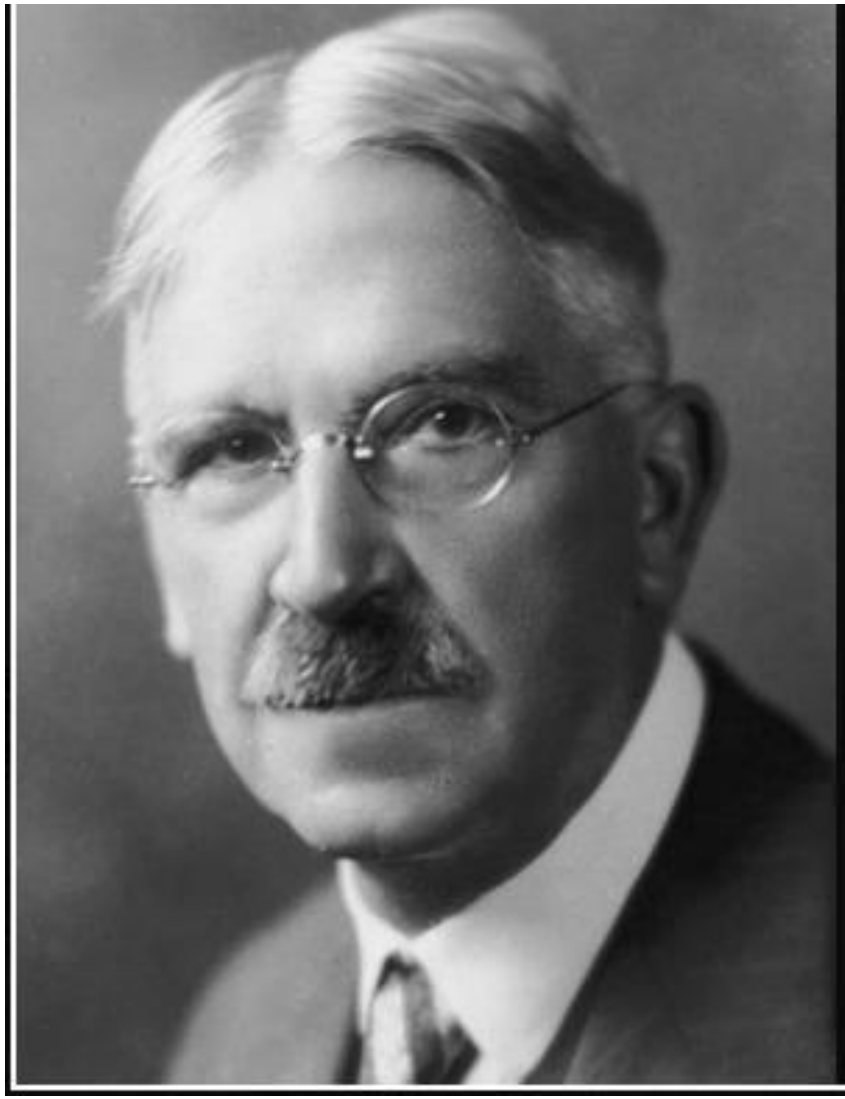
A TASTE OF AI'S CONCEPT AND APPLICATION IN JUNIOR SECONDARY

Eric Sir 陳汝堅老師
Ying Wa College

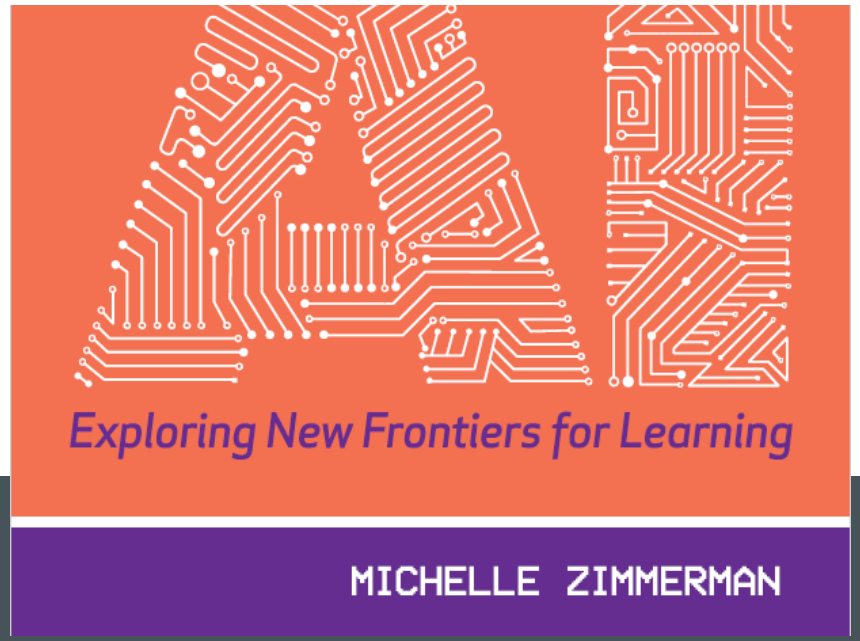


If we teach today's students as we taught yesterday's, we rob them of tomorrow.

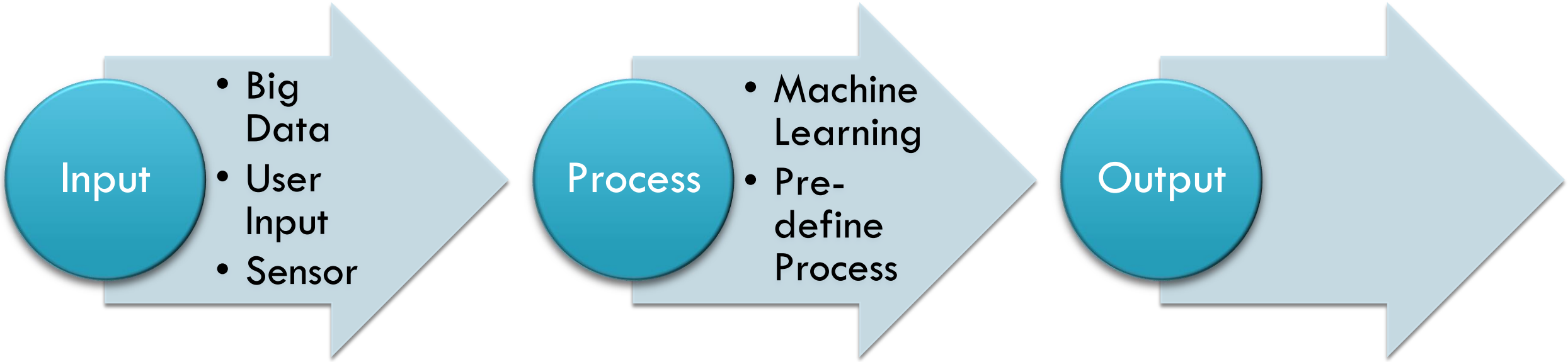
— John Dewey —

AZ QUOTES

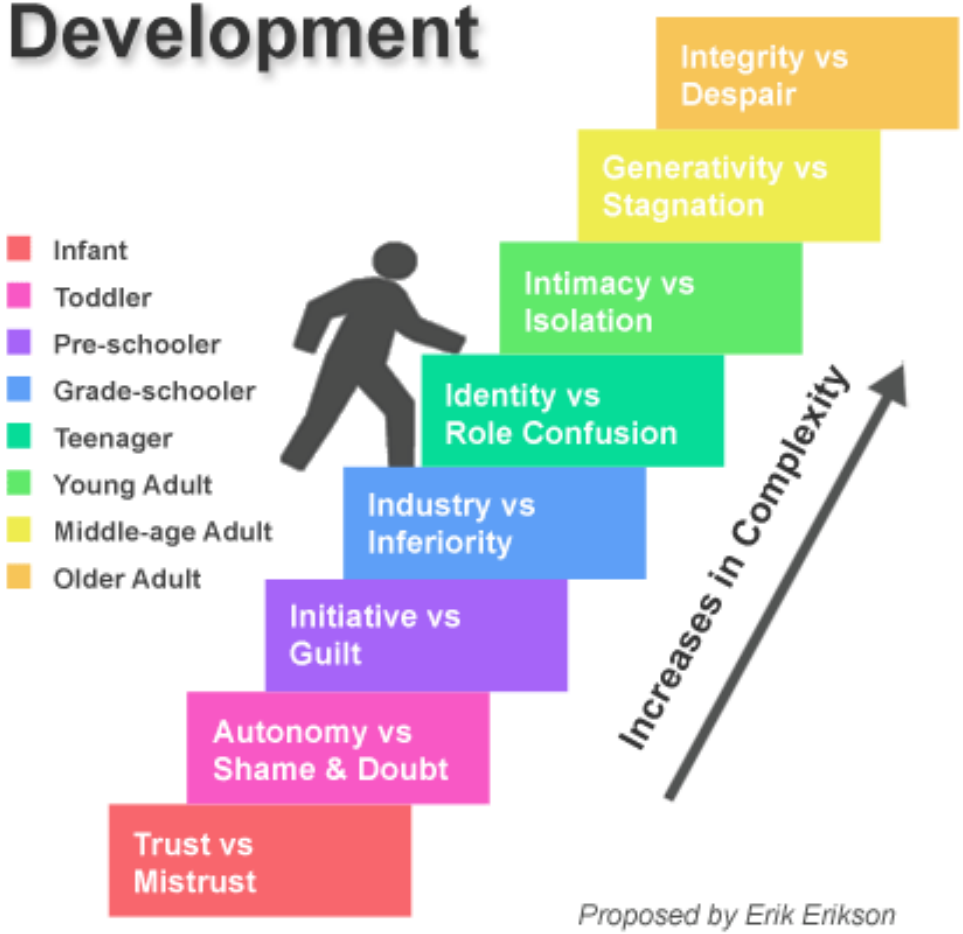
Future careers will become increasingly interdisciplinary as students work with the various components that are part of AI, like robotics, cognitive systems, and machine learning. As educators, we have the opportunity to model our openness to learning and teaching more than one subject domain. While machines are often specific to a particular domain, humans have the ability to cross domains and create applications across fields. That is why this book makes unexpected connections between the arts, sciences,



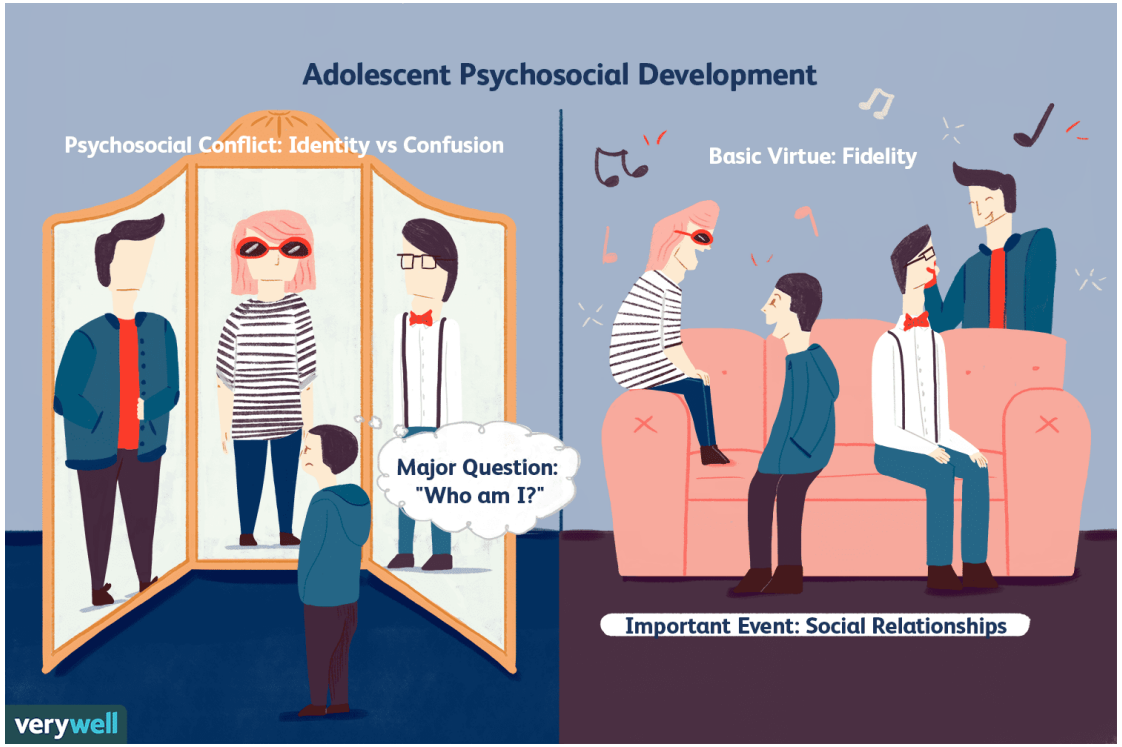
TEACHING AI


Input
• Big Data
• User Input
• Sensor
Process
• Machine Learning
• Pre-define Process
Output

Erikson's Stages of Psychosocial Development



https://zanl13.wordpress.com/about/



https://www.verywellmind.com/identity-versus-confusion-2795735

LEARNING WITH FUN!

WE PROMOTE AI EDUCATION TO ALL STUDENTS.

AI Areas

Machine learning

Developing and improving algorithms that help computers learn from data to create more advanced, intelligent computer systems.

Human language technologies

Linking language to the world through speech recognition, language modeling, language understanding, spoken language systems, and dialog systems.

Perception and sensing

Making computers and devices understand what they see to enable tasks ranging from autonomous driving to analysis of medical images.

AI, people, and society

Examining the societal and individual impacts on the spread of intelligent technologies to formulate best practices for their design.

Systems, tools and platforms

Integrating intelligent technologies to create interactive tools such as chatbots that incorporate contextual data to augment and enrich human reasoning.

Integrative intelligence

Weaving together advances in AI from disciplines such as computer vision and human language technologies to create end-to-end systems that learn from data and experience.

Cyberphysical systems and robotics

Developing formal methods to ensure the integrity of drones, assistive robotics and other intelligent technologies that interact with the physical world.

Human AI collaboration

Harnessing research breakthroughs in artificial intelligence to design technologies that allow humans to interact with computers in novel, meaningful and productive ways.

Decisions and plans

Reasoning about future events to enable informed collaborations between humans and intelligent agents.

PROPOSED AI AREAS FOR LEARNING

Vision

Image-processing algorithms to smartly identify, caption, index, and moderate your pictures and videos.

Knowledge

Map complex information and data in order to solve tasks such as intelligent recommendations and semantic search.

Language

Allow your apps to process natural language with pre-built scripts, evaluate sentiment and learn how to recognize what users want.

Speech

Convert spoken audio into text, use voice for verification, or add speake recognition to your app.

Search

Add Bing Search APIs to your apps and harness the ability to comb billions of webpages, images, videos, and news with a single API call.

- Example of image recognition

颜值鉴定

拼颜值

测CP

谁请客

HTTP

视觉系·小冰

小小朱大荔 • Entertainment

Share Wish list

微软小冰是微软亚洲研究院发布的一款人工智能聊天机器人，俏皮可爱。
我作为微软的粉丝，又喜欢小娜(Cortana)、小冰这对姐妹花，
于是利用闲暇时间把小冰网页版的视觉系技能做成了UWP版本，

More

3+

TEXT ANALYTICS

https://aidemos.microsoft.com/text-analytics

Text Analytics

Microsoft Cognitive Services Text Analytics API determines the sentiment of your message, typed or spoken. Try it out and see if the message is positive, negative, or neutral.

Try it out

Learn to code

让小冰替你创作诗歌初稿

模型已全面升级，诗句篇章更优美，更接近人类心意

马上开始

声明

小冰宣布放弃她创作的诗歌版权
所以你可以任意发表最终的作品
甚至不必提及她参与了你的创作

https://poem.msxiaobing.com/

ery ..... done

ion ..... done

ving literary style ..... done

pening line ..... done

g the opening line ..... done

完成全篇 Completing the full draft ..... done

[illegible] ..... done

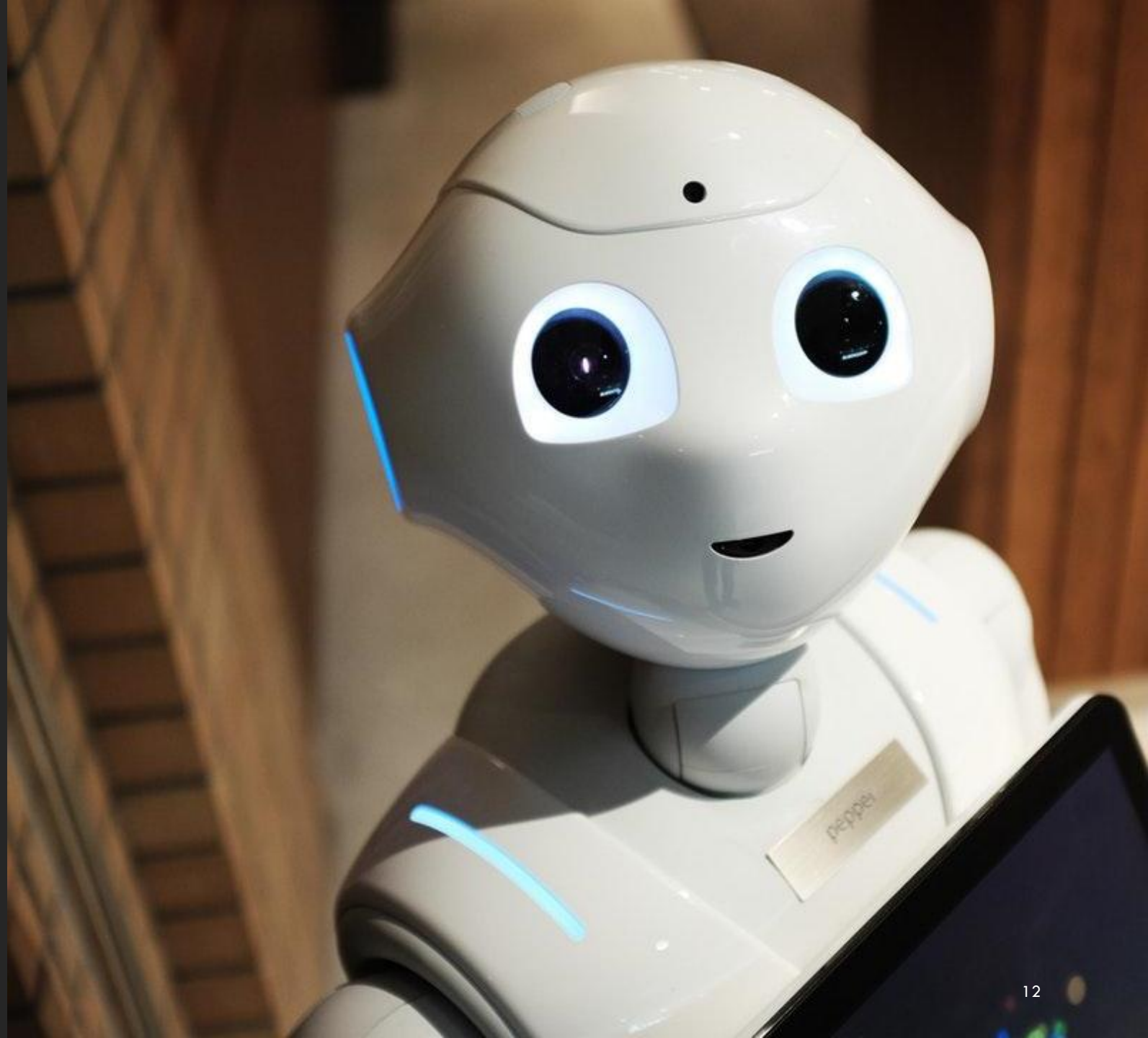
尝试不同篇幅 Trying different forms ..... done

完成！ ALL DONE!

Example of AI application on language

https://poem.msxiaobing.com/

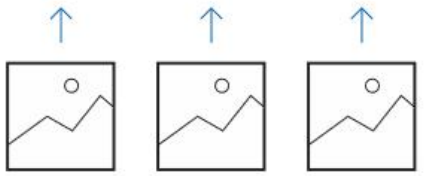
UNDERSTAND AI WITHOUT CODING



Microsoft | Cognitive Services | Custom Vision

HTTPS://WWW.CUSTOMVISION.AI

SIGN IN

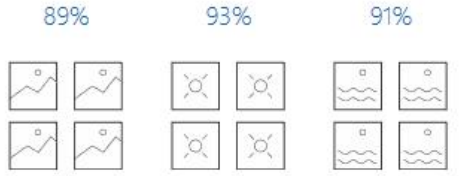


Upload Images

Bring your own labeled images, or use Custom Vision to quickly add tags to any unlabeled images.

Train

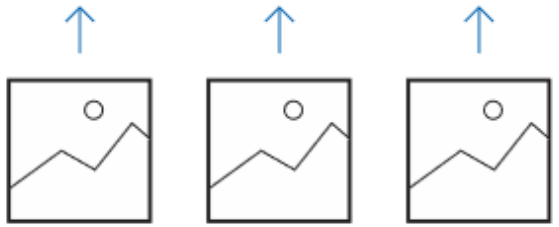
Use your labeled images to teach Custom Vision the concepts you care about.



Evaluate

Use simple REST API calls to quickly tag images with your new custom computer vision model.

DEMONSTRATION OF CUSTOM VISION



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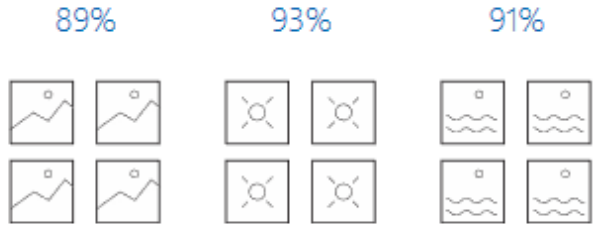

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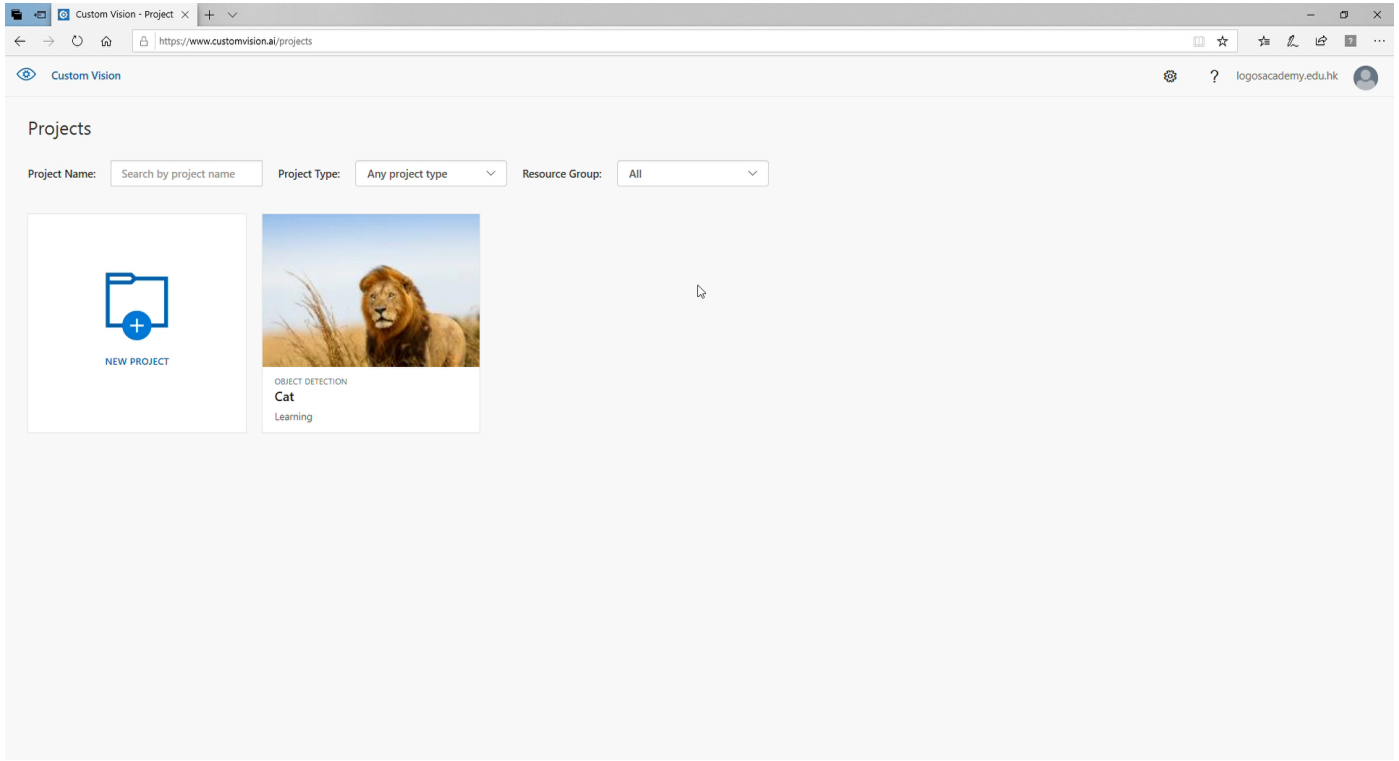
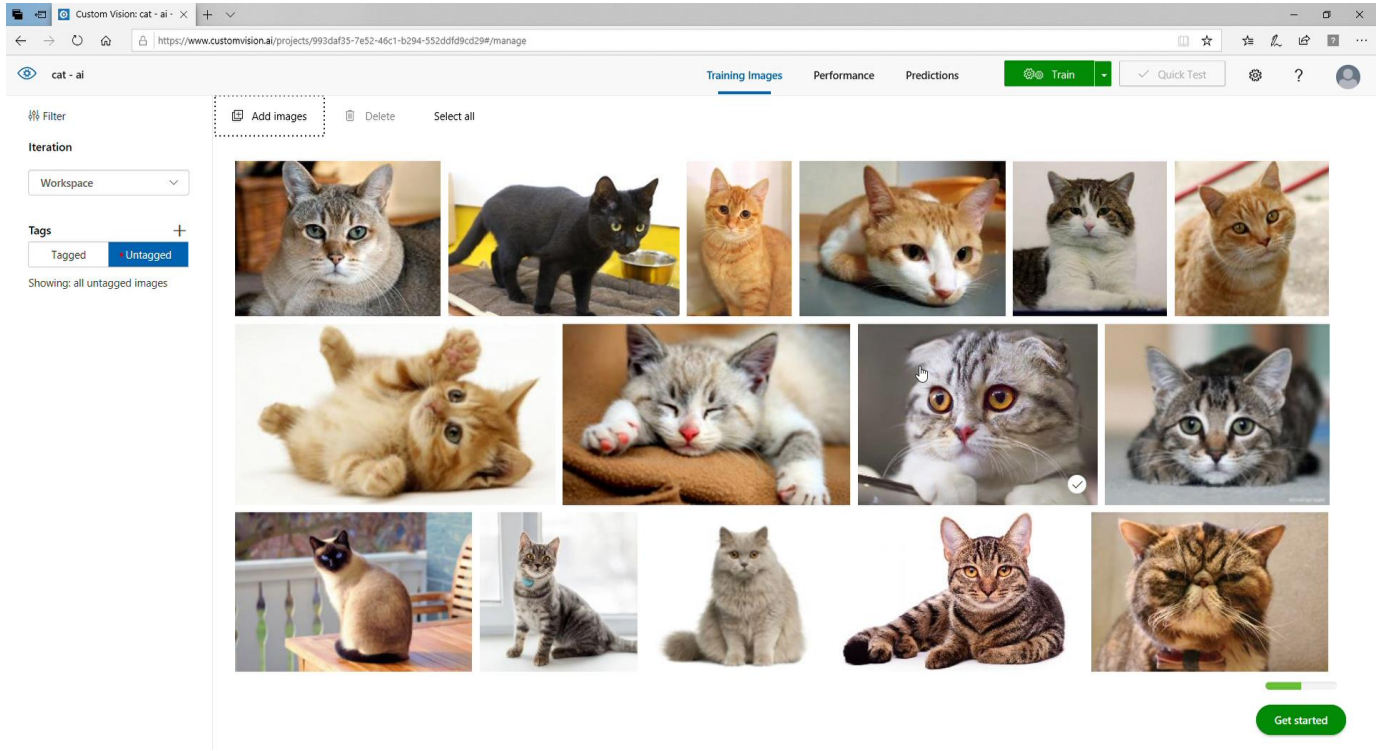
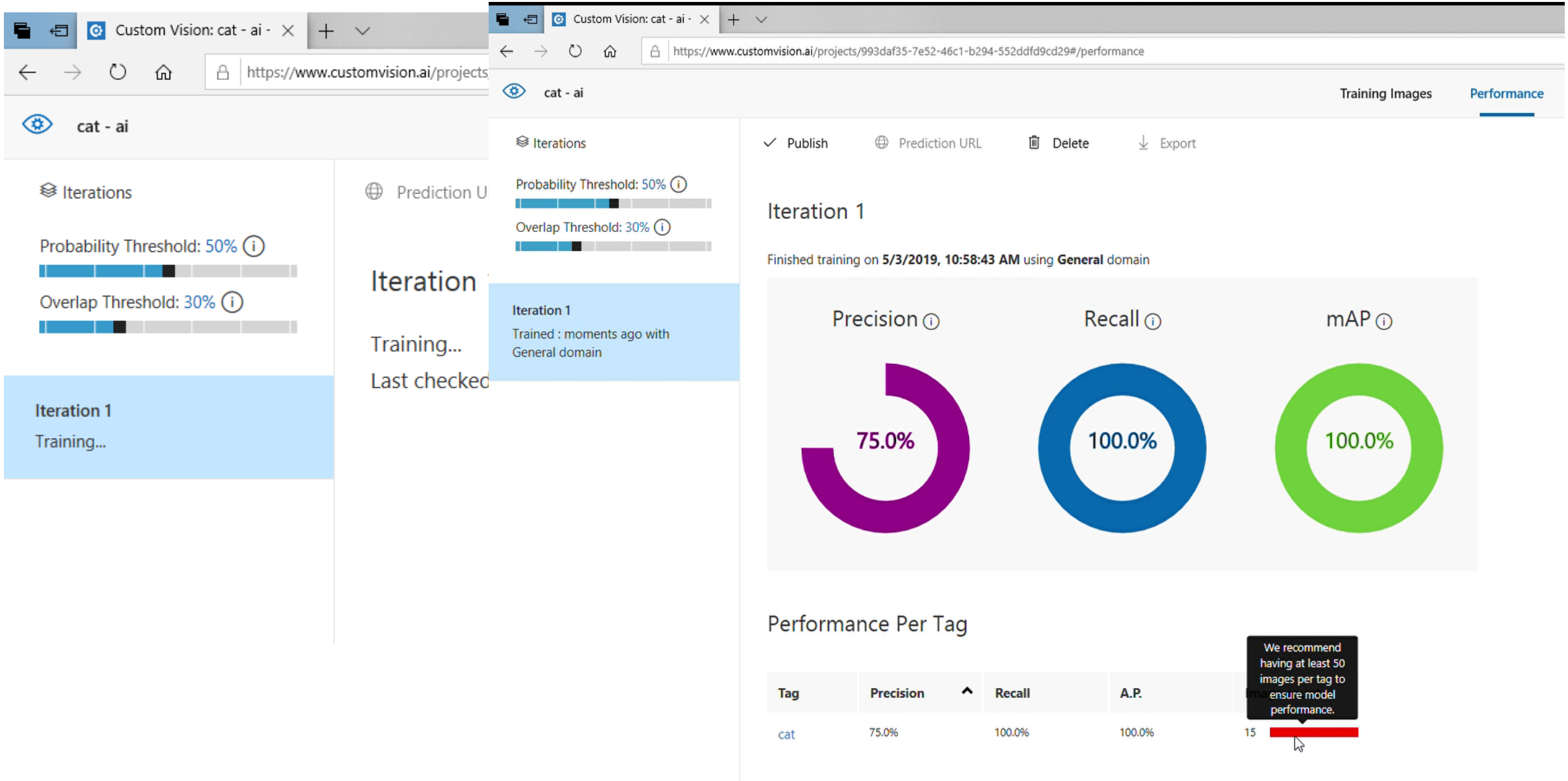
WHAT IS “TRAINING DATA SET”



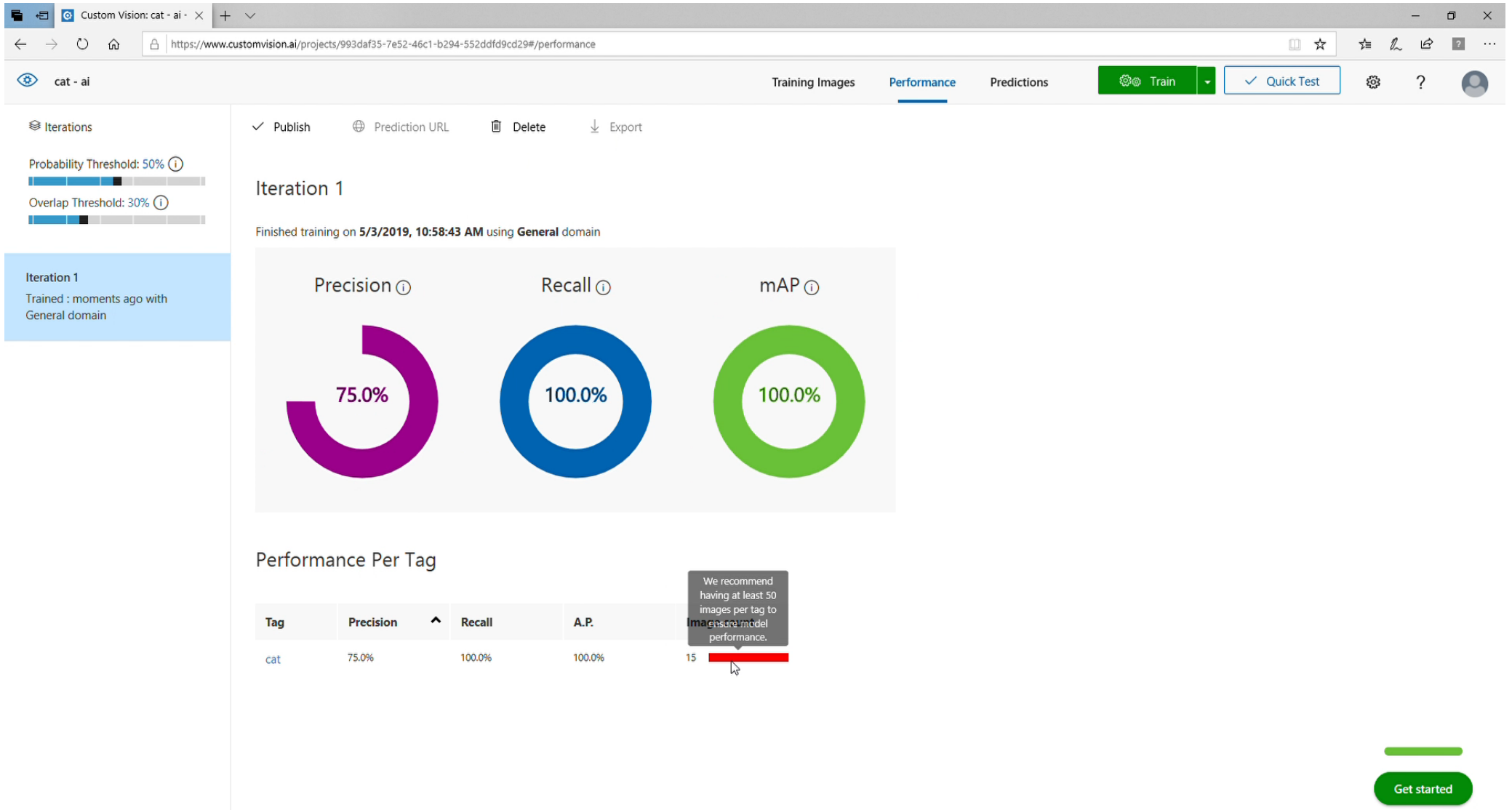


HOW "MACHINE LEARNING" HAPPEN?

UNDERSTANDING - MACHINE LEARNING



TESTING STAGE



LEARNING AI THROUGH PROJECT LEARNING

Junior Secondary Project: Object Identification

ABOUT THE PROJECT

Set a topic: E.g. Identify Cats and Lions

4 students a group

3-minute PowerPoint presentation

2 sets of photos

1 Worksheet

3-MINUTE POWERPOINT PRESENTATION

Why this topic? Why Cats and Lions?

What is the similarity and difference (in the outlook) between Cats and Lions?

How many images do you use to teach the machine?

How to choose the images? Any criteria?

What kind of information can be shown in the “**Analyze an image**”?

What kind of photos mostly can be identified by your AI?

What kind of photos may not be identified correctly by your AI?

	"name": "close", "confidence": 0.288444 }, { "name": "garden", "confidence": 0.2211698 }, { "name": "colored", "confidence": 0.1349126 }]
Description	{ "tags": ["cat", "grass", "animal", "sitting", "flower", "standing", "small", "blue", "gray", "looking", "close", "face", "white", "garden", "grey", "little", "green", "bird", "wearing", "table", "perched", "eyes", "colorful", "red", "yellow"], "captions": [{ "text": "a close up of a cat", "confidence": 0.949099 }] }
Image format	"Jpeg"
Image dimensions	351 x 624
Clip art	0

Group 3 presentation

Custom Vision AI

Distinguishing grapes and cocoa beans

WHY?

They are quite hard to distinguish, so with AI it can help us identify it and can increase the efficiency of work.

Although still in development, after the general brief idea, adjustments can be made and soon later it may even become a product!

similarities

1. They look round in shape
2. Their different variations of colours still look similar

differences

1. The shape of the leaves are different
2. The way they are grown together is different

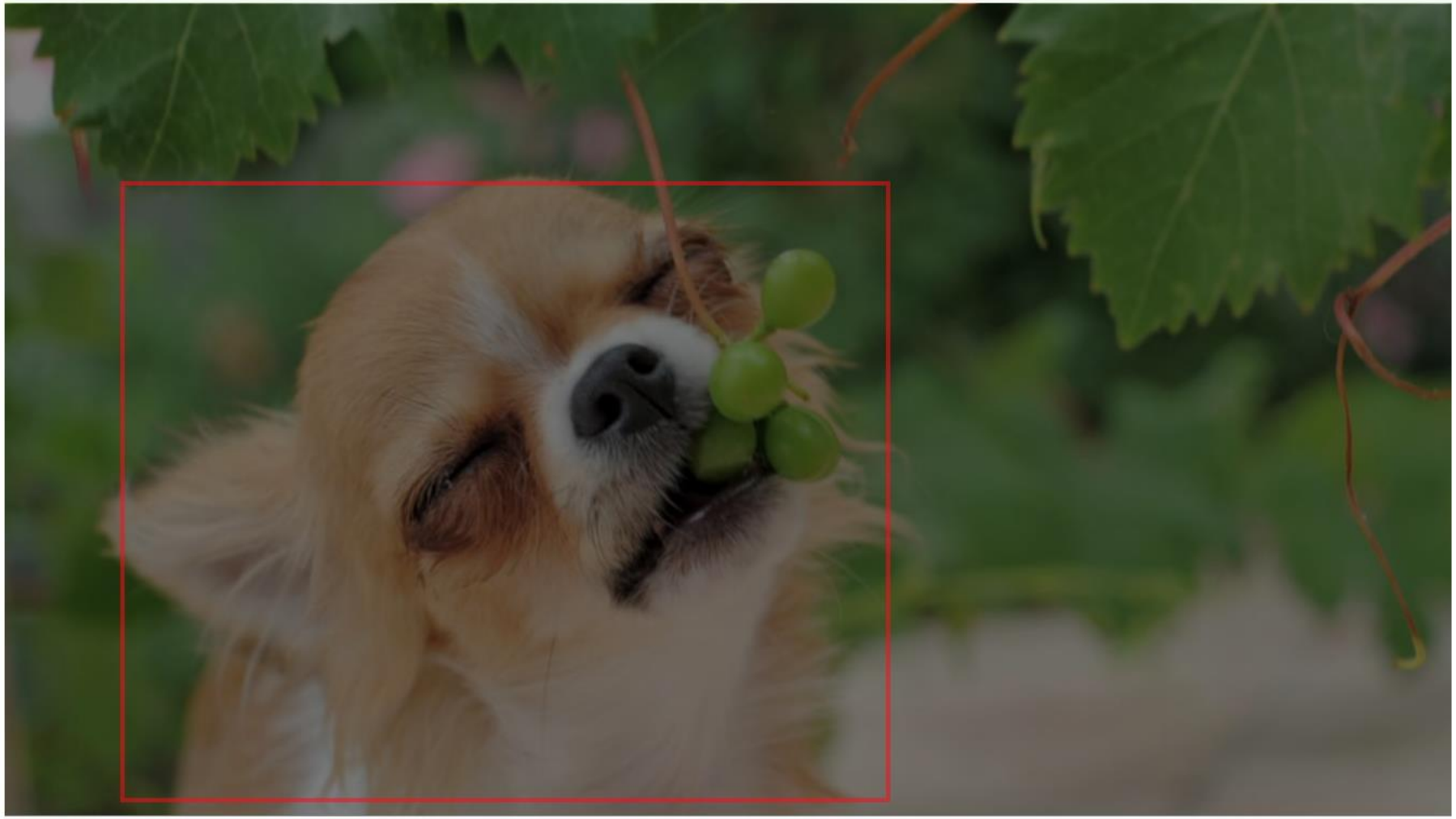


Image URL

Enter Image URL

or

Browse local files

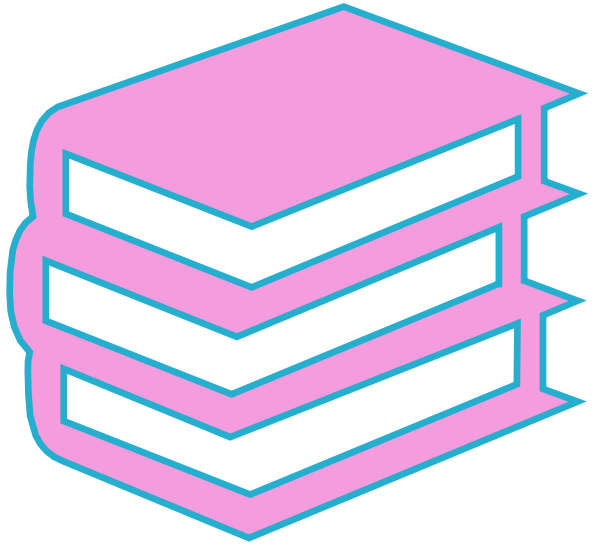
File formats accepted: jpg, png, bmp
File size should not exceed: 4mb

Using model trained in

Iteration

Iteration 1

Tag	Probability
Grapes	83.3%



SENIOR SECONDARY PROJECT

PROJECT FOR WILLIAM JESSUP UNIVERSITY COMPUTER SCIENCE COMPETITION FOR HIGH SCHOOL STUDENTS

Smart Shopping

Project Name: NARV - Z

School Name: Ying Wa College

PROBLEMS

- Difficult to find the most suitable product
- **Queuing** takes a lot time
- **Unmanned Store** (Reasons of unpopularity)
  - Amazon Go (Amazon.com)
    - Hardware cost: >$1 million USD
  - Tao Cafe (Alibaba)
    - In-store renovation
    - Large payment area

Solution

NARV - Z

Unmanned Store? We can do better!

- **Low cost** on hardware
- **One Stop Service**
- Fully autonomous
- Item list and user reviews
  - Instantly compare prices for different brands
  - Find the ideal product under a few minutes

Benefits

For Supermarket

- Reduce manpower
- Prevent man-made mistakes
- No in-store renovation

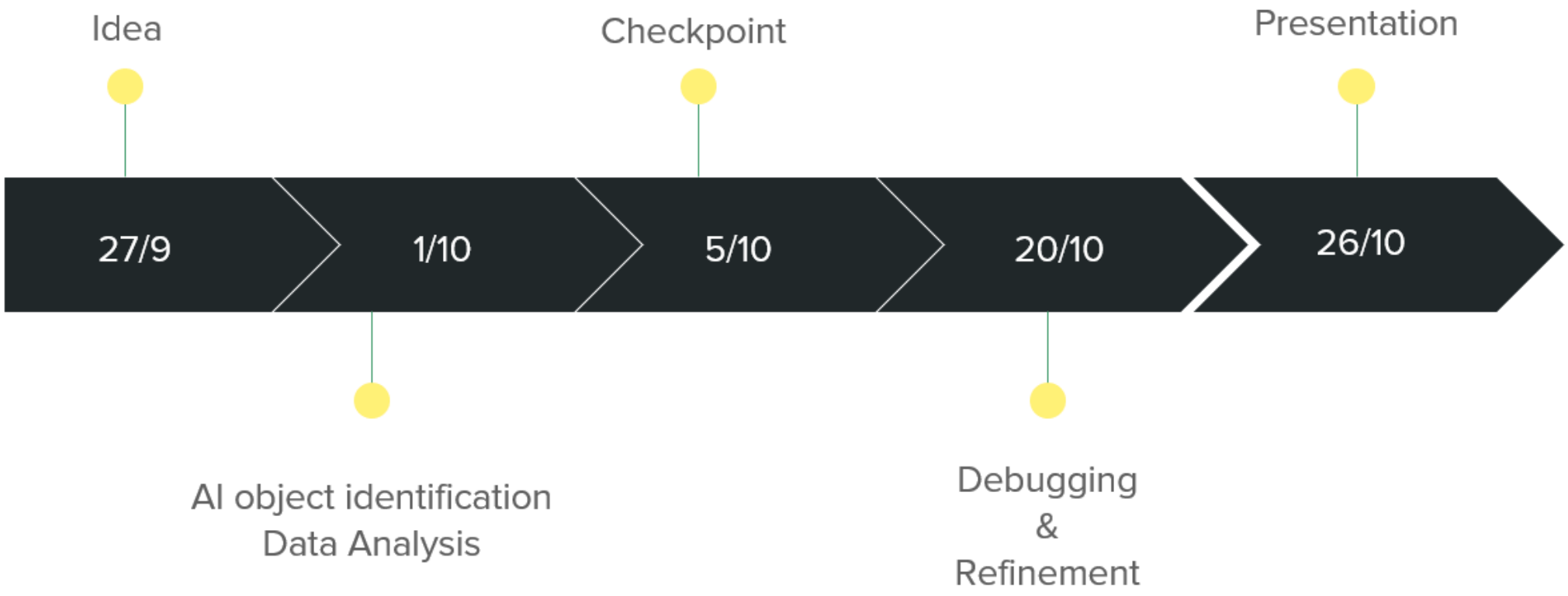
>700 Supermarkets in Hong Kong, How many in the world?

Detachable

Scalable application

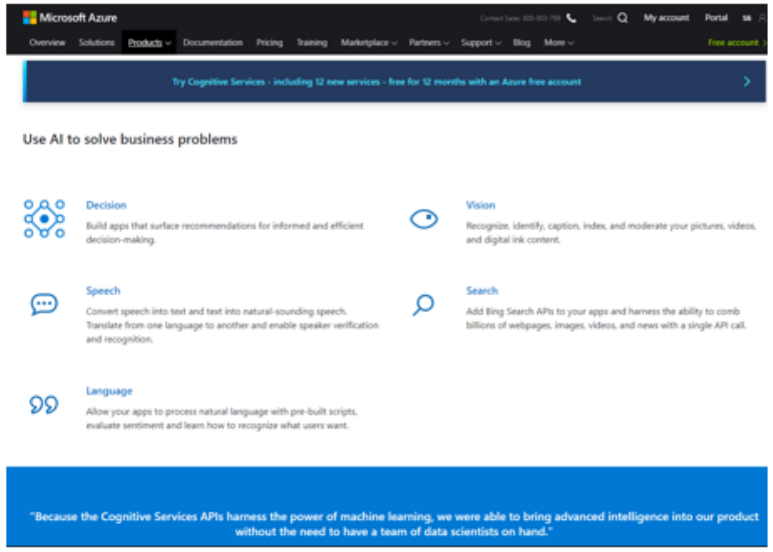
Large opportunities

Project Management



Main Focus

A.I. Object Detection



Cloud based Data Analysis

Services considered:

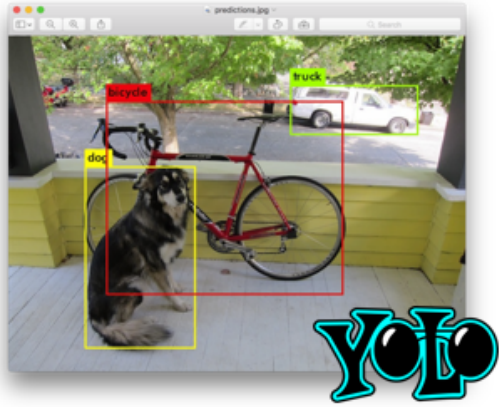
Microsoft Custom Vision AI, YOLO, Tensorflow, IBM Cloud

Limitations:

YOLO: Require darknet implementation

Tensorflow: Server hosting is necessary

IBM Cloud: Low accuracy



TensorFlow

IBM Cloud

Microsoft PowerApps AI builder

Pros: Best performance

Cons: Unable to return real-time result

We have trained

>300 Images

>60 for each item

Why we train that many data sets?

➔Low accuracy

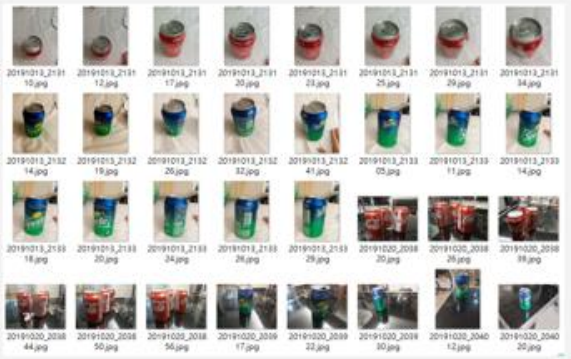
- Errors caused by unclear images & overlapped items
- Insufficient amount of reference images

➔ Errors

- Limited variety of product database

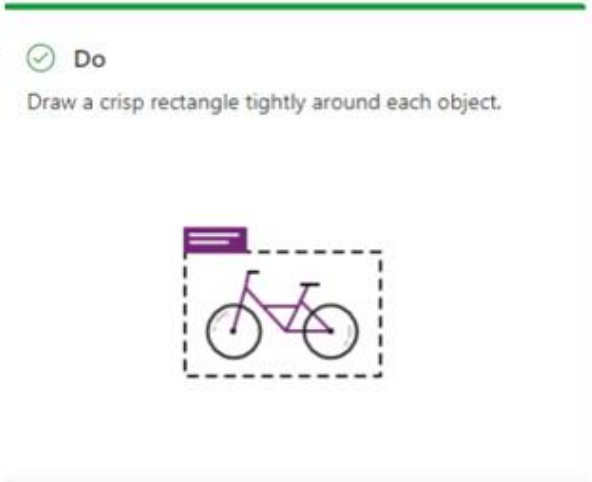
Photo Requirements

- Close up shots
- Stacked situation
- Various angles
- Bright lighting
- High resolution



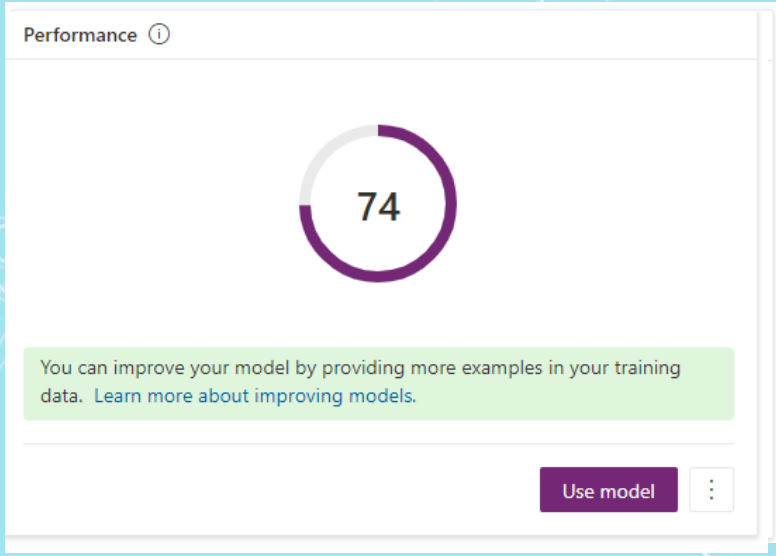
Training Process

1. Upload photos
2. Find suitable images
3. Train the computer to recognise objects
4. Quick test
5. Debug



FAULT TOLERANCE

Accuracy up to 74%



Ying Wa College F.6

Please Scan the QR-Code
for more information

NARV - Z

JOHN DEWEY

The world is moving at a tremendous rate; no one knows where. We must prepare our children not for the world of the past, not for our world, but for their world. The world of the future.

“Education is not the learning of facts, but the training of the mind to think.”

Albert Einstein
1879 - 1955