

{ PRACTICAL AI }



DALL·E 2

{ AGENDA }



1 Overview Ai

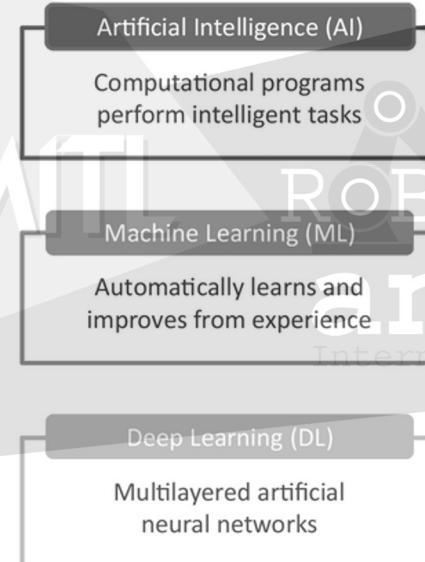
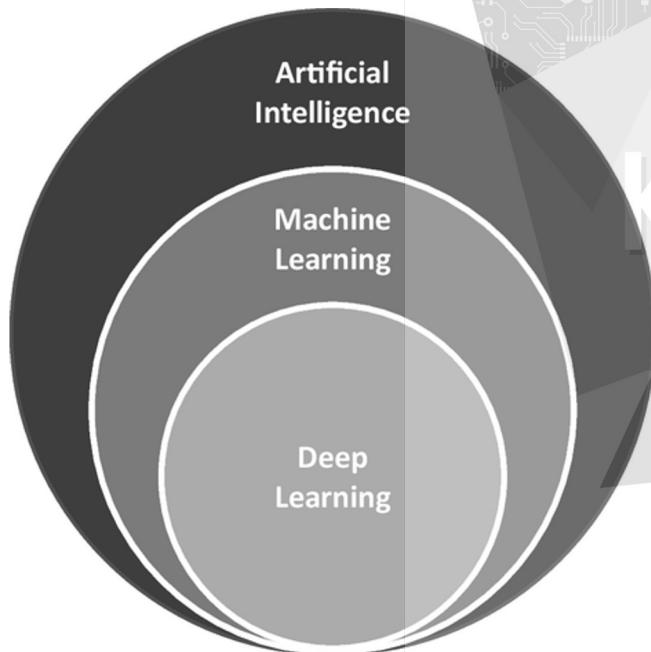
2 Roboflow

3 YOLO v8

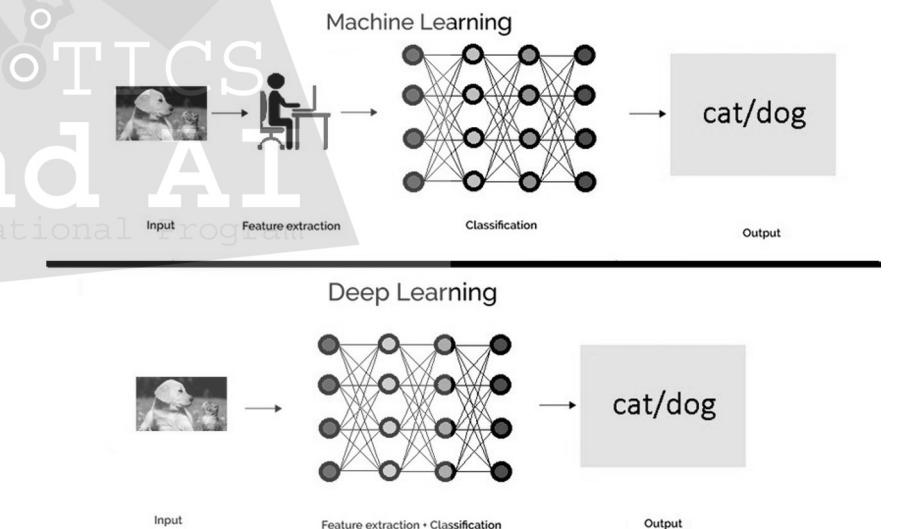
KMIL
ROBOTICS
and AI
International Program

1 Overview Ai

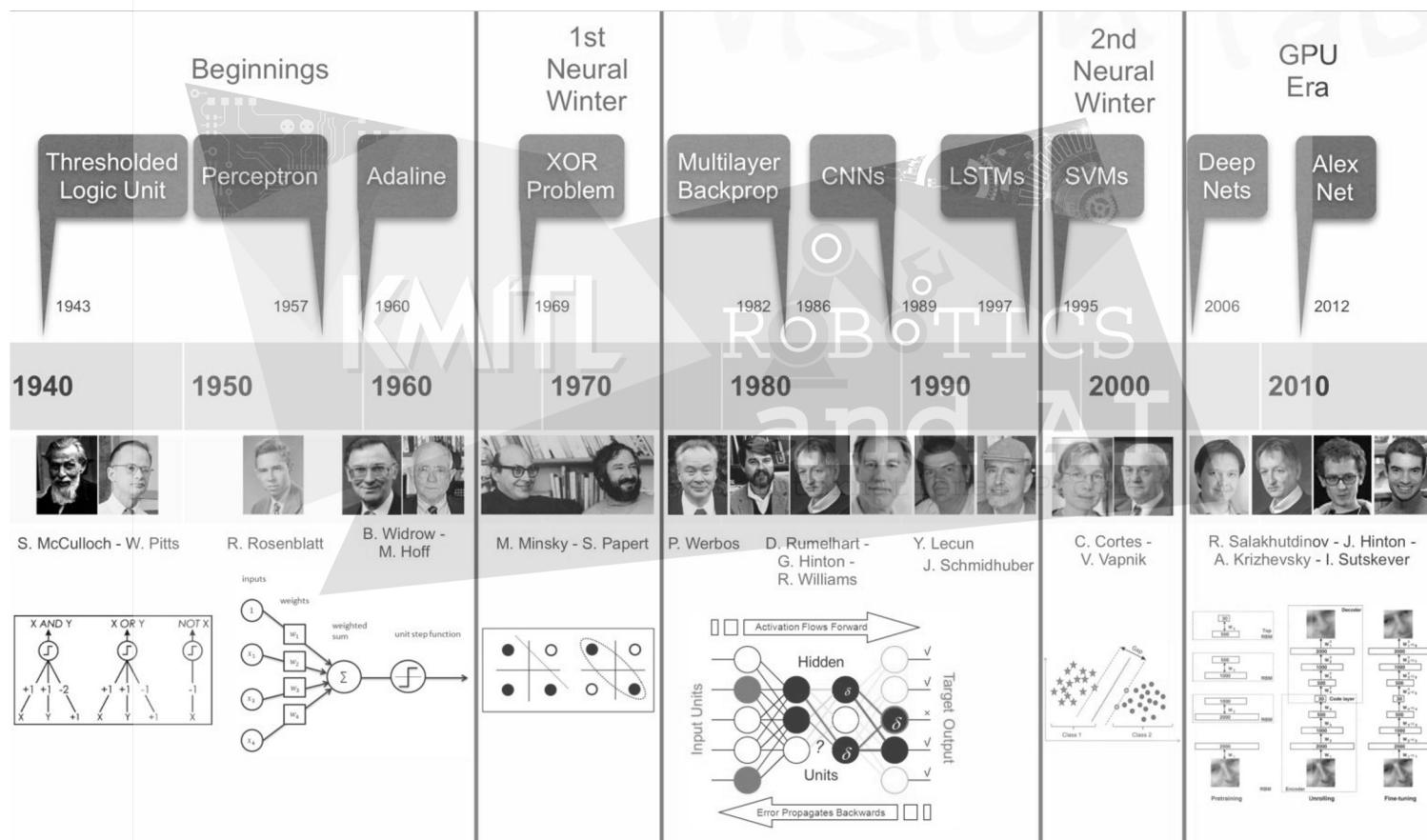
Ai คือ เทคโนโลยีที่เลียนแบบ การทำงานของมนุษย์จากการ เรียนรู้ สู่ผลการดำเนินงาน ด้วยตนเอง และใช้ให้เห็นถึง ความเข้าใจบิบที่มีความซับซ้อน สื่อสารกับมนุษย์อย่างเป็น ธรรมชาติ เสริมสร้างความสามารถ ทางด้านการรู้คิด (Cognitive Performance) ของมนุษย์หรือ ทำงานแทนมนุษย์ในงานที่ไม่เป็น กิจวัตร (Non-routine Task)



ML vs Deep Learning

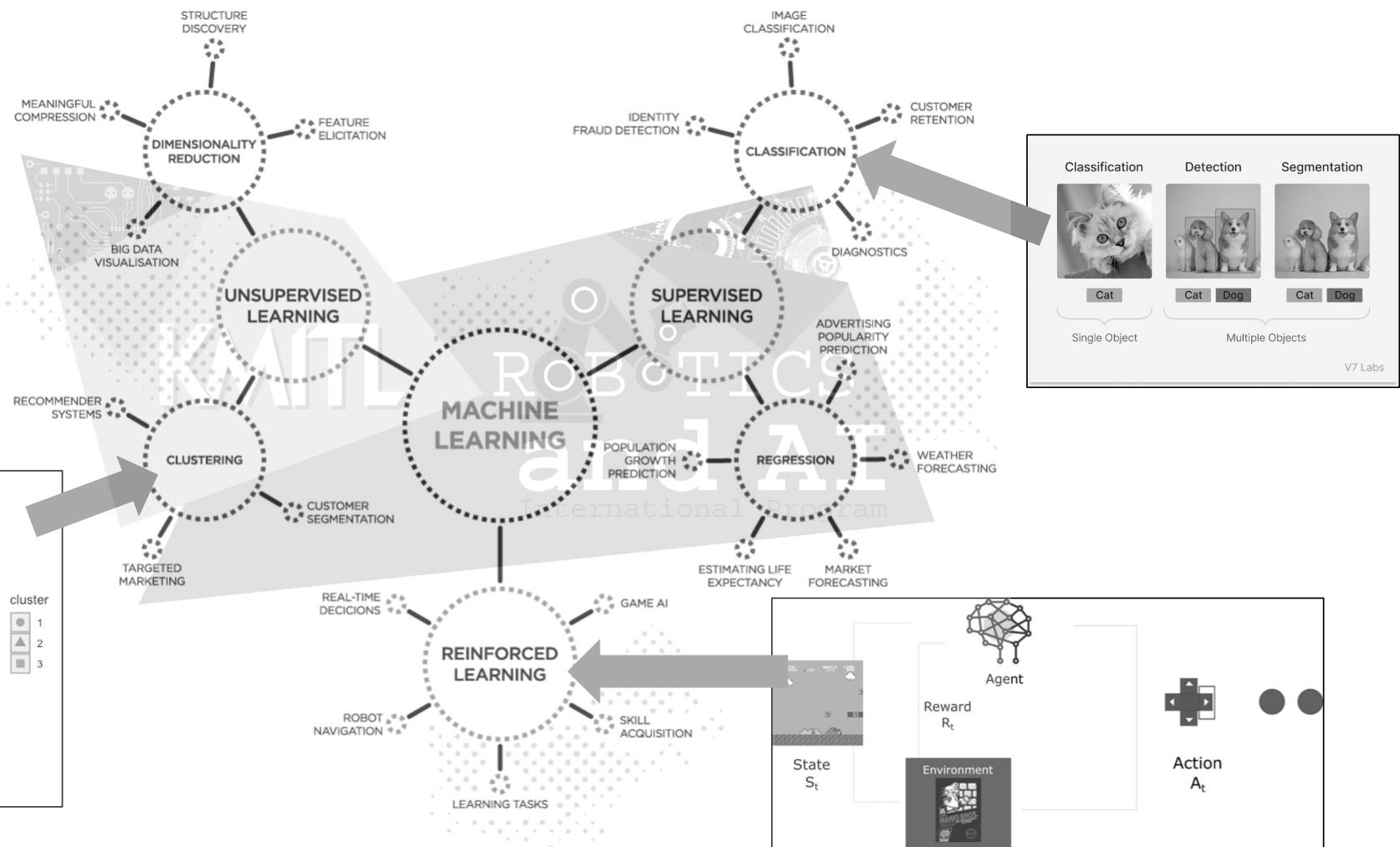
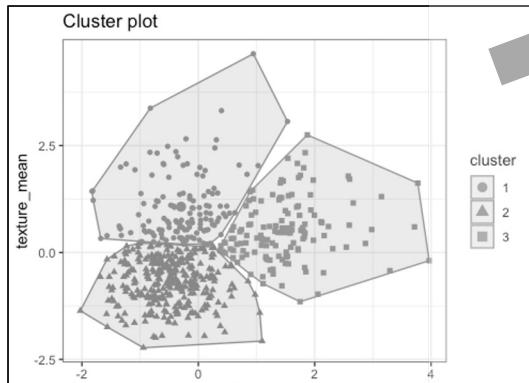


History of Artificial intelligence



Type Machine Learning

1 Overview Ai

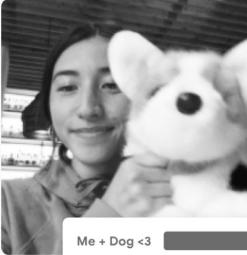


1

Overview Ai

UPGRADE Classification to Detection

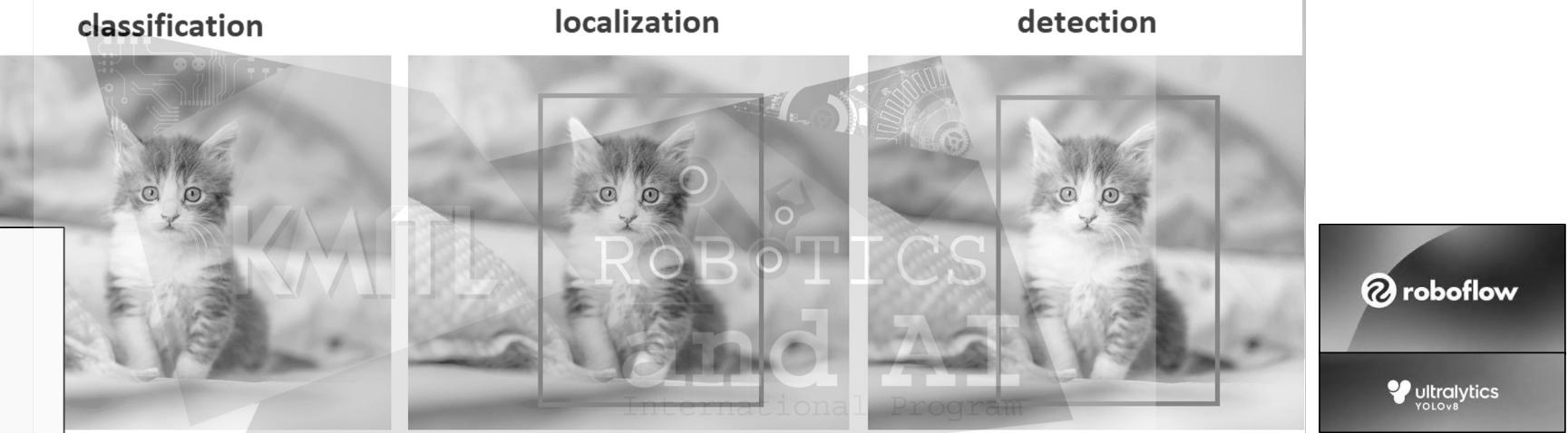
Teachable Machine



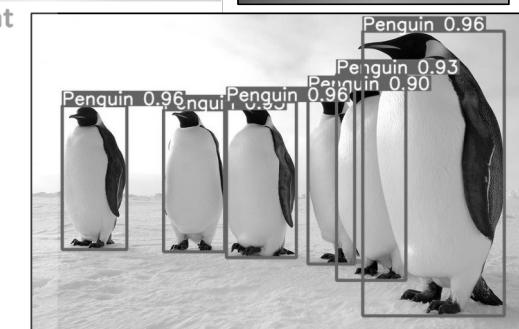
Me + Dog <3
Just Me

Images

Teach a model to classify images using files or your webcam.



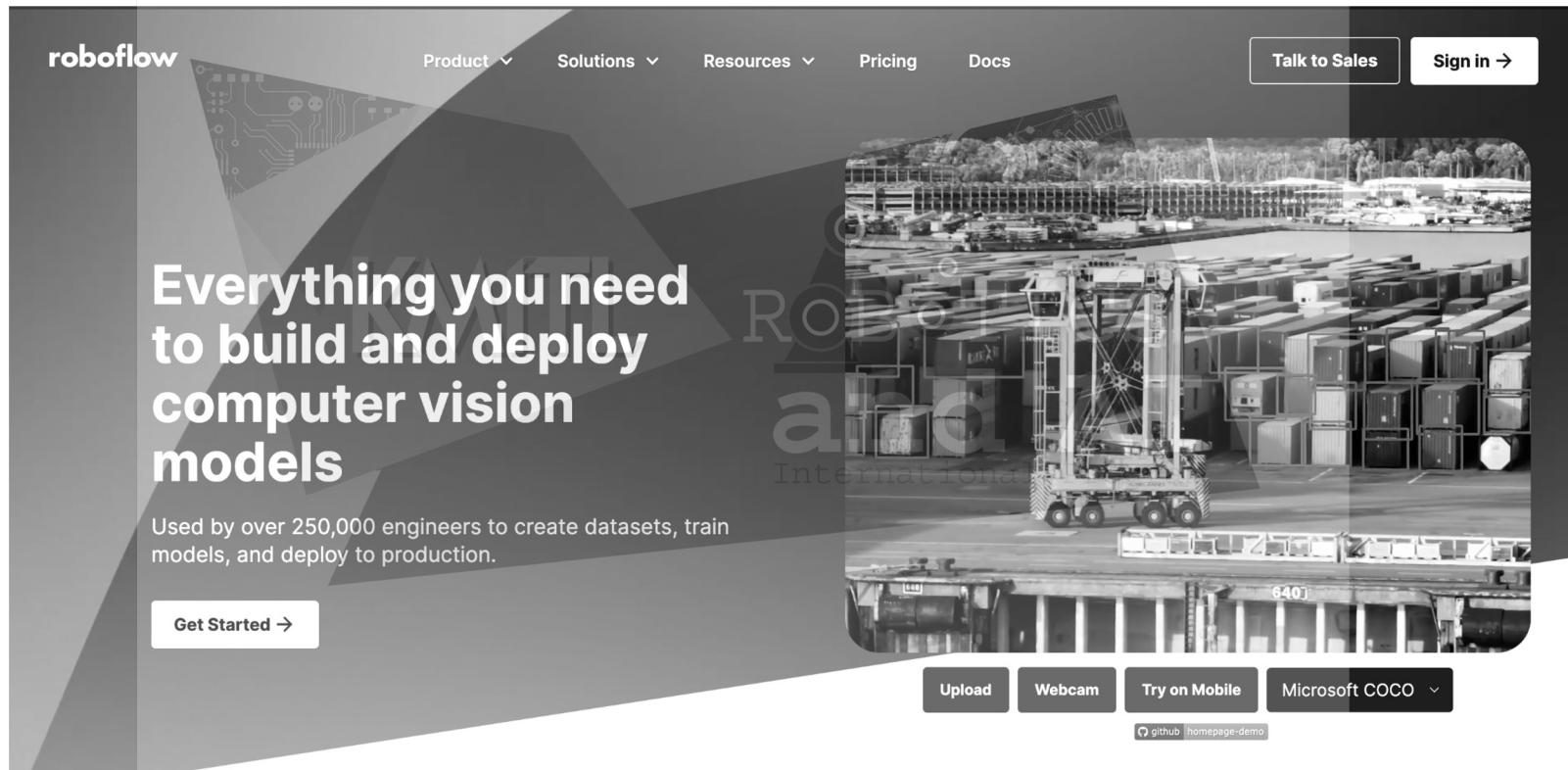
Upgrade Parameter



2

Roboflow

Roboflow with Object Detection



<https://roboflow.com/>

2

Roboflow

Process Flow



Aufnahme_2.10.01.23_.mp4-0025.jpg



d862032a-3eeebe1bc.jpg



b6b8d50f-e8051d3d.jpg



bdac566b-36F0D2AB.jpg



b8d397a1-00000000.jpg



b6ed4cda-00000000.jpg



Input Data

Create Dataset Train,Test

Project Type



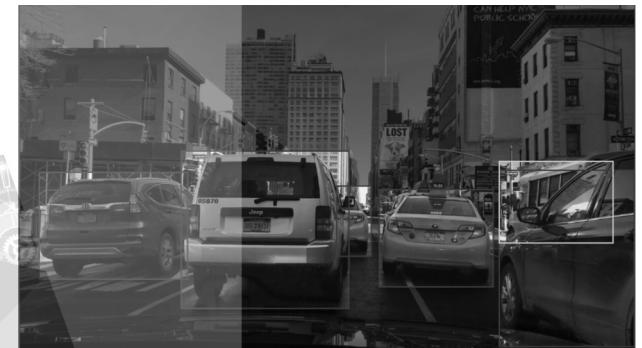
Object Detection

Identify objects and their positions with bounding boxes.

Best For

 # Counting Tracking


- Localization => Draw Bounding Box



- Label => Classification

Annotations	
Group: person-car-bus-bike	
CLASSES	LAYERS
Car	5
Bus	1
	Testing set
	Training set

Output Data

2

Roboflow

1. Download

Street Data
Sample dataset



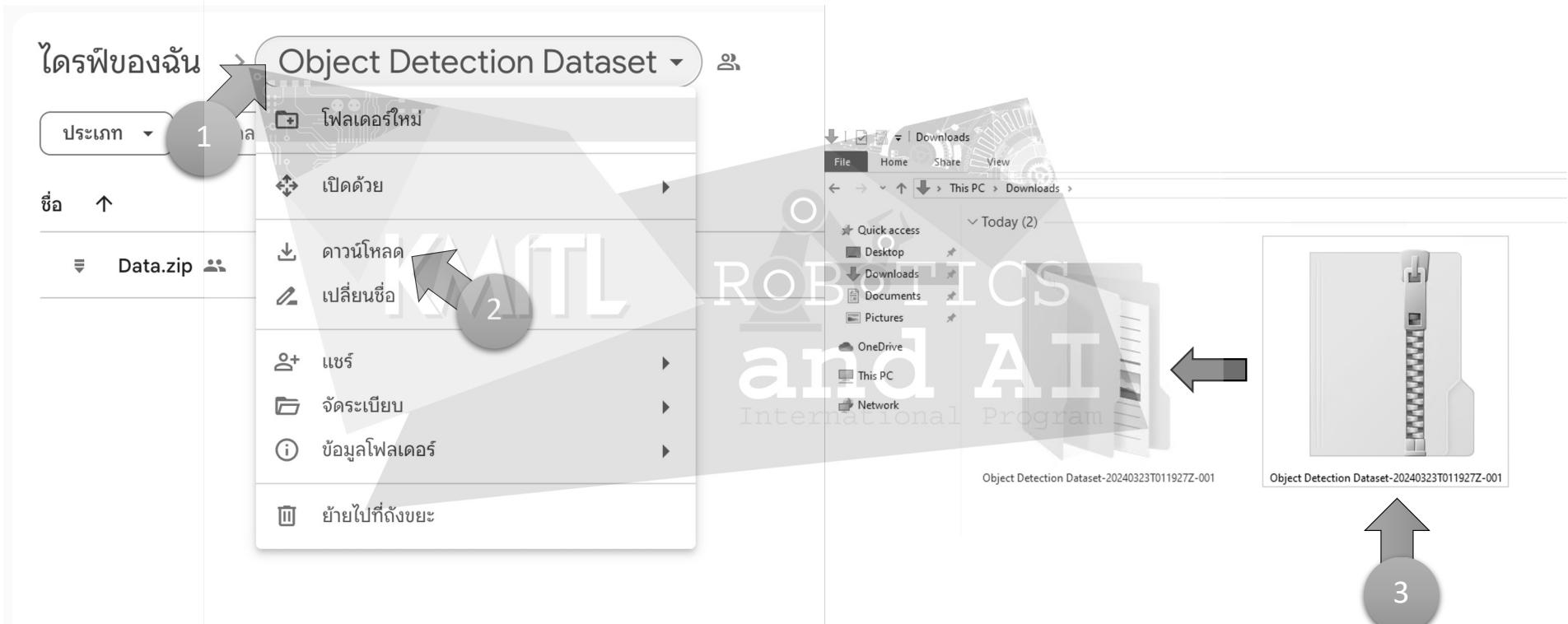
- Car
- Person
- Bus
- Bike

<https://drive.google.com/drive/folders/1vPVPy5VVI3h6pM6Muf0c3U1leWDcpmLQ?usp=sharing>

2

Roboflow

Download Data Sample



unzip

2

Roboflow

2. Sign in

Roboflow

วิธีการลงชื่อเข้าใช้ด้วย Google Account

2

Roboflow

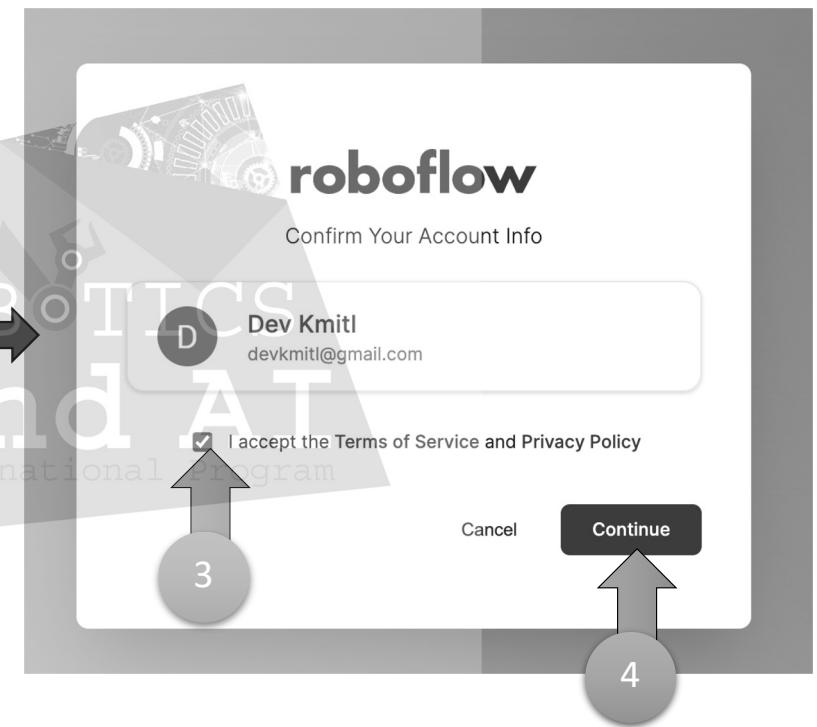
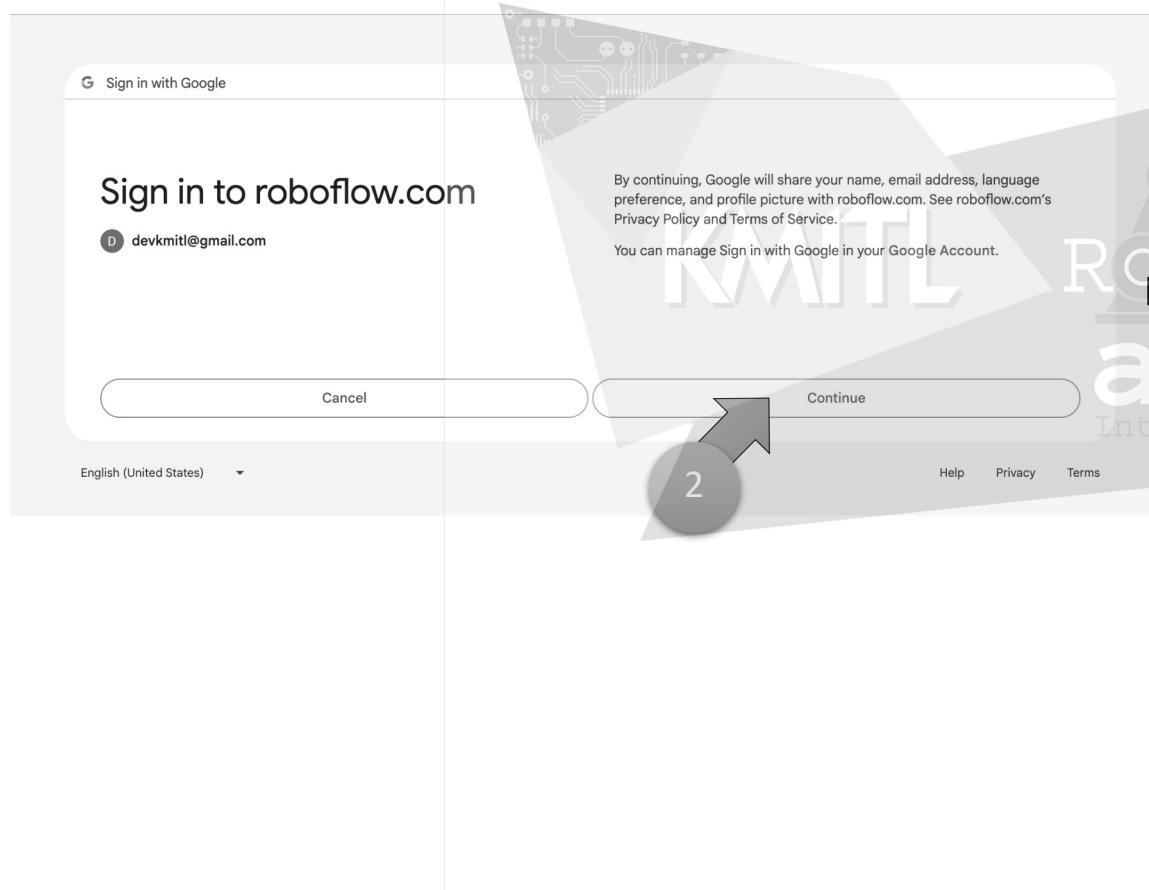
1.ขั้นตอนการสมัคร Roboflow



2

Roboflow

ลงชื่อเข้าใช้ด้วย Gmail



2

Roboflow

2.1 ขั้นตอนหลังจากสมัคร Roboflow

กรอกชื่อใน Workspace

Welcome! Let's get started.

Create your first workspace to house all of your projects and collaborate with teammates.

Name your workspace:

Choose your plan:

Public Plan For hobbyists, students, and personal use	Startups For any business
Free With public data and limited features	Free 14 Day \$249 / mo to continue
<ul style="list-style-type: none"> ⊕ Open source datasets and models on Roboflow Universe ✗ No Commercial Deployment License ✓ Model-Assisted Labeling, Image Preprocessing & Augmentations, and Dataset Health Check 	<ul style="list-style-type: none"> ⊕ Private database ✓ Commercial Deployment License ✓ Active Learning Evaluation, plus...
Public Data 3 Training Credits ⚡ 1,000 Hosted Inference API Calls	Private Database 10 Training Credits ⚡ 10,000 Hosted Inference API Calls

CEIRAVentures2024Demo

Invite teammates.

Add collaborators to help with labeling, upload data, train models, and more.

Invite Teammates via Email:

2 invites available

Role: Admin

1

2

3 กด Skip this step

Create Workspace

Back

Skip Create Workspace

2

Roboflow

3. Create Project

Roboflow

KMITL

ROBOTICS

and AI

“RAIVenture2024”

2

Roboflow

3.1 Create New Project

Let's create your project.

thanakorn kraingudom > New Private Project

Project Name

RAIVentures2024

กรอกชื่อใน Project Name

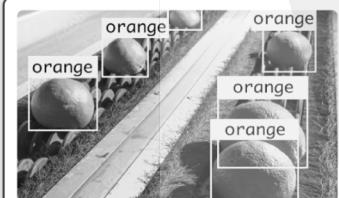
“RAIVentures2024”

Annotation Group

person-car-bus-bike

“person, car, bus, bike”

Project Type



Object Detection

Identify objects and their positions with
bounding boxes.

1



Classification

Assign labels to the entire image.

Classification Type

Multi-Label Single-Label

Best For

Filtering Content Moderation



Instance Segmentation

Detect multiple objects and their actual shape.

Best For

Measurements Odd Shapes



Keypoint Detection

Identify keypoints ("skeletons") to subjects.

Show More ↓

Cancel

Create Private Project

2

2

Roboflow

3.2 Project Setting

Now, drop your image and annotation files here, then continue the upload! (If you don't have your own data yet, try using our sample dataset.)

Drag and drop images and annotations

Select Folder

Images jpg, png, bmp Annotations in 26 formats > Video mov, mp4, avi

Save and Continue

Tags: Search or add tags for images...

Downloads

Today (2)

Object Detection Dataset-20240323T011927Z-001

1

2

Drag and Drop your folder

Drag and drop images and annotations.

Select Files Select Folder

Aufnahme_2_10_01_23_mp4-0025.jpg d862032a-3e6eb1bc.jpg b6b8d59f-e8051d3d.jpg Aufnahme_04_28_02_23_mp4-0047.jpg cf057b1d-00000000.jpg Aufnahme_1_10_01_23_mp4-0759.jpg Aufnahme_1_10_01_23_mp4-0513.jpg

2

Roboflow

3.3 Annotate

THANAKORN KRAINGUDOM

Batch Name: Folder: Data

RAIVentures20... Object Detection

Data

- Classes 0
- Upload Data
- Assign Images
- Annotate**
- Dataset 0
- Health Check
- Generate
- Versions

Models

- Visualize
- Deploy

Object Detection

How do you want to label your images?

Auto Label Free Beta

Use a large generalized model to automatically label images.

Start Auto Label

Roboflow Labeling

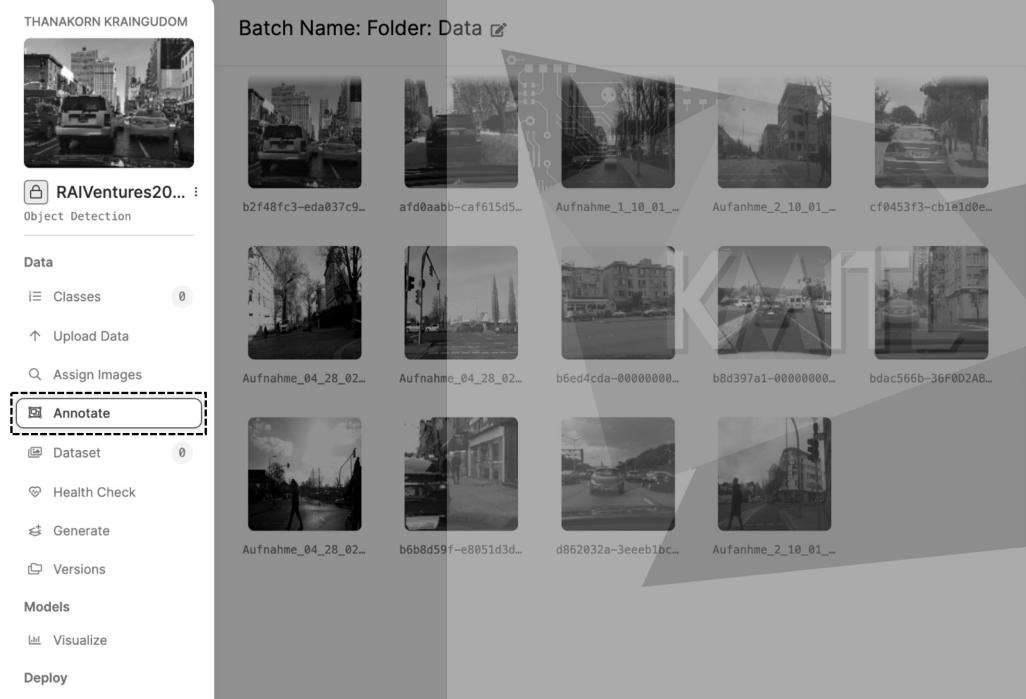
Work with a professional team of human labelers.

Start Roboflow Labeling

Manual Labeling

You and your team label your own images.

Start Manual Labeling



How do you want to label your images? x

Auto Label Free Beta

Use a large generalized model to automatically label images.

Start Auto Label

Roboflow Labeling

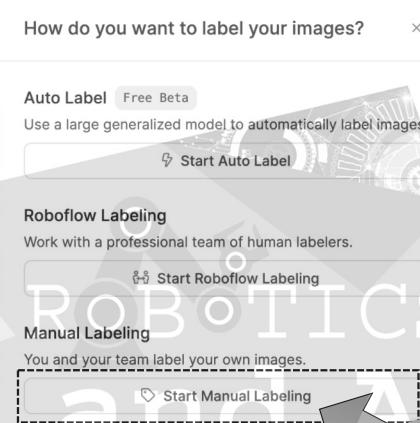
Work with a professional team of human labelers.

Start Roboflow Labeling

Manual Labeling

You and your team label your own images.

Start Manual Labeling



< Manual Labeling x

Assign Images to Teammates

Choose teammates to label images. Images will be evenly divided between selected teammates.

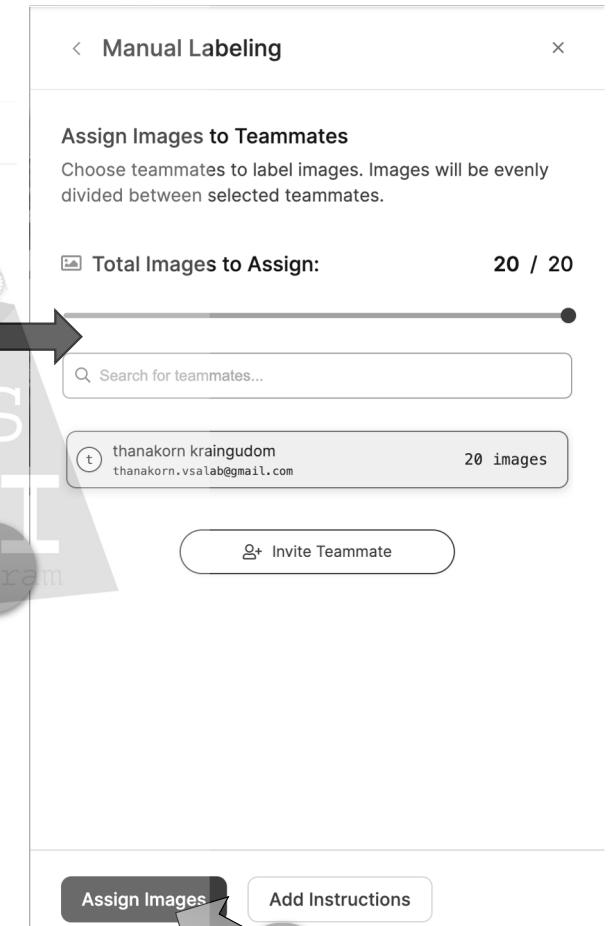
Total Images to Assign: 20 / 20

Search for teammates...

thanakorn kraingudom thanakorn.vsalab@gmail.com 20 images

Invite Teammate

Assign Images Add Instructions



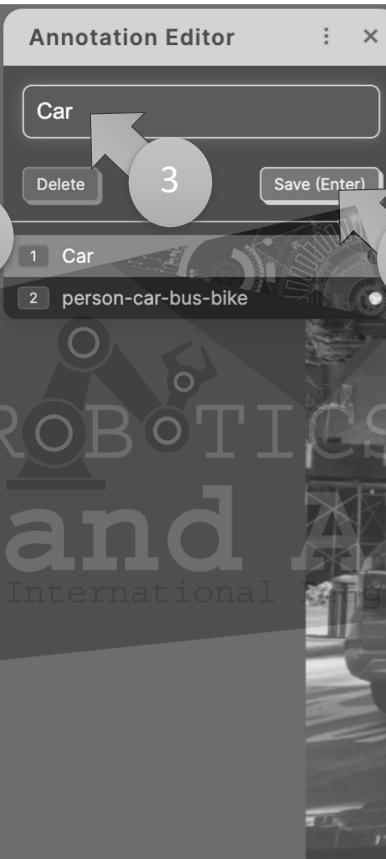
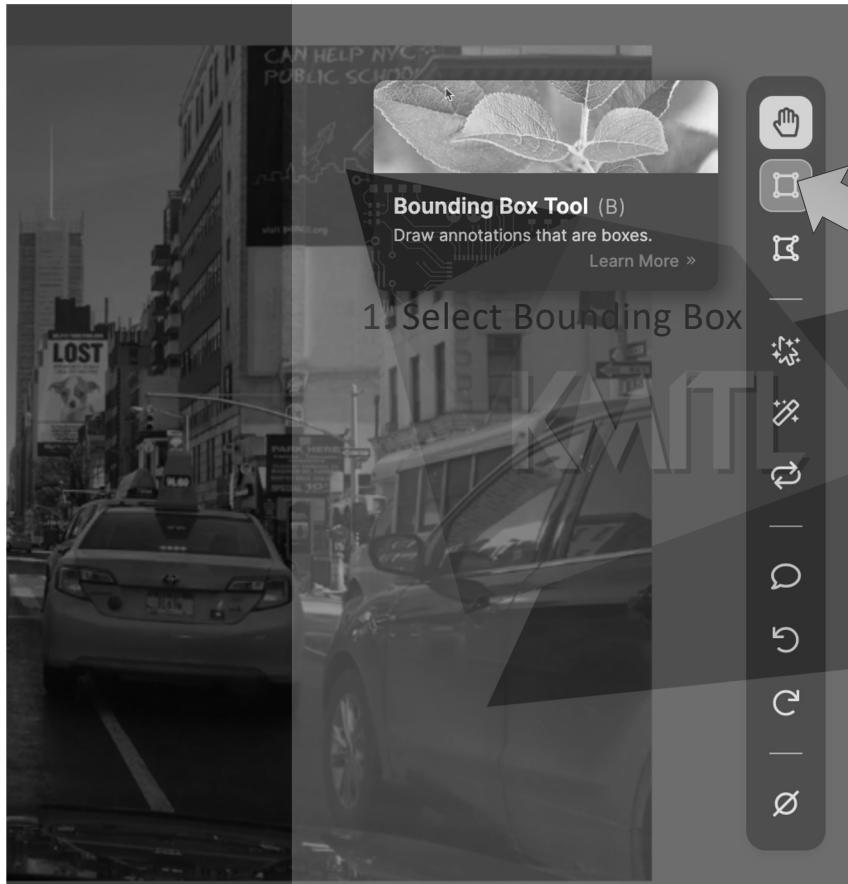
2

Assign Images

Add Instructions

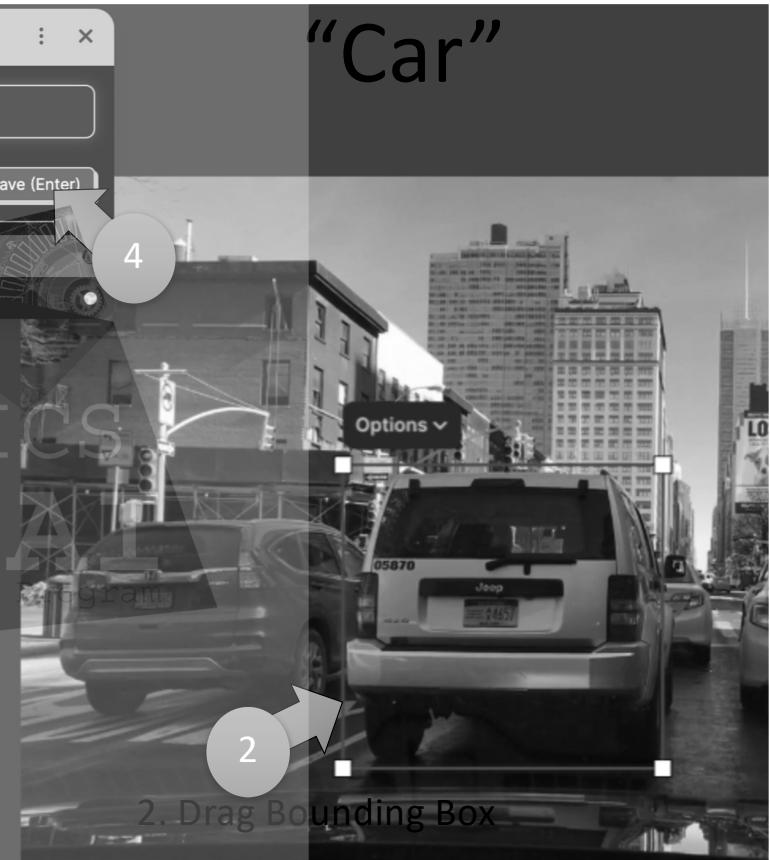
2

Roboflow



3. set class name :

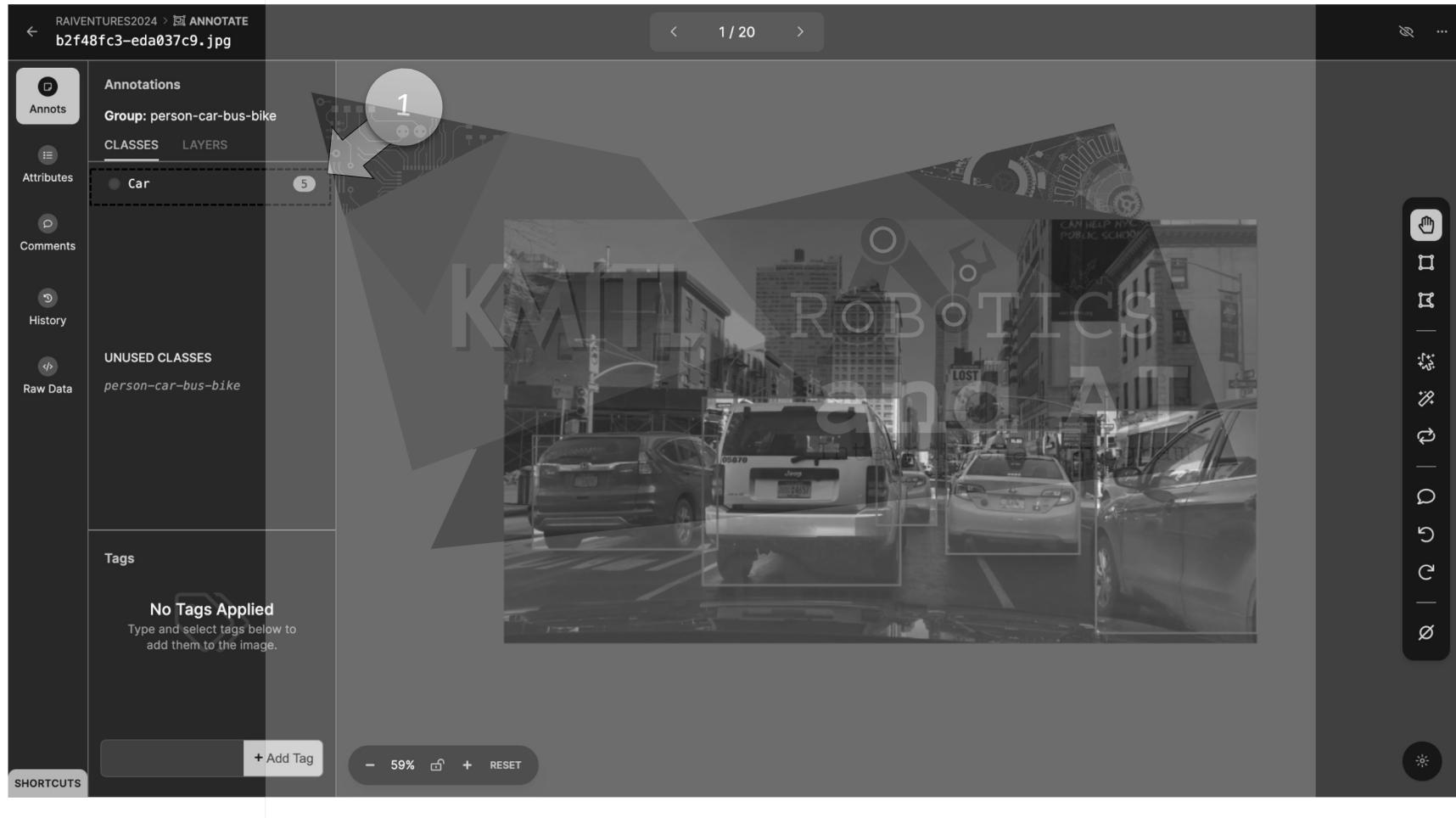
“Car”



2

Roboflow

Annotations Sample



2

Roboflow

Next new image



2

Roboflow

THANAKORN KRAINGUDOM

Folder: Data

Progress

20 Images
● 20 Annotated
○ 0 Unannotated

Instructions

No specific instructions were added when this job was assigned.

Assignment

thanakorn kraingudom Reassign Labeler

Timeline

B BlueBox Dev created this Job and assigned it to thanakorn.vsalab@gmail.com.
3/23/2024, 6:51:17 AM

Add 20 images to Dataset

1

2

Roboflow

3.4 Setting Ratio Training

Folder: Data

Progress
20 Images
• 20 Annotated
○ 0 Unannotated

Instructions
No specific instructions were added when this job was assigned

Assignment
thanakorn kraingudom Labeler

Timeline
BlueBox Dev created this Job and assigned it to thanakorn.vsalab@gmail.com.
3/23/2024, 6:51:17 AM

Unannotated 0 **Annotated** 20

Add Images To Dataset

Add 20 images to dataset

② What's Train, Valid, Test?

Method

Split Images Between Train/Valid/Test

Image Distribution

Train 70%	Valid 20%	Test 10%
---------------------	---------------------	--------------------

Train: 14 images
Valid: 4 images
Test: 2 images

You are about to add 20 images to the dataset
0 images will be sent back as part of a new job

Add Images

2

Roboflow

THANAKORN KRAINGUDOM

RAIVentures20... Object Detection

Data

- Classes 5
- Upload Data
- Assign Images
- Annotate**
- Dataset 20
- Health Check
- Generate
- Versions

Models

- Visualize

Deploy

- Upgrade

Annotate

Unassigned 0 Batches

Upload More Images

Annotating 0 Jobs

Upload and assign images to an annotator.

Review

Enable role-based access control to access labeler roles and annotation reviews. Learn more

Enable Review Mode

Dataset 1 Job

See all 0 images

Folder: Data
Labeler: thanakorn kraingudom
20 Images

+ Create New Version

1

2

Roboflow

THANAKORN KRAINGUDOM



RAIVentures20... :

Object Detection

Data

Classes 5

Upload Data

Assign Images

Annotate

Dataset 20

Health Check

Generate

Versions

Models

Visualize

Deploy

RAIVentures2024 Dataset

Create New Version

VERSIONS

To train a model, you must first create a new version of your dataset.

Choose your dataset settings to get started.

Creating New Version

Prepare your images and data for training by compiling them into a version. Experiment with different configurations to achieve better training results.

Source Images

Images: 20
Classes: 5
Unannotated: 0

Train/Test Split

Training Set: 14 images
Validation Set: 4 images
Testing Set: 2 images

Preprocessing

① What can preprocessing do?

Decrease training time and increase performance by applying image transformations to all images in this dataset.

Auto-Orient

Resize
Stretch to 640x640

+ Add Preprocessing Step

Continue

Augmentation

Create

1

2

3

4

5

Creating New Version

Prepare your images and data for training by compiling them into a version. Experiment with different configurations to achieve better training results.

Source Images

Images: 20
Classes: 5
Unannotated: 0

Train/Test Split

Training Set: 14 images
Validation Set: 4 images
Testing Set: 2 images

Preprocessing

Auto-Orient: Applied
Resize: Stretch to 640x640

Augmentation

Turned Off

Create

Review your selections then click "Create" to create a moment-in-time snapshot of your dataset with the applied preprocessing steps.

Maximum Version Size: 20
[See how this is calculated >](#)

Create

2

Roboflow

3.5 Export Dataset

THANAKORN KRAINGUDOM

RAIVentures2024 Image Dataset

1 **Export Dataset**

2 **Versions**

Create New Version

VERSIONS

2024-03-23 8:02am
v1 Mar 23, 2024

v1 2024-03-23 8:02am Generated on Mar 23, 2024

This version doesn't have a model.

Train an optimized, state of the art model with Roboflow or upload a custom trained model to use features like Label Assist and Model Evaluation and deployment options like our auto-scaling API and edge device support.

Train with Roboflow Custom Train and Upload

Available Credits: 3

20 Total Images

View All Images →

Dataset Split

TRAIN SET	70%
14 Images	

VALID SET	20%
4 Images	

TEST SET	10%
2 Images	

2

Roboflow

RAIVentures2024 Image Dataset

VERSIONS

2024-03-23 8:02am v1 Mar 23, 2024

Export

Format: YOLOv8

TX annotations and YAML config used with YOLOv8.

download zip to computer show download code

Cancel Continue

is PC > Downloads

Today (3)

Object Detection Dataset-20240323T011927Z-001 Object Detection Dataset-20240323T011927Z-001

Success RAIventures2024.v1.yolov8

โจทย์

2

Roboflow

สร้าง Annotation บน Roboflow
ด้วยรูปภาพที่มี 1-3 ชนิด จำนวน 20 ภาพ



* สำหรับใช้เทรนโมเดลในครั้งถัดไป

3

YOLO v8

How to open Colab Yolo V8 from GitHub and AI

International Program



DOWNLOAD THE APP



GET IT ON
Google Play

Download on the
App Store

What YoloV8 ?

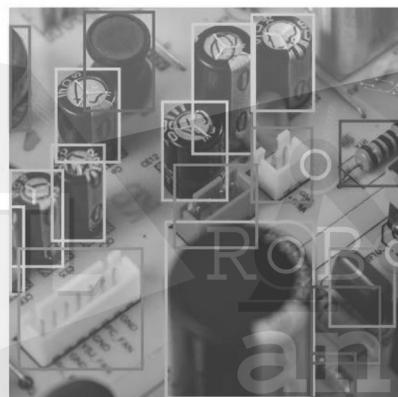
YOLO: You Only Look Once

Classification



Capacitor

Object Detection



Capacitor, Resistor, Transformer,
Connector, Inductor, Polyester Capacitor

Segmentation



Capacitor, Resistor, Transformer,
Connector, Inductor, Polyester Capacitor

Introducing **YOLOv8** the latest version of the acclaimed real-time object detection and image segmentation model.

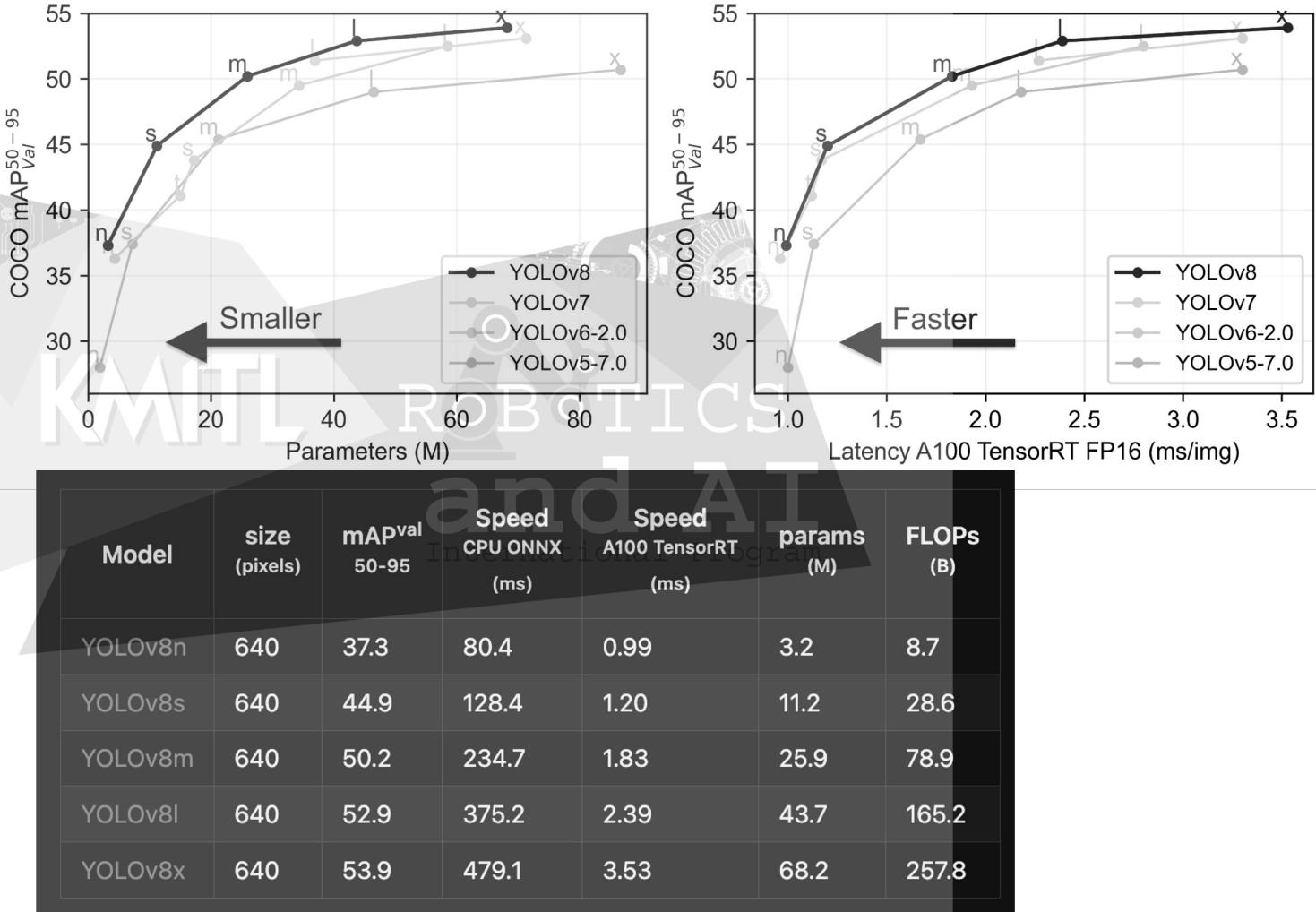
YOLOv8 is built on cutting-edge advancements in deep learning and computer vision, offering unparalleled performance in terms of speed and accuracy.

Its streamlined design makes it suitable for various applications and easily adaptable to different hardware platforms, from edge devices to cloud APIs.

Why YoloV8 ?

Comparison of Performance Model Object Detection Performance by Yolo All Models

3 YOLO v8



3

YOLO v8

IoU (Intersection over union)



 Ground truth
 Prediction

$$IoU = \frac{\text{area of overlap}}{\text{area of union}}$$

Overlap

Union

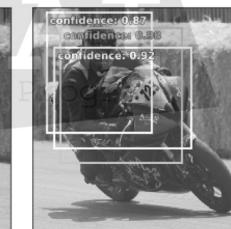
KMITL
ROBOTICS

For each class...

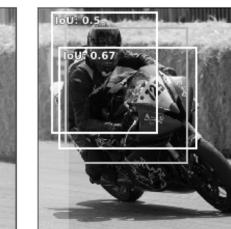
Repeat with next highest confidence prediction until no more boxes are being suppressed



After filtering out low confidence predictions, we may still be left with **redundant detections**



Select the bounding box prediction with the **highest confidence**



Calculate the IoU between the **selected box** and all remaining predictions



Remove any boxes which have an IoU score above some defined threshold

Overview Flow



3

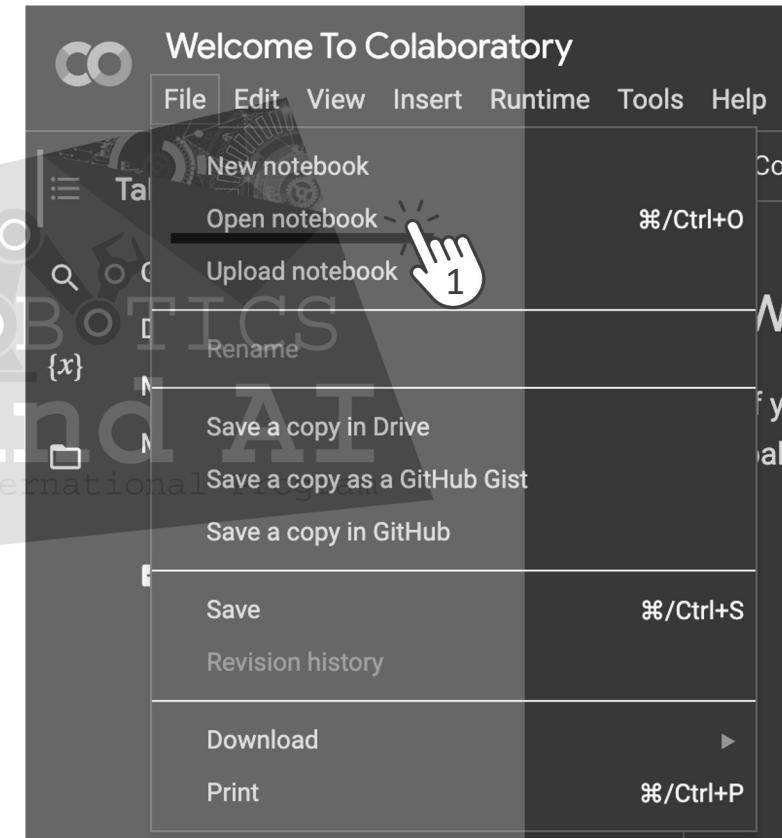
YOLO v8

1. ขั้นตอนเปิด Project Colab จาก GitHub



เข้าเว็บไซต์ Colab

<https://colab.research.google.com/>



3

YOLO v8

หลังจากเลือก Open notebook จะปรากฏหน้าต่างแบบนี้ขึ้นมา



คลิก 2 ครั้ง เพื่อเข้าสู่ Project YoloV8.ipynb

<https://github.com/bluebox-dev/Workshop-YoloV8.git>

3

YOLO v8

หลังจากเลือก YoloV8.ipynb จะปรากฏหน้าต่างแบบนี้ขึ้นมา

The screenshot shows a Google Colab notebook titled "YoloV8.ipynb". The title bar includes "File Edit View Insert Runtime Tools Help" and "Copy to Drive". The main content area is titled "ตรวจสอบไฟล์จะมี 5 Step ตามภาพที่ปรากฏ". It lists five steps:

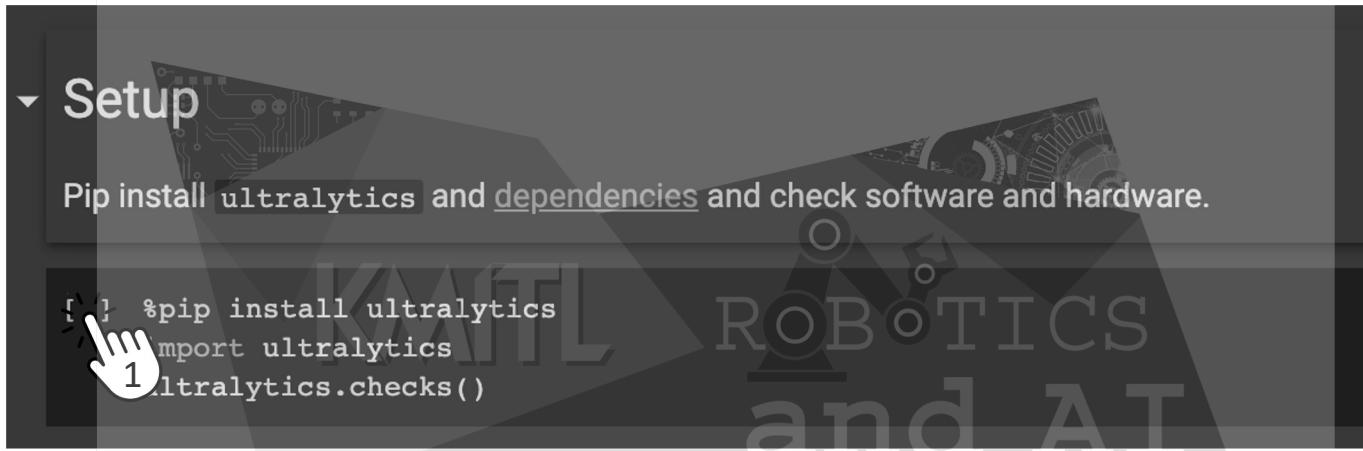
- Setup: Pip install ultralytics and dependencies and check software and hardware.
- 1. Predict (Test Setup Yolo v8): YOLOv8 may be used directly in the Command Line Interface (CLI) with a `yolo` command for a variety of tasks and modes and accepts additional arguments, i.e. `imgs=640`. See a full list of available `yolo` arguments and other details in the YOLOv8 Predict Docs.
- 2. Add Data Roboflow
- 3. Train Data Roboflow
- 4. Test Model Training
- 5. Export to Model

Each step has a "1 cell hidden" indicator next to it. The background of the Colab interface features a watermark with the text "ROBOTICS and AI International Program".

3

YOLO v8

2. ขั้นตอนการติดตั้ง Library YoloV8

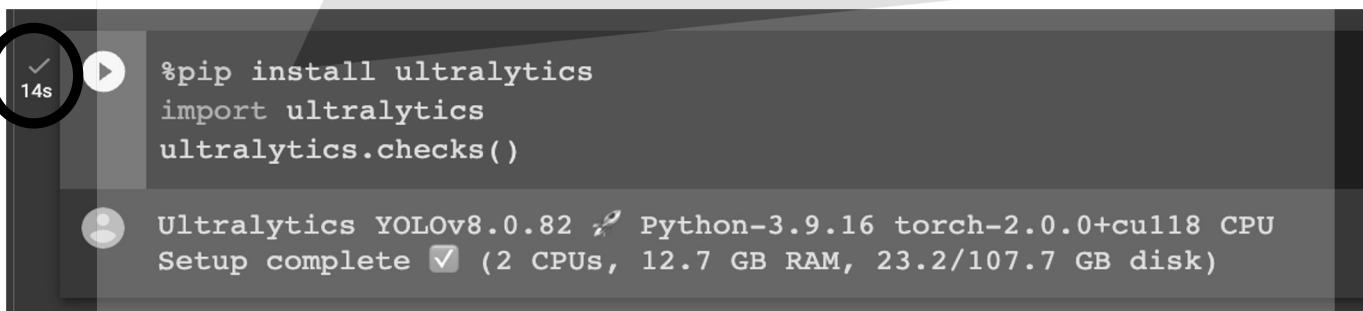


Setup

Pip install ultralytics and dependencies and check software and hardware.

```
%pip install ultralytics  
import ultralytics  
ultralytics.checks()
```

หลังกดให้รอเครื่องหมายตีกถูก



14s

%pip install ultralytics
import ultralytics
ultralytics.checks()

Ultralytics YOLOv8.0.82 Python-3.9.16 torch-2.0.0+cu118 CPU
Setup complete (2 CPUs, 12.7 GB RAM, 23.2/107.7 GB disk)

3. ขั้นตอนตรวจสอบการติดตั้ง Library YoloV8

▼ 1. Predict (Test Setup Yolo v8)

YOLOv8 may be used directly in the Command Line Interface (CLI) with a `yolo` command for a variety of tasks and modes and accepts additional arguments, i.e. `imgsz=640`. See a full list of available `yolo` arguments and other details in the [YOLOv8 Predict Docs](#).

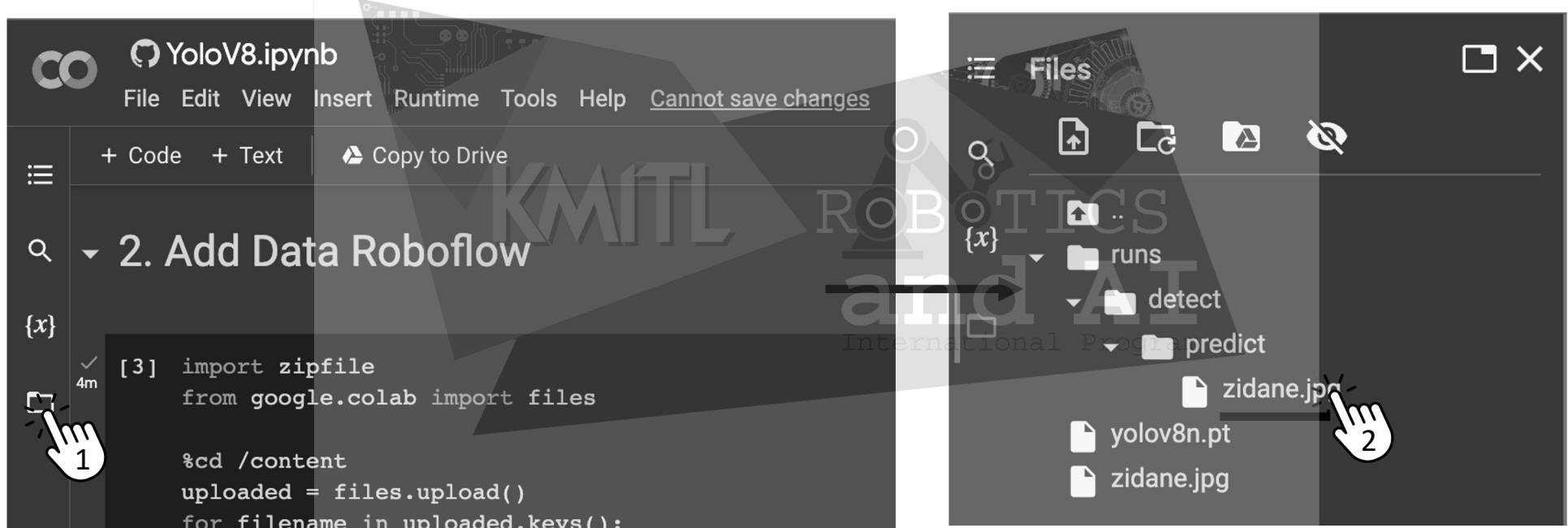
```
✓ 1 # Run inference on an image with YOLOv8n
yolo predict model=yolov8n.pt source='https://ultralytics.com/images/zidane.jpg'
13s
Downloaded https://github.com/ultralytics/assets/releases/download/v0.0.0/yolov8n.pt to yolov8n.pt...
100% 6.23M/6.23M [00:00<00:00, 67.0MB/s]
Ultralytics YOLOv8.0.82 ✨ Python-3.9.16 torch-2.0.0+cu118 CPU
YOLOv8n summary (fused): 168 layers, 3151904 parameters, 0 gradients, 18.7 GFLOPs

Downloaded https://ultralytics.com/images/zidane.jpg to zidane.jpg...
100% 165k/165k [00:00<00:00, 6.11MB/s]
image 1/1 /content/zidane.jpg: 384x640 2 persons, 1 tie, 236.3ms
Speed: 2.0ms preprocess, 236.3ms inference, 29.0ms postprocess per image at shape (1, 3, 640, 640)
Results saved to runs/detect/predict ที่อยู่ของไฟล์รูปที่ Predict แล้ว
```

3

YOLO v8

วิธีการตรวจสอบผลลัพธ์ Prediction หลังการติดตั้ง



3

YOLO v8

ผลลัพธ์ Prediction ของรูปตัวอย่าง Zidane



3

YOLO v8

4. ขั้นตอนนำข้อมูลที่ทำไว้จาก Roboflow มาใส่

ไฟล์ที่นำเข้าจะเป็น .Zip ที่ได้จาก Export



2. Add Data Roboflow

```
1 import zipfile  
from google.colab import files  
%cd /content  
uploaded = files.upload()  
for filename in uploaded.keys():  
    pass International Program  
  
zip_ref = zipfile.ZipFile(filename, 'r')  
zip_ref.extractall("/content/")
```

/content
Choose Files No file chosen Cancel upload

2

3

YOLO v8

วิธีการตรวจสอบไฟล์ที่นำเข้ามาจาก Roboflow

The image shows a Jupyter Notebook interface on the left and a file browser window on the right.

Jupyter Notebook (Left):

- Title: YoloV8.ipynb
- File menu: File, Edit, View, Insert, Runtime, Tools, Help
- Message: Cannot save changes
- Code cell 1 (highlighted with a hand cursor):

```
[ 3] import zipfile  
      from google.colab import files  
  
      %cd /content  
      uploaded = files.upload()  
      for filename in uploaded.keys():
```

File Browser (Right):

- Title: ต้องมีไฟล์ดังนี้
- Buttons: Files, Search, Copy, Paste, Refresh, Close
- Content:
 - {x}
 - runs
 - test
 - train
 - valid
 - README.dataset.txt
 - README.roboflow.txt
 - data.yaml
 - data_roboflow.zip
 - yolov8n.pt
 - zidane.jpg

5. ขั้นตอนทำการฝึกสอน Model Yolo V8

ผลลัพธ์หลังกด 1

3. Train Data Roboflow

```
# Validate YOLOv8n
yolo train model=yolov8n.pt data=data.yaml epochs=200 imgs=640
```

163 epochs completed in 1.223 hours.
Optimizer stripped from runs/detect/train/weights/last.pt, 6.2MB
Optimizer stripped from runs/detect/train/weights/best.pt, 6.2MB

Validating runs/detect/train/weights/best.pt...
Ultralytics YOLOv8.0.82 Python-3.9.16 torch-2.0.0+cu118 CPU
Model summary (fused): 168 layers, 3006818 parameters, 0 gradients, 8.1 GFLOPs

Class	Images	Instances	Box(P)	R	mAP50	mAP50-95
all	8	116	0.925	0.94	0.973	0.614
blue	8	32	0.997	1	0.995	0.643
brown	8	8	1	0.779	0.995	0.593
green	8	6	0.824	1	0.901	0.681
red	8	24	0.943	1	0.995	0.638
white	8	9	0.863	0.889	0.963	0.531
yellow	8	37	0.923	0.973	0.991	0.598

Speed: 2.0ms preprocess, 222.4ms inference, 0.0ms loss, 74.1ms postprocess per image
Results saved to runs/detect/train ที่อยู่ของไฟล์ Model ที่ฝึกสอนเสร็จแล้ว

3

YOLO v8

6. ขั้นตอนทดสอบการฝึกสอน Model Yolo V8

4. Test Model Training

```
!yolo detect predict model=/content/runs/detect/train/weights/best.pt source='/content/test/images/IMG_8760.JPG.jpg.rf.cc2a55dd53109ebd8433fa93dee34113.jpg'  
Ultralytics YOLOv8.0.82 ✨ Python-3.9.16 torch-2.0.0+cu118 CPU  
Model summary (fused): 168 layers, 3006818 parameters, 0 gradients, 8.1 GFLOPS  
image 1/1 /content/test/images/IMG_8760.JPG.jpg.rf.cc2a55dd53109ebd8433fa93dee34113.jpg: 640x640 4 blues, 1 brown, 1 green, 3 reds, 1 white, 7 yellows, 277.2ms  
Speed: 9.7ms preprocess, 277.2ms inference, 2.7ms postprocess per image at shape (1, 3, 640, 640)  
Results saved to runs/detect/predict2
```

การใช้ command สามารถปรับค่าของการตรวจจับได้ โดยใช้ command ดังนี้
imgsz=640 conf=0.25

4. Test Model Training

```
[6] !yolo detect predict imgsz=640 conf=0.25 model=/content/runs/detect/train/weights/best.pt source='/content/test/images/IMG_8760.JPG.jpg.rf.cc2a55dd53109ebd8433fa93dee34113.jpg'  
Ultralytics YOLOv8.0.83 ✨ Python-3.9.16 torch-2.0.0+cu118 CUDA:0 (Tesla T4, 15102MiB)  
Model summary (fused): 168 layers, 3006818 parameters, 0 gradients, 8.1 GFLOPs  
image 1/1 /content/test/images/IMG_8760.JPG.jpg.rf.cc2a55dd53109ebd8433fa93dee34113.jpg: 640x640 4 blues, 1 brown, 1 green, 3 reds, 1 white, 5 yellows, 8.6ms  
Speed: 0.7ms preprocess, 8.6ms inference, 83.2ms postprocess per image at shape (1, 3, 640, 640)  
Results saved to runs/detect/predict3
```

3

YOLO v8

4. Test Model Training

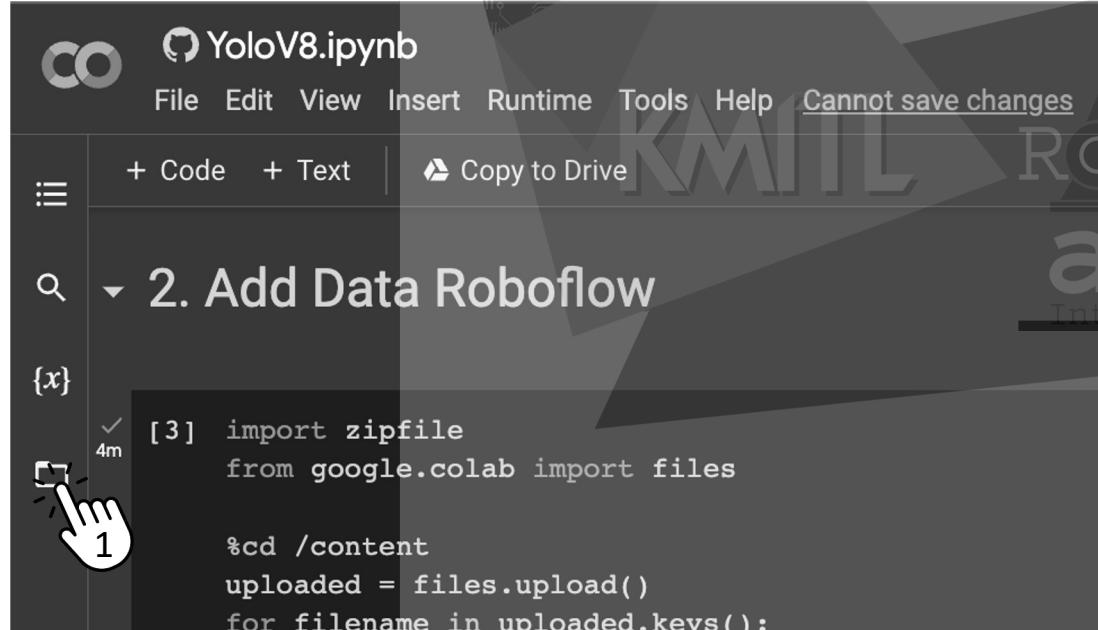
```
[6] !yolo detect predict imgs=640 conf=0.25 model=/content/runs/detect/train/weights/best.pt source='/content/test/images/IMG_8760.JPG.jpg.rf.cc2a55dd53109ebd8433f' 8s  
Ultralytics YOLOv8.0.83 ✨ Python-3.9.16 torch-2.0.0+cull18 CUDA:0 (Tesla T4, 15102MiB)  
Model summary (fused): 168 layers, 3006818 parameters, 0 gradients, 8.1 GFLOPs  
  
image 1/1 /content/test/images/IMG_8760.JPG.jpg.rf.cc2a55dd53109ebd8433fa93dee34113.jpg: 640x640 4 blues, 1 brown, 1 green, 3 reds, 1 white, 5 yellows, 8.6ms  
Speed: 0.7ms preprocess, 8.6ms inference, 83.2ms postprocess per image at shape (1, 3, 640, 640)  
Results saved to runs/detect/predict3
```

model คือไฟล์ Model ที่สร้างขึ้นเป็นไฟล์ best.pt ซึ่งสามารถนำไปใช้งานต่อได้
imgs=640 คือรูปที่นำมาจะทำการปรับ scale เป็น 640x640
conf=0.25 คือ ค่าที่ระบุความแม่นยำในการแสดงผลว่าต้องมีค่ามากกว่า 0.25
ตัวอย่างเป็น 0.25 ดังนั้น ภาพที่ออกมา 0.54 จะแสดงผลได้ว่าวัตถุ
source คือ ข้อมูลที่จะสามารถนำเข้ามาประมวลผลได้

3

YOLO v8

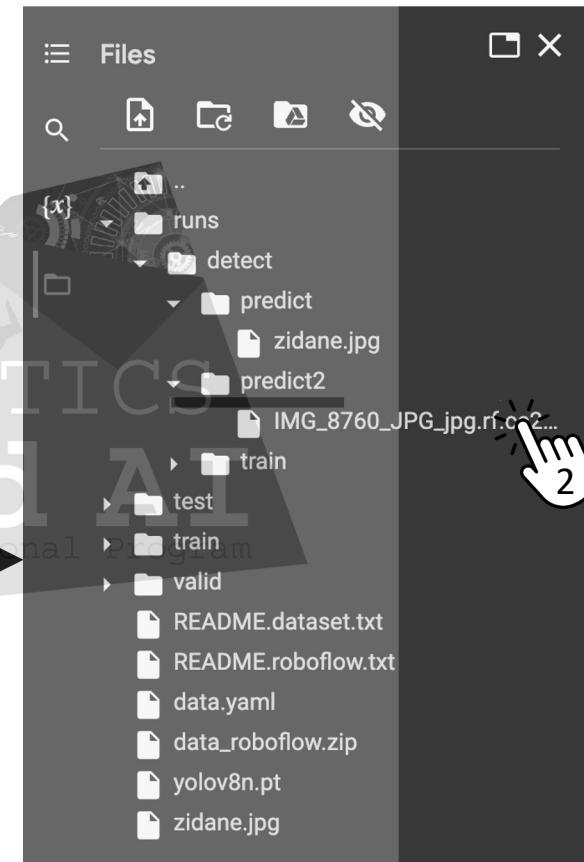
วิธีการตรวจสอบผลลัพธ์ Prediction



The screenshot shows a Jupyter Notebook interface with the following details:

- Title:** YoloV8.ipynb
- Toolbar:** File, Edit, View, Insert, Runtime, Tools, Help, Cannot save changes
- Code Cell:** [3] import zipfile
from google.colab import files

%cd /content
uploaded = files.upload()
for filename in uploaded.keys():



3

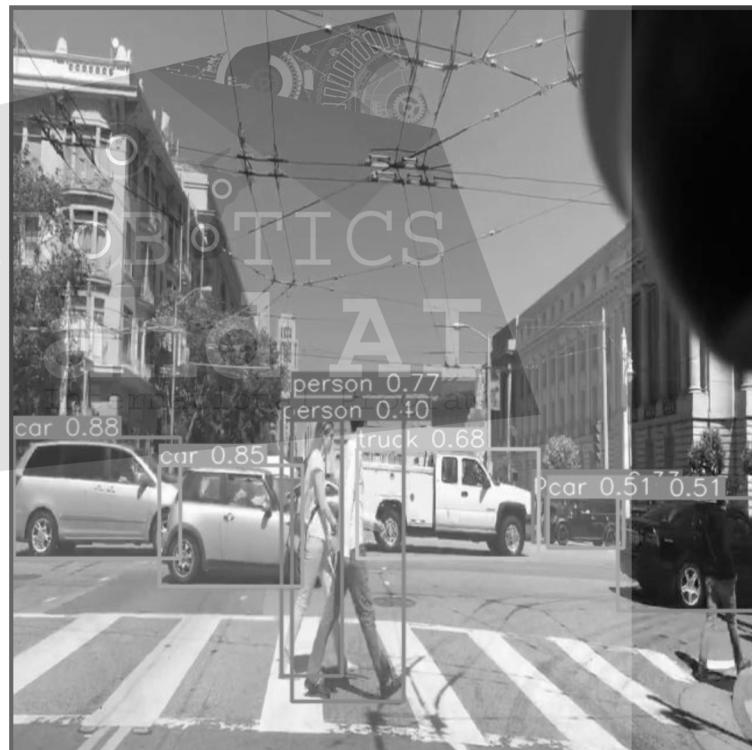
YOLO v8

ผลลัพธ์ Prediction ของรูปตัวอย่างจาก Data Test

Before



After



หากต้องการนำไปใช้ที่อื่นสามารถ Export File Model ได้

5. Export to Model

Export a YOLOv8 model to any supported format below with the `format` argument, i.e. `format=onnx`. See [YOLOv8 Export Docs](#) for more information.

- ProTip: Export to [ONNX](#) or [OpenVINO](#) for up to 3x CPU speedup.
- ProTip: Export to [TensorRT](#) for up to 5x GPU speedup.

Format	<code>format=</code>	Model
PyTorch	-	yolov8n.pt
TorchScript	<code>torchscript</code>	yolov8n_torchscript
ONNX	<code>onnx</code>	yolov8n.onnx
OpenVINO	<code>openvino</code>	yolov8n_openvino_model/
TensorRT	<code>engine</code>	yolov8n.engine
CoreML	<code>coreml</code>	yolov8n.mlmodel
TensorFlow SavedModel	<code>saved_model</code>	yolov8n_saved_model/
TensorFlow GraphDef	<code>pb</code>	yolov8n.pb
TensorFlow Lite	<code>tflite</code>	yolov8n.tflite
TensorFlow Edge TPU	<code>edgetpu</code>	yolov8n_edgetpu.tflite
TensorFlow.js	<code>tfjs</code>	yolov8n_web_model/
PaddlePaddle	<code>paddle</code>	yolov8n_paddle_model/

```
[ ] !yolo export model=/content/runs/detect/train/weights/best.pt format=pb
```

การบ้าน

จำแนกเครื่องแต่งกายจากข้อมูลดังต่อไปนี้โดยใช้ Yolo v8

Class (กลุ่มข้อมูล): https://drive.google.com/file/d/1wROMOoX1P_bwnr2PAIP4_b7WzP_i4d9/view?usp=sharing

1. Sunglass
2. Hat
3. Jacket
4. Shirt
5. Pants
6. Shorts
7. Skirt
8. Dress
9. Bag
10. Shoe

