

Lab09

Object Detection with YOLOv7

Dataset: <https://reurl.cc/NyeQlx>

Outline

安裝CUDA

安裝cuDNN

安裝pytorch

安裝yolo-v7

訓練自己的yolo-v7模型

Lab09

安裝CUDA

CUDA Toolkit 11.8 Downloads

Select Target Platform

Click on the green buttons that describe your target platform. Only supported platforms will be shown. By downloading and using the software, you agree to fully comply with the terms and conditions of the [CUDA EULA](#).

Operating System

[Linux](#)[Windows](#)

Architecture

[x86_64](#)

Version

[10](#)[11](#)[Server 2016](#)[Server 2019](#)[Server 2022](#)

Installer Type

[exe \(local\)](#)[exe \(network\)](#)

Download Installer for Windows 11 x86_64

The base installer is available for download below.

[> Base Installer](#)[Download \(3.0 GB\)](#)

Installation Instructions:

1. Double click cuda_11.8.0_522.06_windows.exe
2. Follow on-screen prompts

這邊安裝
cuda11.8

[CUDA下載連結](#)

前面都一直點下一步或繼續

到安裝選項這邊點**自訂(進階選項)**



只要勾第一個CUDA

*Display Driver的部分，如果新版本大於目前的版本的話也要打勾



這邊記好安裝的路徑



這邊打勾並按NEXT開始安裝



NVIDIA CUDA

版本 11.8



✓ 系統檢查

✓ 授權協議書

✓ 選項

✓ 安裝

完成

「NVIDIA 安裝程式」已完成

| 元件 | 版本 | 狀態 |
|----------------------|------|-----|
| Occupancy Calculator | 11.8 | 已安裝 |
| CUFFT Development | 11.8 | 已安裝 |
| Demo Suite | 11.8 | 已安裝 |
| NVJPEG Runtime | 11.8 | 已安裝 |
| CUDA Profiler API | 11.8 | 已安裝 |
| nvcc | 11.8 | 已安裝 |
| NVIDIA Driver | 11.8 | 已安裝 |

關閉(C)

開啟終端機輸入

nvcc -V

nvidia-smi

確認第一個紅框的部分是你剛剛安裝的版本

且第二個紅框的數字大於等於第一個紅框

```
C:\Users\covis223b>nvcc -V
nvcc: NVIDIA (R) Cuda compiler driver
Copyright (c) 2005-2022 NVIDIA Corporation
Built on Wed_Sep_21_10:41:10_Pacific_Daylight_Time_2022
Cuda compilation tools, release 11.8 V11.8.89
Build cuda_11.8.r11.8/compiler.31833905_0
```

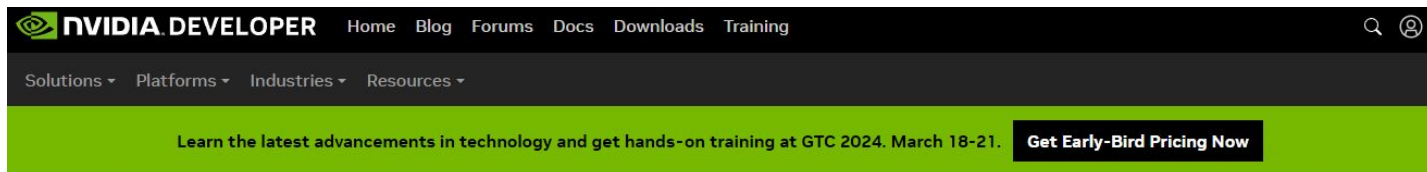
```
C:\Users\covis223b>nvidia-smi
Mon Nov 20 15:58:59 2023
```

| NVIDIA-SMI 526.47 | | | | Driver Version: 526.47 | | CUDA Version: 12.0 | |
|-------------------|--------------------|----------|------------------|------------------------|----------|--------------------|--------|
| GPU | Name | TCC/WDDM | Bus-Id | Disp.A | Volatile | Uncorr. ECC | |
| Fan | Temp | Perf | Pwr:Usage/Cap | Memory-Usage | GPU-Util | Compute M. | MIG M. |
| 0 | NVIDIA GeForce ... | WDDM | 00000000:08:00.0 | On | | | N/A |
| 46% | 31C | P8 | N/A / 75W | 484MiB / 4096MiB | 0% | Default | N/A |

安裝cuDNN

安裝CUDNN

點擊Download cuDNN Library(需要登入NVIDIA會員才能下載)



NVIDIA cuDNN

The NVIDIA CUDA® Deep Neural Network library (cuDNN) is a GPU-accelerated library of primitives for deep neural networks. cuDNN provides highly tuned implementations for standard routines such as forward and backward convolution, attention, matmul, pooling, and normalization.

[Download cuDNN Library](#)[Download cuDNN Frontend](#)[View Documentation](#)

依照剛剛安裝的CUDA版本 本以及作業系統選擇

cuDNN Download

NVIDIA cuDNN is a GPU-accelerated library of primitives for deep neural networks.

☒ I Agree To the Terms of the [cuDNN Software License Agreement](#)

Note: Please refer to the [Installation Guide](#) for release prerequisites, including supported GPU architectures and compute capabilities, before downloading.

For more information, refer to the cuDNN Developer Guide, Installation Guide and Release Notes on the [Deep Learning SDK Documentation](#) web page.

Download cuDNN v8.9.6 (November 1st, 2023), for CUDA 12.x

Download cuDNN v8.9.6 (November 1st, 2023), for **CUDA 11.x**

Local Installers for Windows and Linux, Ubuntu(x86_64, armsbsa)

[Local Installer for Windows \(Zip\)](#)

[Local Installer for Linux x86_64 \(Tar\)](#)

[Local Installer for Linux PPC \(Tar\)](#)

[Local Installer for Linux SBSA \(Tar\)](#)

[Local Installer for Debian 11 \(Deb\)](#)

[Local Installer for Ubuntu18.04 x86_64 \(Deb\)](#)

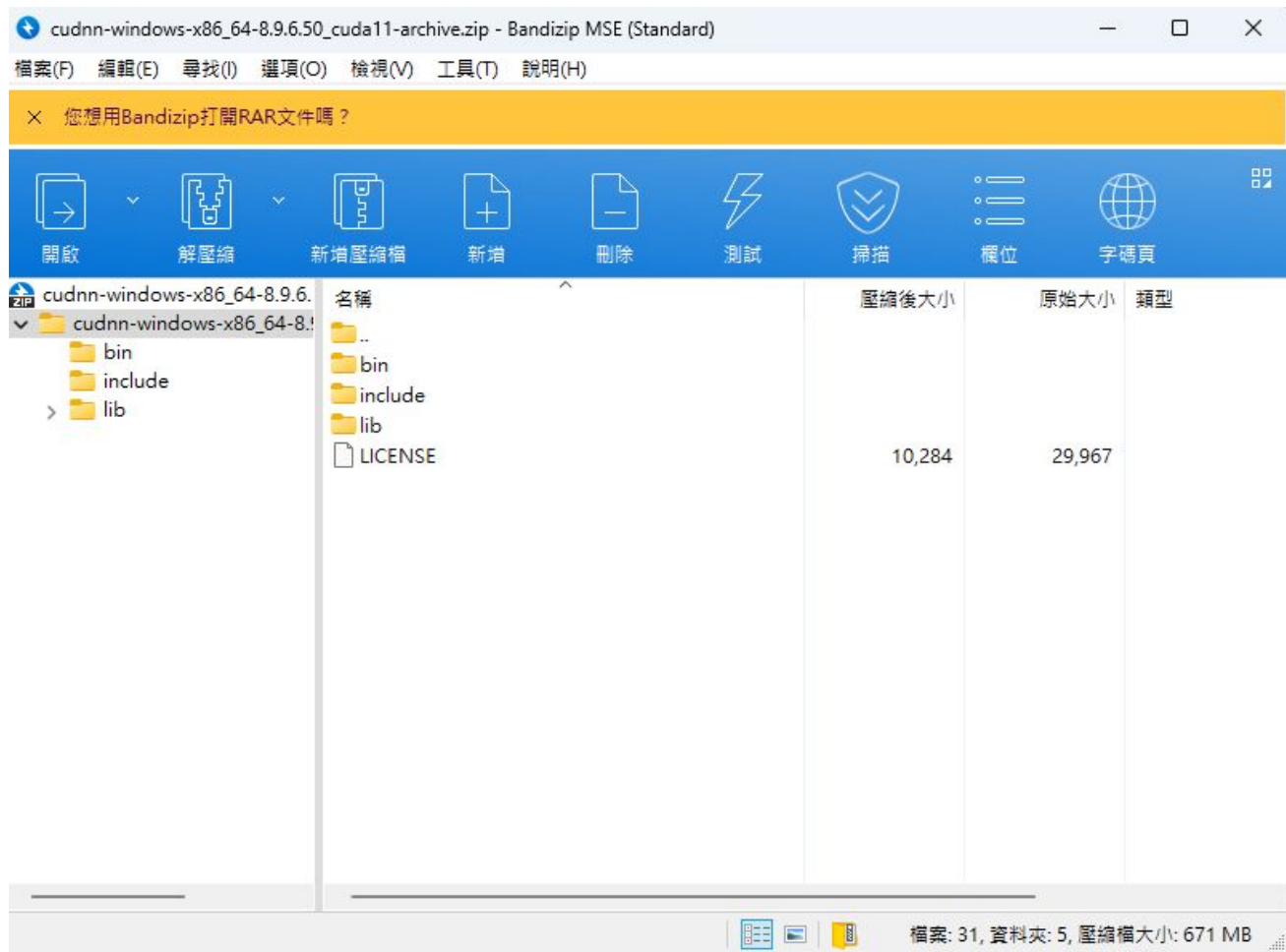
[Local Installer for Ubuntu20.04 x86_64 \(Deb\)](#)

[Local Installer for Ubuntu22.04 x86_64 \(Deb\)](#)

[Local Installer for Ubuntu20.04 aarch64sbsa \(Deb\)](#)

[Local Installer for Ubuntu22.04 aarch64sbsa \(Deb\)](#)

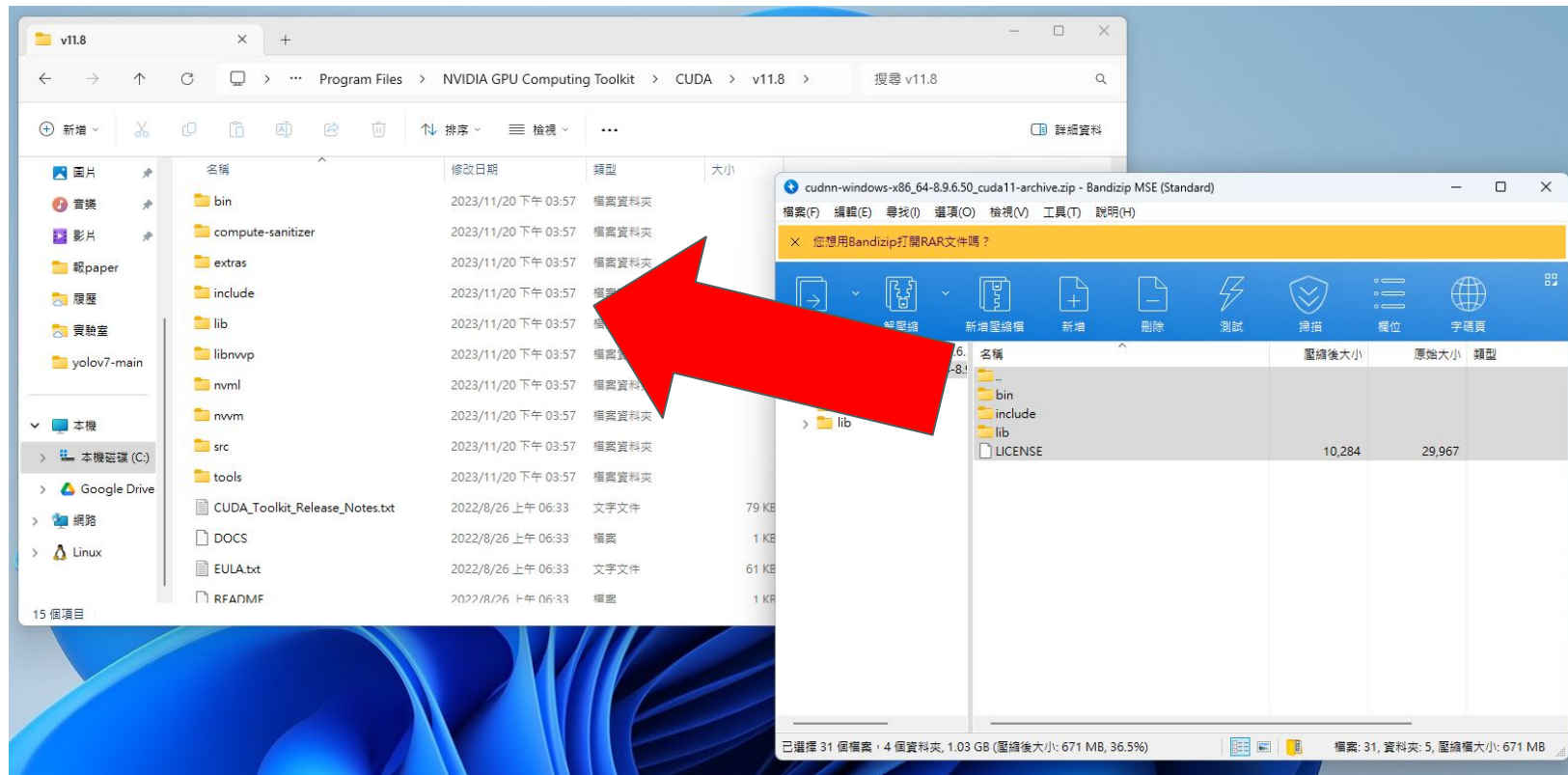
下載完長這樣



找到你前面安裝CUDA的路徑, 預設安裝路徑:

C:\Program Files\NVIDIA GPU Computing Toolkit\CUDA\v11.8

將壓縮包內所有檔案丟進去覆蓋



安裝Pytorch GPU版本

下載Pytorch

在你的conda環境輸入指令:

```
pip install torch torchvision torchaudio --index-url  
https://download.pytorch.org/whl/cu118
```

| | | | | |
|-------------------|--|-----------|-------------------|--------|
| PyTorch Build | Stable (2.1.1) | | Preview (Nightly) | |
| Your OS | Linux | Mac | Windows | |
| Package | Conda | Pip | LibTorch | Source |
| Language | Python | | C++ / Java | |
| Compute Platform | CUDA 11.8 | CUDA 12.1 | ROCm 5.6 | CPU |
| Run this Command: | <pre>pip3 install torch torchvision torchaudio --index-url https://download.pytorch. org/whl/cu118</pre> | | | |

NOTE: PyTorch LTS has been deprecated. For more information, see [this blog](#).

輸入pip list確認是否安裝成功

*最後面要有+cuXXX才是GPU版本的

```
torch                2.1.1+cu118
torchaudio           2.1.1+cu118
torchvision          0.16.1+cu118
```

開啟python確認輸出結果是否一樣

```
import torch
```


```
torch.cuda.is_available()
```




```
torch.zeros((3,3), device="cuda")
```

```
(uav) C:\Users\covis223b>python
Python 3.9.18 (main, Sep 11 2023, 14:09:
Type "help", "copyright", "credits" or "
>>> import torch
>>> torch.cuda.is_available()
True
>>> torch.zeros((3,3), device="cuda")
tensor([[0., 0., 0.],
        [0., 0., 0.],
        [0., 0., 0.]], device='cuda:0')
```


安裝yolo-v7

下載yolo-v7

 **yolov7** Public

 Watch 107  Fork 3.7k  Star 11.7k

main 9 branches 1 tag Go to file Add file <> Code

 **WongKinYiu** Update README.md

cfg

main code

data

Added param loss_ota for hyp

deploy/triton-inference-server

Update README.md (#850)

figure

Add files via upload

inference/images

Support dynamic batch for Ten

models

main code

paper

main code

scripts

main code

tools

updated Reparameterization w

utils

utils/loss.py minor bug fix (#1344)

.gitignore

update gitignore (#461)

LICENSE.md

Create LICENSE.md

README.md

Update README.md

Local

Codespaces

Clone

HTTPS SSH GitHub CLI

https://github.com/WongKinYiu/yolov7.git

Use Git or checkout with SVN using the web URL.

Open with GitHub Desktop

Download ZIP

Code 55% faster with AI pair programming.

Start my free trial Don't show again

About

Implementation of paper - YOLOv7:
Trainable bag-of-freebies sets new state-
of-the-art for real-time object detectors

pytorch

darknet

yolov3

yolov4

scaled-yolov4

yolor

yolov7

Readme

GPL-3.0 license

Activity

11.7k stars

107 watching

3.7k forks

Report repository

Releases

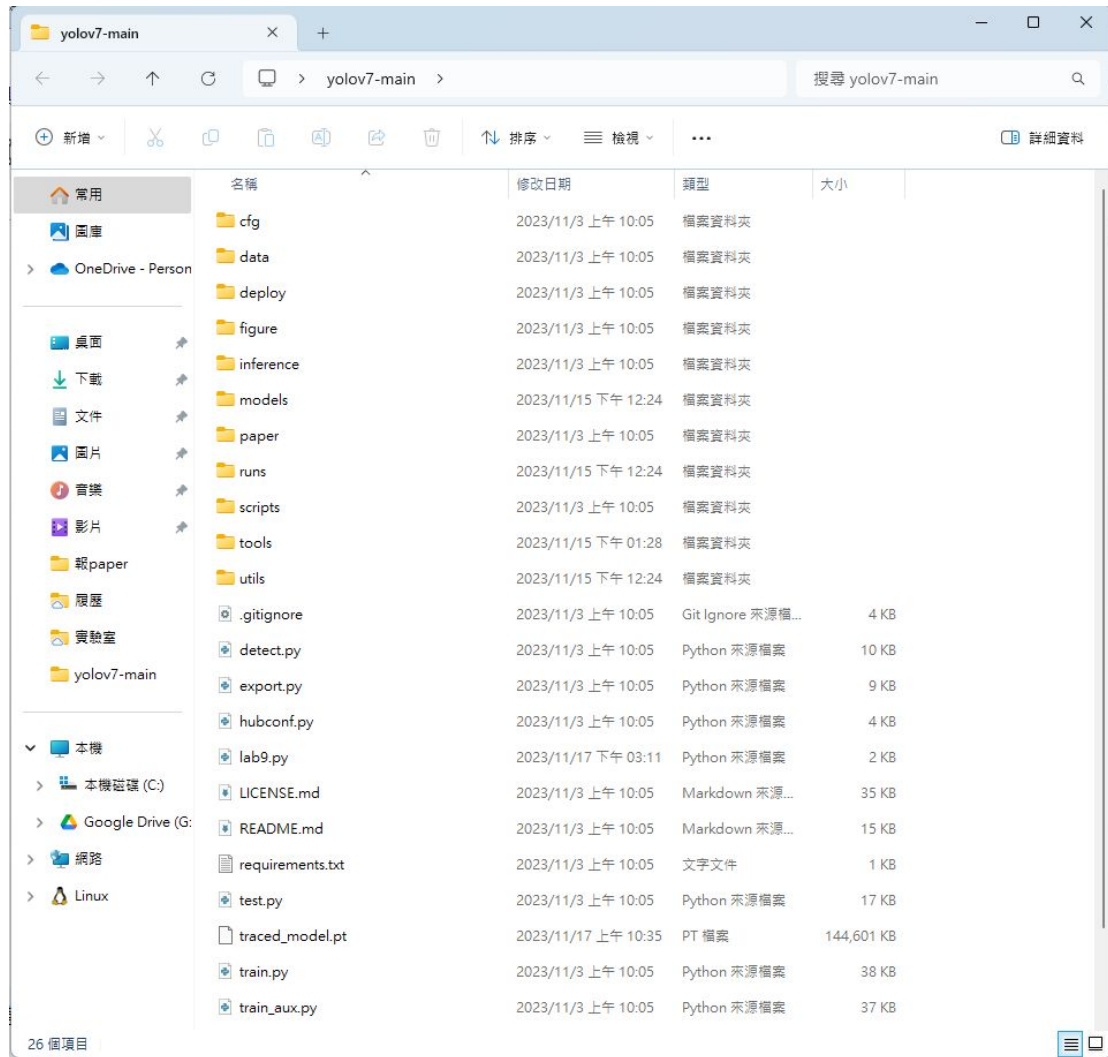
1 tags

Packages

No packages published

解壓縮，並在該目錄開啟終端
機來安裝必要的套件

```
pip install -r requirements.txt
```

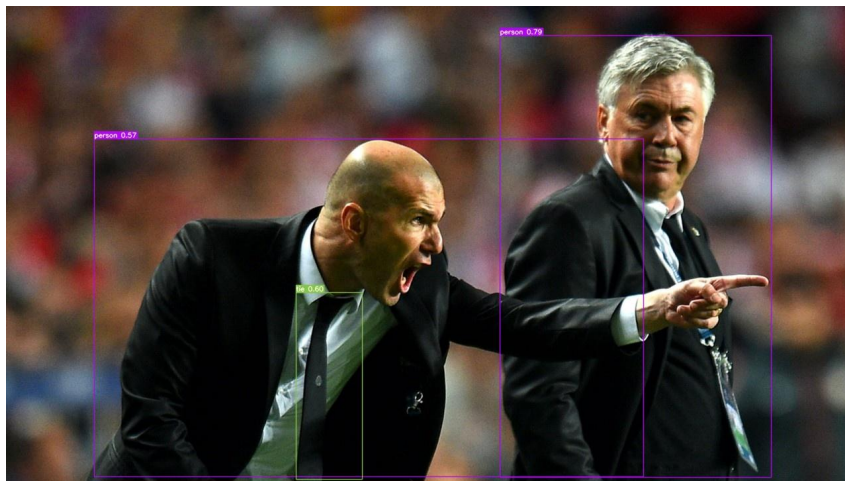


下載yolov7 tiny的[權重](#)並放入
同一資料夾當中

```
python detect.py --weights  
yolov7-tiny.pt --conf 0.25  
--img-size 640 --source  
inference/images/
```

確認是否能夠跑出結果

```
4 persons, 1 bus, Done. (18.0ms) Inference, (13.0ms) NMS  
The image with the result is saved in: runs\detect\exp7\bus.jpg  
5 horses, Done. (13.0ms) Inference, (1.0ms) NMS  
The image with the result is saved in: runs\detect\exp7\horses.jpg  
2 persons, 1 tie, 1 donut, Done. (16.0ms) Inference, (2.0ms) NMS  
The image with the result is saved in: runs\detect\exp7\image1.jpg  
2 persons, 1 sports ball, Done. (13.0ms) Inference, (1.0ms) NMS  
The image with the result is saved in: runs\detect\exp7\image2.jpg  
1 dog, 1 horse, Done. (15.0ms) Inference, (2.0ms) NMS  
The image with the result is saved in: runs\detect\exp7\image3.jpg  
2 persons, 1 tie, Done. (11.0ms) Inference, (2.0ms) NMS  
The image with the result is saved in: runs\detect\exp7\zidane.jpg  
Done. (0.625s)
```



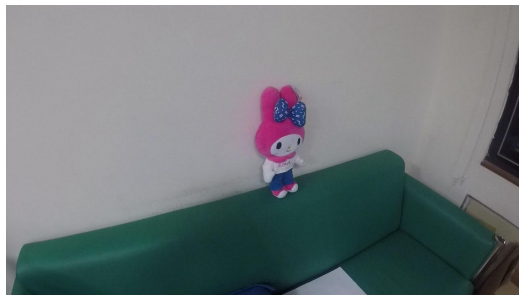
訓練自己的yolo-v7模型

標註照片

Dataset: <https://reurl.cc/NyeQlx>

Dataset共有三個資料夾

1. 只有卡娜赫拉:469張
 2. 只有美樂蒂:481張
 3. 兩個同時出現:589張
- 不需要全部都標
 - 兩個種類的數量要差不多
 - 怎麼標要講好(ex.框臉or全身)



roboflow 雲端共享Labeling的工具，請先註冊會員

roboflow

Product ▾

Solutions ▾

Resources ▾

Pricing

Docs

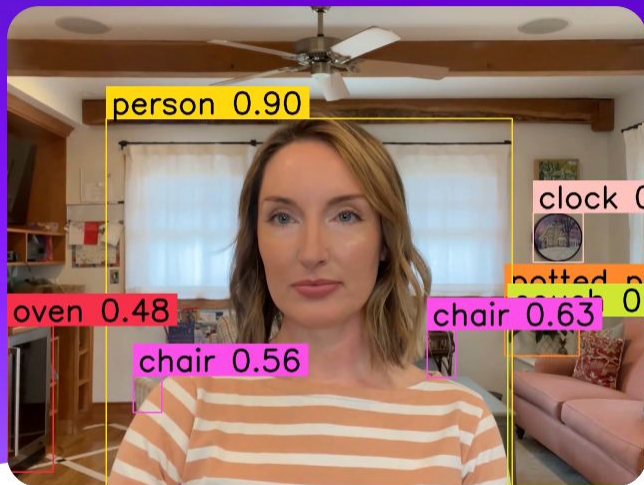
Talk to Sales

Sign in →

Everything you need to build and deploy computer vision models

Used by over 250,000 engineers to create datasets, train models, and deploy to production.

Get Started →



Upload

Webcam

Try on Mobile

Microsoft COCO ▾

github homepage-demo

Projects

[+ Create New Project](#)

上方的invite可以邀請成員
點擊Create New Project



This workspace has no projects.

Create new projects and they'll appear here.

[+ Create New Project](#)

Tasks



There are no tasks here yet!

Tasks will appear here once you have images to annotate, submit, or approve.

選擇Object Detection

Create New Project



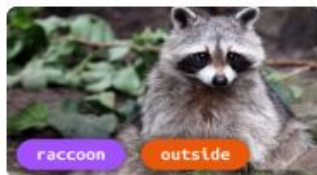
UAVlab09 / [New Public Project](#)

Project Type



Object Detection

Find multiple things and their specific location.



Classification

Assign labels to the entire image.



Instance Segmentation

Detect multiple objects and their actual shape.

Show More ↓

Project Name

lab09

What are you detecting? [?](#)

dolls

License

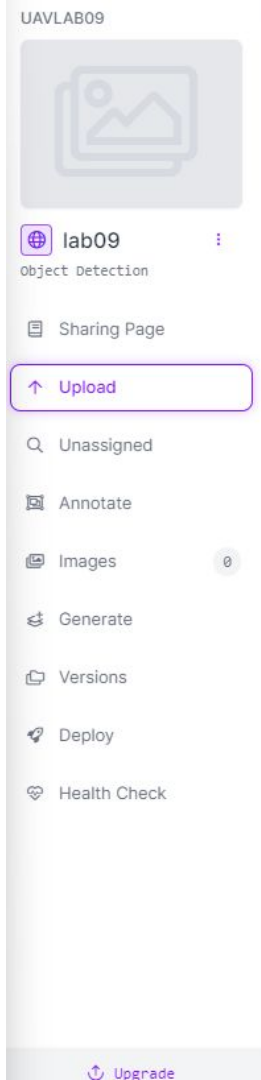
MIT



Cancel

Create Public Project

點擊Select Folder將所有 圖片上傳



 Upload [? Want to change the classes on your annotated images?](#)

Batch Name: Uploaded on 11/21/23 at

Tags: [?](#)



Drag and drop images and
annotations to upload them.

OR

 Select Files

 Select Folder

Need images to get started? We've got you covered.



Import YouTube Video:



Find a Universe Dataset [→](#)

Browse over 100k free datasets for images
and build a model in minutes.




Integrate Our API [→](#)

Collect real world images directly from your
existing application.

Upload images directly from cloud storage [→](#)

Upload images and annotations directly from AWS, Azure or GCP

SUPPORTED FORMATS

 Images in .jpg, .png, .bmp  Annotations in 26 formats  Videos in .mov, .mp4, .avi

點擊Assign images來分配 Label的任務

UAVLAB09



lab09

Object Detection

Sharing Page

Upload

Unassigned

Annotate

Images

Generate

Versions

Deploy

Health Check

Annotate

Outsource Labeling

Unassigned

1 Images

Upload More Images

View Unassigned Images

All data

1533 unassigned images

Assign Images →

Annotating

0 Images

Upload and assign images to an annotator.

Dataset

0 Images

Approve annotated images to add them to your dataset

這邊可以分配要label的數量給團隊裡面的每一個人

Assign Images for Annotation



TOTAL IMAGES TO ASSIGN: **1533** / 1533



Assign Images to Teammates

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

You can assign specific images on the [Unassigned images tab](#)

🔍 Search for teammates...



曾正豪

zxcv3558160@gmail.com

1533 images



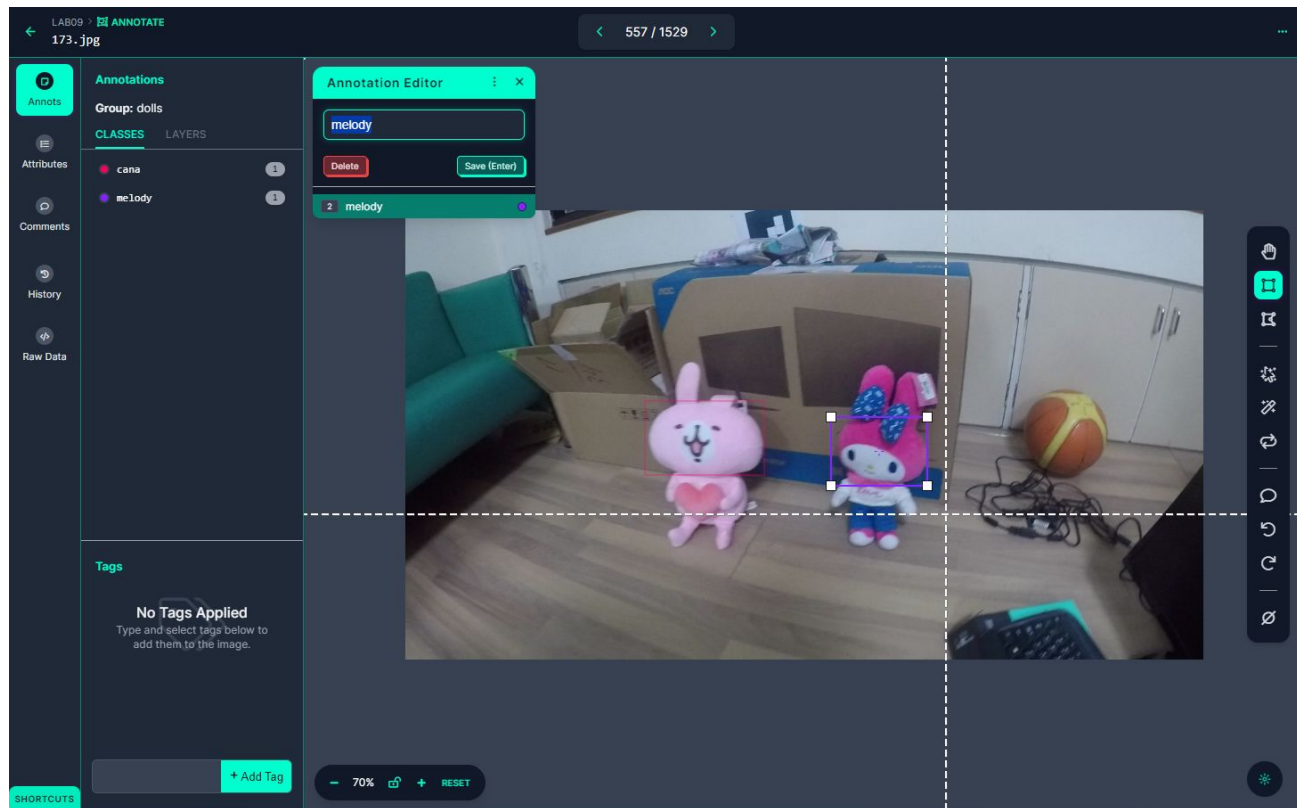
Outsource Labeling

👤+ Invite Teammate

分配完之後就可以開始進行標記


The screenshot displays the Roboflow web application interface. At the top, a navigation bar includes the Roboflow logo and links for Projects, Universe, Documentation, and Forum. The user's name, 曾正豪, is in the top right corner. On the left sidebar, the project 'UAVLAB09' is selected, showing a thumbnail of a green sofa. Below the project name, a list of actions includes Sharing Page, Upload, Unassigned, Annotate (highlighted with a purple border), Images, Generate, Versions, Deploy, and Health Check. The main content area is titled 'Annotate' and features three panels: 'Unassigned' (0 Images) with an 'Upload More Images' button; 'Annotating' (1 Images) which includes a 'Labeler' dropdown set to '曾正豪', a summary of '1533 Images' (0 Annotated, 1533 Unannotated), and a 'Start Annotating' button highlighted with a red rectangle; and 'Dataset' (0 Images) with instructions to approve annotated images for the dataset. An 'Outsource Labeling' link is also present in the top right of the main area.

這是標記的介面，先
匡出物體的方框出來
，然後輸入標記物體
的名稱，若有輸入
過的可以直接用滑鼠
選擇




標記完之後點擊 Add images to Dataset


UAVLAB09



lab09 :
Object Detection


- Sharing Page
- Upload
- Unassigned
- Annotate**
- Images 0
- Generate
- Versions
- Deploy
- Health Check

All data 

Start Annotating **Add 40 images to Dataset** 


Progress

1533 Images
48 Annotated
1493 Unannotated

Instructions 

No specific instructions were added when this job was assigned

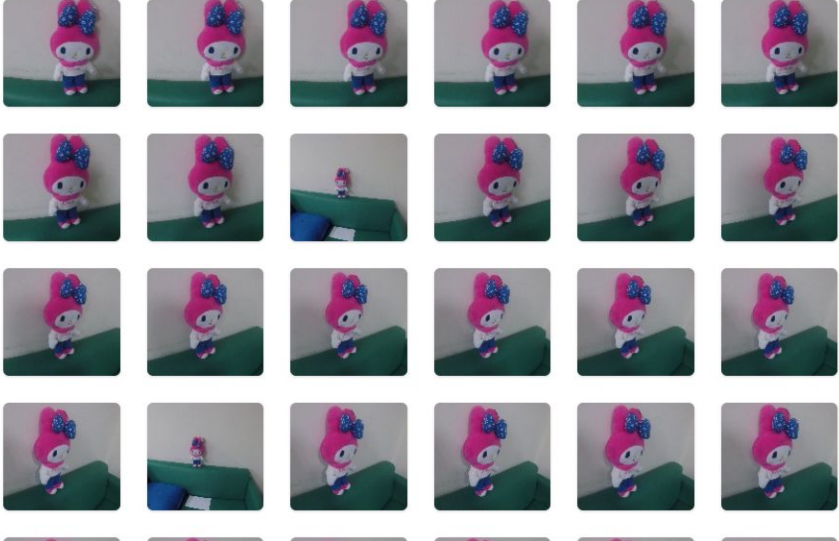
Assignment

曾正豪  Reassign
Labeler

Timeline

曾正豪 created this Job and assigned it to zxcv3558160@gmail.com.
2023/11/21 下午1:36:52

Unannotated 1493 Annotated 48



然後跟切分出訓練、測試資料集的數量出來

本次lab建議:

Train/Valid/Test

80%/20%/0%

Add Images To Dataset



Add 40 images to dataset

[? What's Train, Valid, Test?](#)

Method

Split Images Between Train/Valid/Test



Image Distribution

Train: 28 images

Valid: 8 images

Test: 4 images


You are about to add 40 images to the dataset


1493 images will be sent back as part of a new job

Add Images


點擊左邊的Generate來生成dataset出來，這邊可以選擇資料前處理或是增強。我們這邊選擇都不要做。


UAVLAB09





 lab09


Object Detection


 Sharing Page


 Upload


 Unassigned


 Annotate


 Images 40

 **Generate**

 Versions

 Deploy

 Health Check

 Generate New Version


VERSIONS

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

Choose your dataset settings to get started.

Generating 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: 40

Classes: 2

Unannotated: 0



Train/Test Split

Training Set: 36 images


Validation Set: images

Testing Set: 4 images

3

Preprocessing

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

 Add Preprocessing Step

Continue

4


Augmentation

5

Generate

最後點擊 Generate

UAVLAB09



lab09 Object Detection

Sharing Page

Upload

Unassigned

Annotate

Images 40

Generate

Versions

Deploy

Health Check

 Generate New Version





VERSIONS

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

Choose your dataset settings to get started.

Generating 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: 40
Classes: 2
Unannotated: 0
-  **Train/Test Split**
Training Set: 36 images
Validation Set: images
Testing Set: 4 images
-  **Preprocessing**
None
-  **Augmentation**
Turned Off


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

Maximum Version Size: 40
[See how this is calculated >>](#)


Generate

點擊右上角 Export Dataset


UAVLAB09





View on Universe


 lab09


Object Detection

 Sharing Page


 Upload


 Unassigned

 Annotate


 Images


40


 Generate

 Versions

1

 Deploy

 Health Check

 Generate New Version

VERSIONS

2023-11-21 1:48pm

v1 Nov 21, 2023

v1 2023-11-21 1:48pm

Generated on Nov 21, 2023

Export Dataset

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: 2

40 Total Images

[View All Images →](#)



Dataset Split

TRAIN SET

36 Images

90%

VALID SET

0 Images

0%

TEST SET

4 Images

10%

Preprocessing

No preprocessing steps were applied.

Augmentations

No augmentations were applied.

格式選擇Yolo v7

Export



Format

YOLO v7 PyTorch



TXT annotations and YAML config used with [YOLOv7](#).



download zip to computer

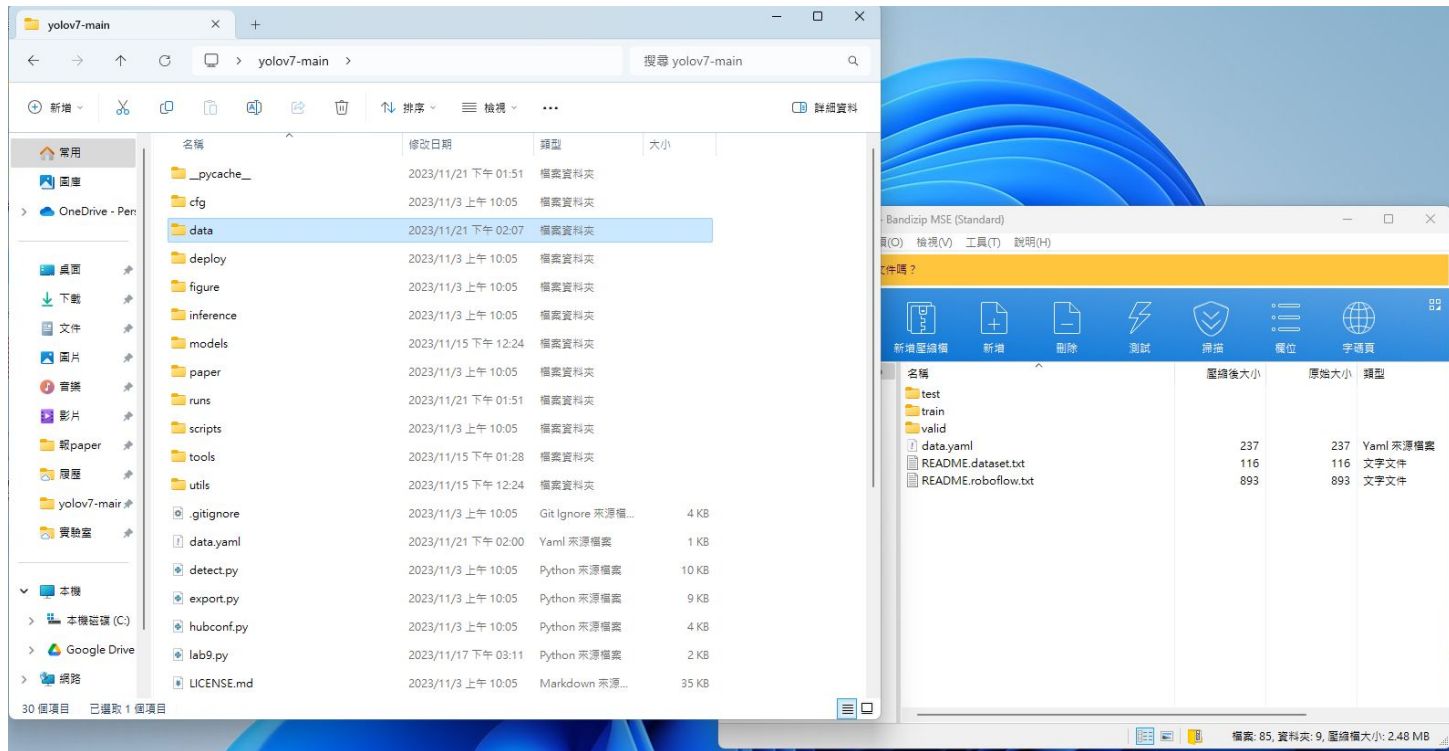


show download code

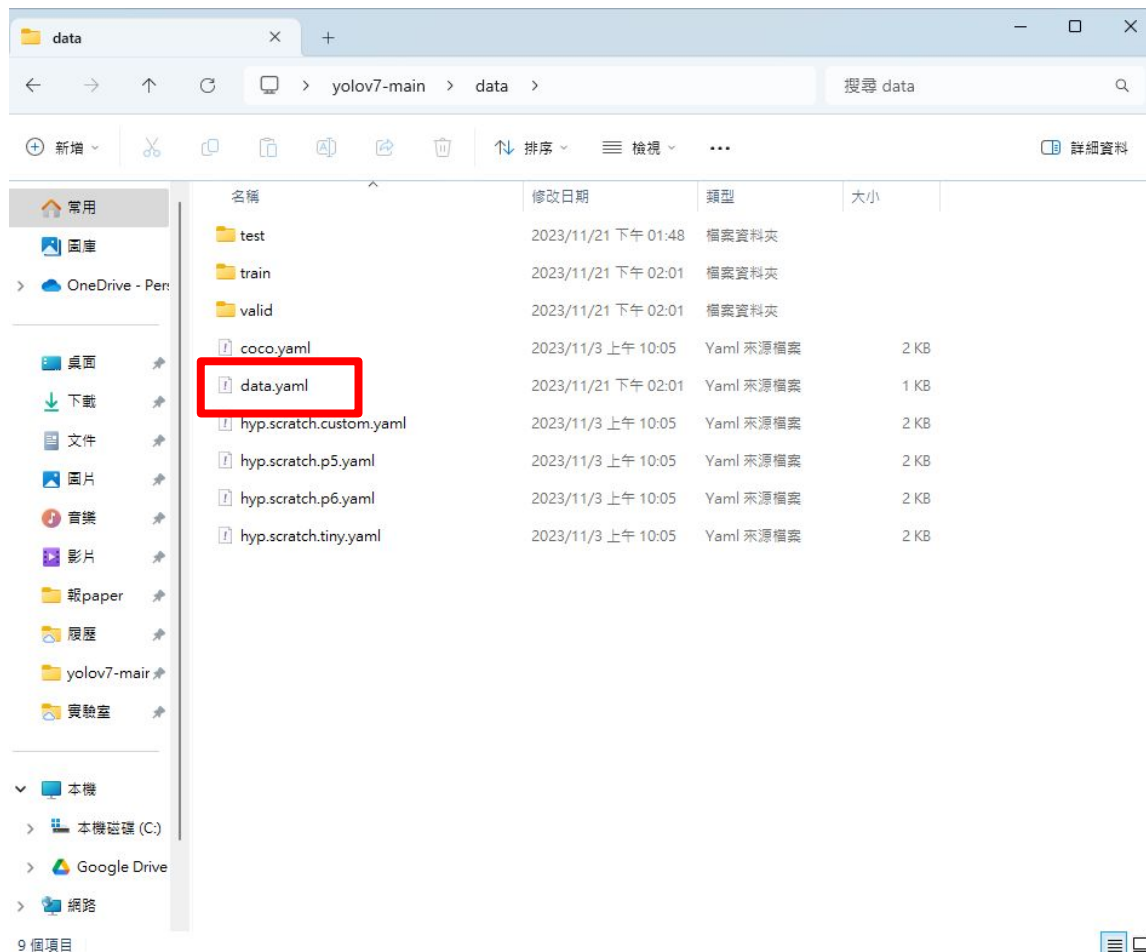
Cancel

Continue

將下載下來的所有檔案複製到 data 資料夾當中



接著修改data.yaml的內容



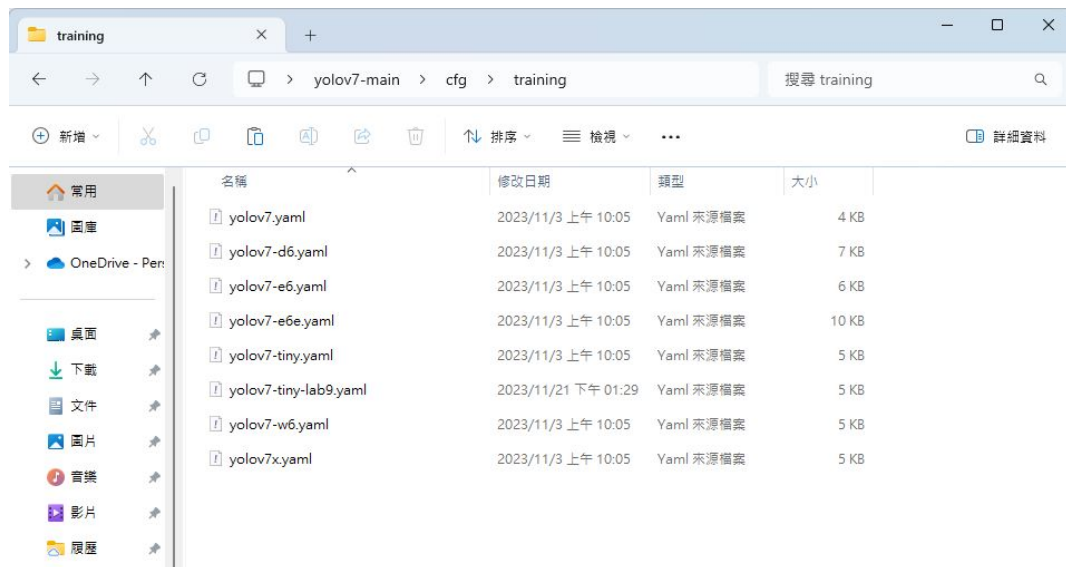
將前三行修改成資料集的路徑

```
1  train: ../data/train/images
2  val: ../data/valid/images
3  test: ../data/test/images
4  |
5  nc: 2
6  names: ['cana', 'melody']
7
8  roboflow:
9    workspace: uavlab09
10   project: lab09
11   version: 2
12   license: MIT
13   url: https://universe.roboflow.com/uavlab09/lab09/dataset/2
```

將 `cfg\training\yolov7-tiny.yaml`
複製一份出來並改名
`yolov7-tiny-lab9.yaml`

修改檔案第二行的`nc`, 改為2

```
1 # parameters
2 nc: 2 # number of classes
3 depth_multiple: 1.0 # model depth multiple
4 width_multiple: 1.0 # layer channel multiple
5
6 # anchors
7 anchors:
8   - [10,13, 16,30, 33,23] # P3/8
9   - [30,61, 62,45, 59,119] # P4/16
10  - [116,90, 156,198, 373,326] # P5/32
```



訓練的指令:

```
python train.py --device 0 --batch-size 8 --data data/data.yaml --img 1280 720  
--cfg cfg/training/yolov7-tiny-lab9.yaml --weights 'yolov7-tiny.pt' --name  
yolov7-lab09 --hyp data/hyp.scratch.tiny.yaml --epoch 300
```

#batch-size 同時放多少張下去訓練(記憶體不夠有error就降低數量)

#data資料集的yaml檔 #img影像尺寸 #cfg 自定義模型的config檔

#name名字, 隨便取 #weights從哪個初始權重開始訓練

#hyp各種設定的超參數(可以自己調調看)

正常跑的話會像這
個樣子

```
train: Scanning 'data\train\labels' images and labels... 36 found, 0 missing, 1 empty, 0 corrupted:
train: New cache created: data\train\labels.cache
val: Scanning 'data\valid\labels' images and labels... 1 found, 0 missing, 0 empty, 0 corrupted: 10
val: New cache created: data\valid\labels.cache
```

```
autoanchor: Analyzing anchors... anchors/target = 4.38, Best Possible Recall (BPR) = 1.0000
Image sizes 1280 train, 736 test
Using 2 dataloader workers
Logging results to runs\train\yolov7-lab0910
Starting training for 300 epochs...
```

| Epoch | gpu_mem | box | obj | cls | total | labels | img_size | |
|-------|---------|---------|---------|---------|-------|--------|----------|-------------------|
| 0/299 | 1.49G | 0.06453 | 0.05509 | 0.01442 | 0.134 | 3 | 1280: | 100% █ 18/18 [00 |
| | Class | Images | Labels | | P | R | mAP@.5 | mAP@.5:.95: 100% |
| | all | 1 | 0 | | 0 | 0 | 0 | 0 |

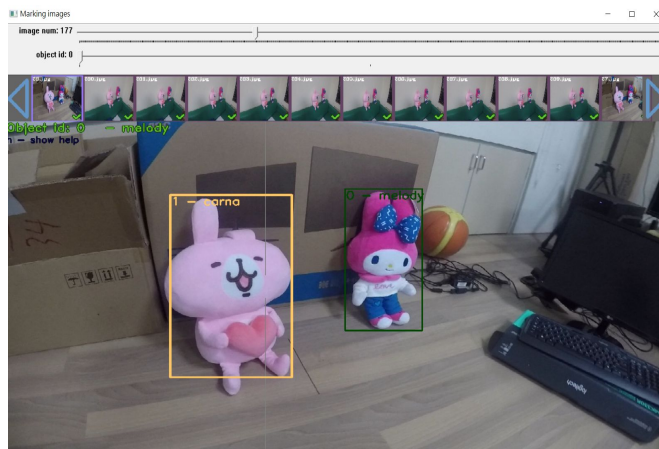
| Epoch | gpu_mem | box | obj | cls | total | labels | img_size | |
|-------|---------|---------|--------|---------|--------|--------|----------|-------------------|
| 1/299 | 1.5G | 0.05584 | 0.0511 | 0.01278 | 0.1197 | 4 | 1280: | 100% █ 18/18 [00 |
| | Class | Images | Labels | | P | R | mAP@.5 | mAP@.5:.95: 100% |
| | all | 1 | 0 | | 0 | 0 | 0 | 0 |

| Epoch | gpu_mem | box | obj | cls | total | labels | img_size | |
|-------|---------|---------|---------|---------|--------|--------|----------|-------------------|
| 2/299 | 1.5G | 0.06299 | 0.04521 | 0.01357 | 0.1218 | 2 | 1280: | 100% █ 18/18 [00 |
| | Class | Images | Labels | | P | R | mAP@.5 | mAP@.5:.95: 100% |
| | all | 1 | 0 | | 0 | 0 | 0 | 0 |

| Epoch | gpu_mem | box | obj | cls | total | labels | img_size | |
|-------|---------|---------|---------|---------|-------|--------|----------|-------------------|
| 3/299 | 1.5G | 0.05625 | 0.04301 | 0.01272 | 0.112 | 9 | 1280: | 100% █ 18/18 [00 |
| | Class | Images | Labels | | P | R | mAP@.5 | mAP@.5:.95: 100% |
| | all | 1 | 0 | | 0 | 0 | 0 | 0 |

訓練model - 調整訓練

- 框的時候盡量不要框進太多背景
- 選擇框臉或頭或身體
 - 框臉跟框身體的不能一起訓練，要統一
- 訓練時
 - 先學兩隻一起出現的，再訓練單一隻出現的
 - 全部放在一起訓練
 - 先訓練單一隻出現的，再訓練兩隻出現的
 - 觀看結果，假如美樂蒂效果較差，加強訓練美樂蒂的資料集
- 訓練時的learning rate
 - loss高時設大 ex. $1e-3$
 - loss接近1時設小 ex. $1e-5 \sim 1e-7$
- 一定要用pretrained weight, 不然效果很差
- 嘗試不同的.cfg檔及.weights檔



訓練完成的權重會放在.\runs\train\yolov7-lab09\weights

best是valid最好的那一個epoch

last是最後一個epoch

| 名稱 | 修改日期 | 類型 | 大小 |
|--|---------------------|-------|-----------|
|  best.pt | 2023/11/21 下午 02:16 | PT 檔案 | 11,989 KB |
|  epoch_000.pt | 2023/11/21 下午 02:13 | PT 檔案 | 47,520 KB |
|  epoch_024.pt | 2023/11/21 下午 02:15 | PT 檔案 | 47,526 KB |
|  epoch_025.pt | 2023/11/21 下午 02:15 | PT 檔案 | 47,526 KB |
|  epoch_026.pt | 2023/11/21 下午 02:15 | PT 檔案 | 47,526 KB |
|  epoch_027.pt | 2023/11/21 下午 02:16 | PT 檔案 | 47,526 KB |
|  epoch_028.pt | 2023/11/21 下午 02:16 | PT 檔案 | 47,527 KB |
|  epoch_029.pt | 2023/11/21 下午 02:16 | PT 檔案 | 47,527 KB |
|  init.pt | 2023/11/21 下午 02:12 | PT 檔案 | 23,720 KB |
|  last.pt | 2023/11/21 下午 02:16 | PT 檔案 | 11,989 KB |

Lab 09

Lab09.py

Lab09.py內是範例程式，請放入YOLOv7的資料夾當中

將電腦攝像頭的影像來做實時的物件偵測

更改WEIGHT的檔案可以更換偵測的模型權重

```
12 WEIGHT = './yolov7-tiny.pt'
13 device = 'cuda' if torch.cuda.is_available() else 'cpu'
14
15 model = attempt_load(WEIGHT, map_location=device)
16 if device == "cuda":
17     model = model.half().to(device)
18 else:
19     model = model.float().to(device)
20 names = model.module.names if hasattr(model, 'module') else model.names
21 colors = [[random.randint(0, 255) for _ in range(3)] for _ in names]
22
23
24 cap = cv2.VideoCapture(0)
25 while True:
26     ret, image = cap.read()
27     if not ret:
28         break
29
30     image_orig = image.copy()
31     image = letterbox(image, (640, 640), stride=64, auto=True)[0]
32     if device == "cuda":
33         image = transforms.ToTensor()(image).to(device).half().unsqueeze(0)
34     else:
35         image = transforms.ToTensor()(image).to(device).float().unsqueeze(0)
36     with torch.no_grad():
37         output = model(image)[0]
38     output = non_max_suppression_kpt(output, 0.25, 0.65)[0]
39
40     ## Draw label and confidence on the image
41     output[:, :4] = scale_coords(image.shape[2:], output[:, :4], image_orig.shape).round()
42     for *xyxy, conf, cls in output:
43         label = f'{names[int(cls)]} {conf:.2f}'
44         plot_one_box(xyxy, image_orig, label=label, color=colors[int(cls)], line_thickness=1)
45
46     cv2.imshow("Detected", image_orig)
47     cv2.waitKey(1)
48
49
```

Lab09.py

Lab09.py內是範例程式，請將範例程式改成輸入一段影片來進行物件偵測，並將偵測到的物體框出來標上Label與Confidence，最後輸出成一個新的影片檔

