深度學習
標註

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前言

- 深度/機器學習都是data-driven的算法

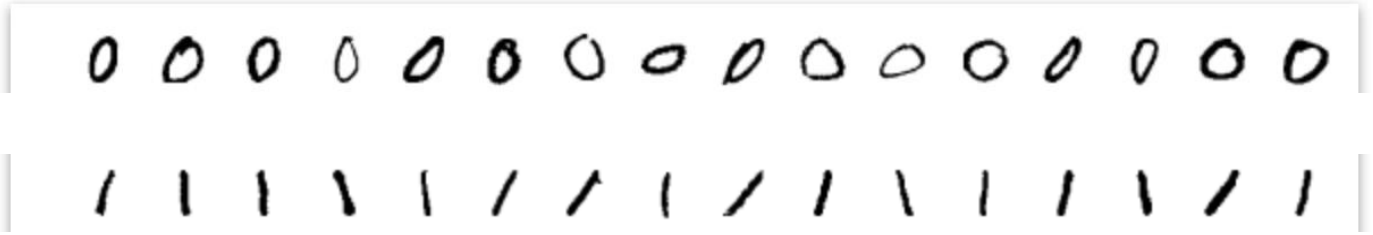
Data is most important.

1. Classification
2. Segmentation
3. Object detection

怎麼標註(labeling)。

1. Classification

手寫數字辨識



Label: 0

Label: 1

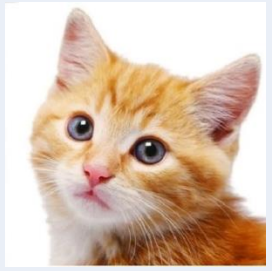
Label: “狗”

Label: 0

Label: “貓”

Label: 1

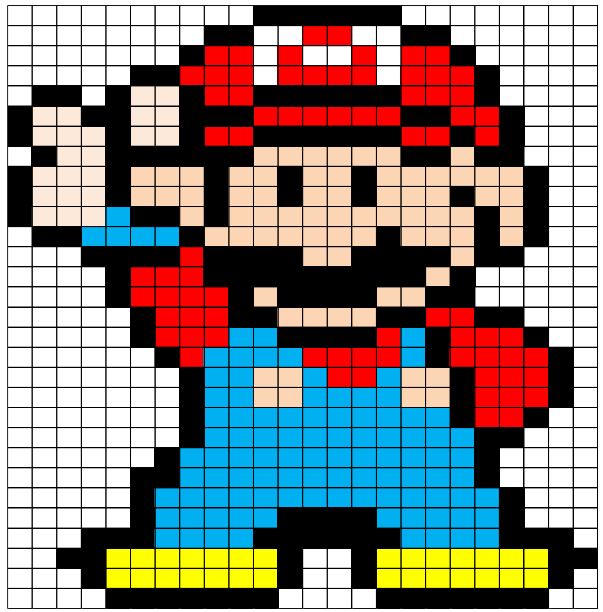
Onehot encoder

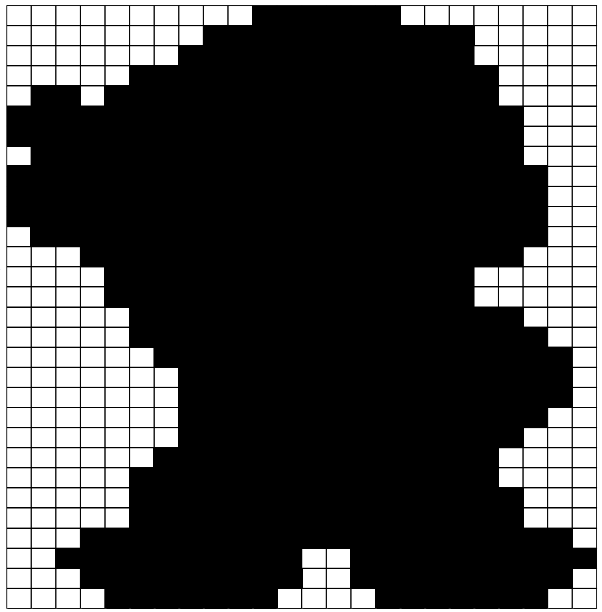
	狗 (0)	貓 (1)
	1	0
	0	1

2. Segmentation

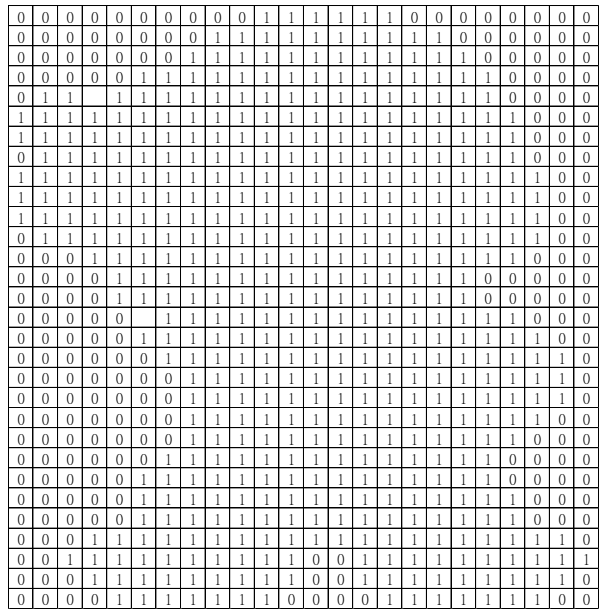
- Pixel-level classification

前景背景切割



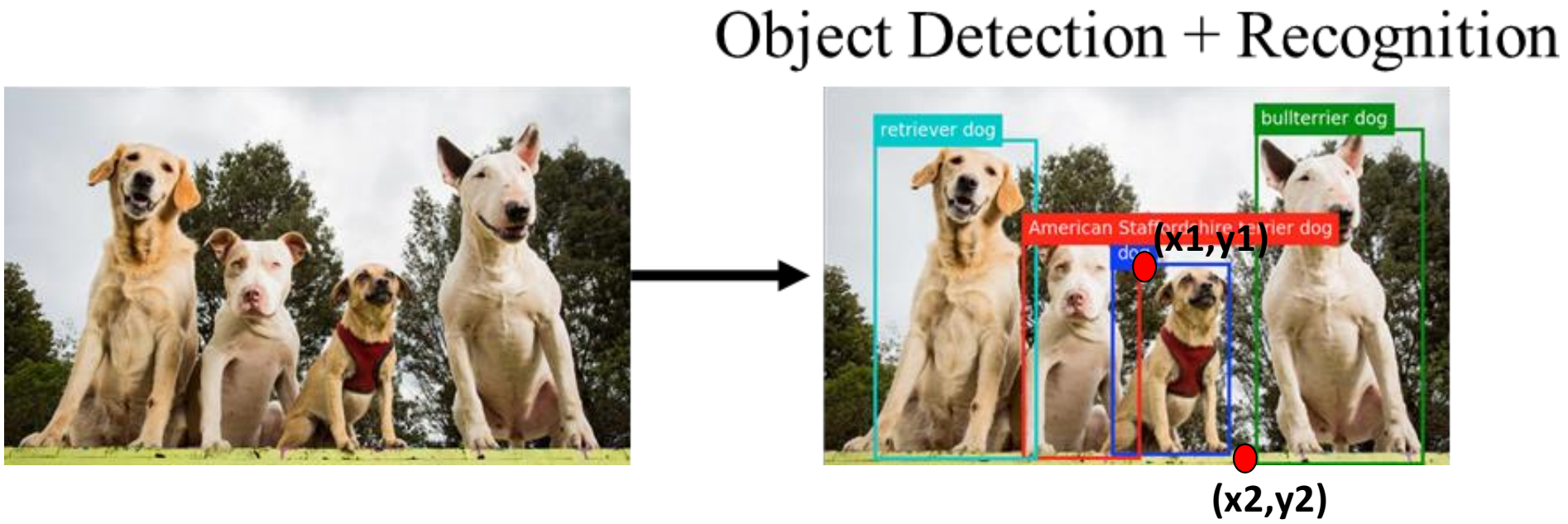


前景: 1
背景: 0



3. Object detection

- 物件偵測顧名思義就是找到圖片中
  - 物件的位置(Object location)和物件總類(object classification)



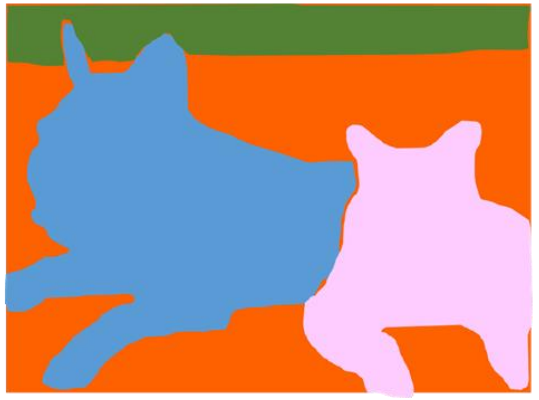
Object1: locatioization :(x1,y1) (x2,y2), label: dog

Image tasks in deep learning

Classification

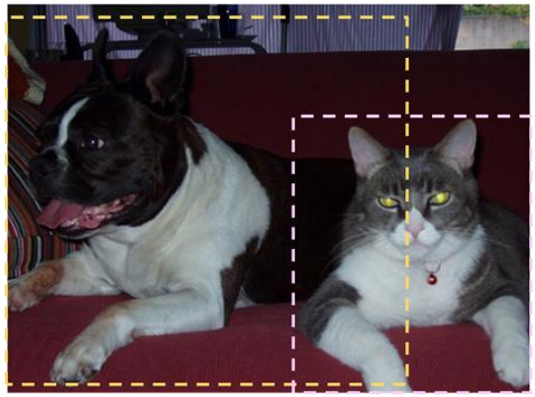
假設
狗機率是0.51
貓機率是0.49
這張圖是狗

Semantic Segmentation



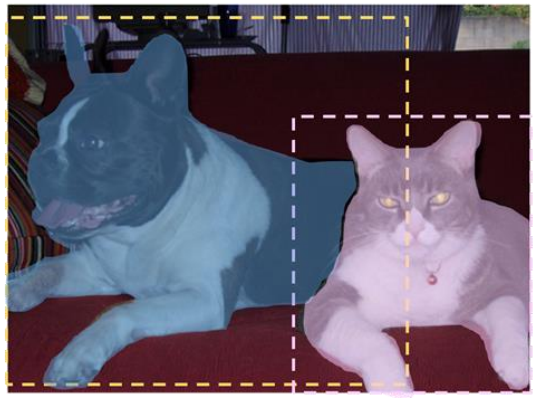
pixel-by-pixel
藍色Mask是狗
紅色Mask是貓
橘色Mask是沙發
綠色是Background

Object detection



這張圖裡面有
一隻貓
一隻狗

Instance Segmentation



Object detection後
的框框內那些pixel
是實際的物件。

Introduction

人工智慧的背後是”大數據”，大數據的背後是工人智慧。

工人智慧如何達成?

今天這堂課教大家如何達成”工人”智慧來教電腦學習人工智慧。

Introduction

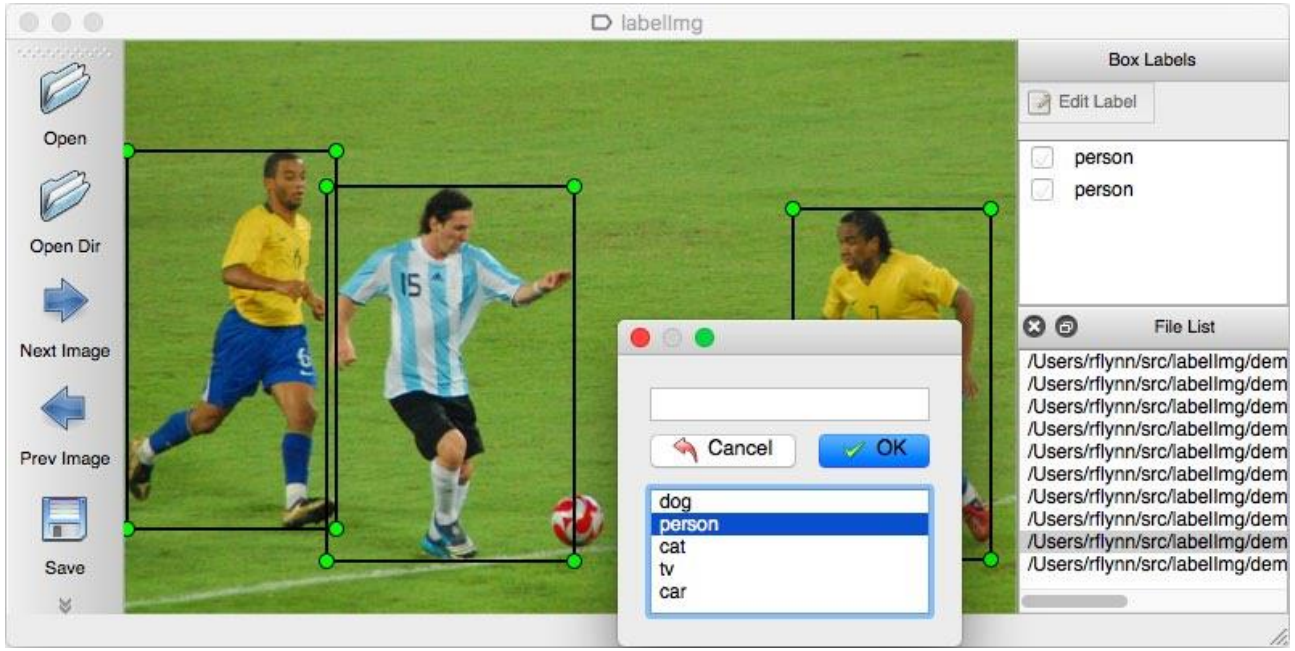
- I. LabelImg: 專門label boundary box(Object detection)

https://github.com/tzutalin/labelImg

- II. PixelAnnotationTool: 專門用來label segmentation annotation
  https://github.com/abreheret/PixelAnnotationTool
- III. Labelme: Object detection, segmentation, instance segmentation
- https://github.com/wkentaro/labelme
- IV. cvat: 皆可
- https://github.com/opencv/cvat

LabelImg

- LabelImg is a graphical image annotation tool and label object bounding boxes in images.
- Annotations are saved as XML files in PASCAL VOC format.



XML files in PASCAL VOC format

```xml
<annotation>
    <folder>B0123_N1chn120180517183908</folder>
    <filename>B0123_N1chn120180517183908 005.jpg</filename>
    <path>D:\car-video\0926\B0123_N1chn120180517183908\B0123_N1chn120180517183908 005.jpg</path>
    <source>
        <database>Unknown</database>
    </source>
    <size>
        <width>1280</width>
        <height>720</height>
        <depth>3</depth>
    </size>
    <segmented>0</segmented>
    <object>
        <name>c</name>
        <pose>Unspecified</pose>
        <truncated>0</truncated>
        <difficult>1</difficult>
        <bndbox>
            <xmin>584</xmin>
            <ymin>281</ymin>
            <xmax>639</xmax>
            <ymax>308</ymax>
        </bndbox>
    </object>
    <object>
```

Label圖像的大小

每個Object的class都包含一個Object boundary box訊息
VOC格式內定義
name: 要標註的類別。
pose:物件拍攝的角度
truncated: 物件是否有被截斷
difficult: 物件的檢測難度
Bndbox: 物件的座標

XML files in PASCAL VOC format

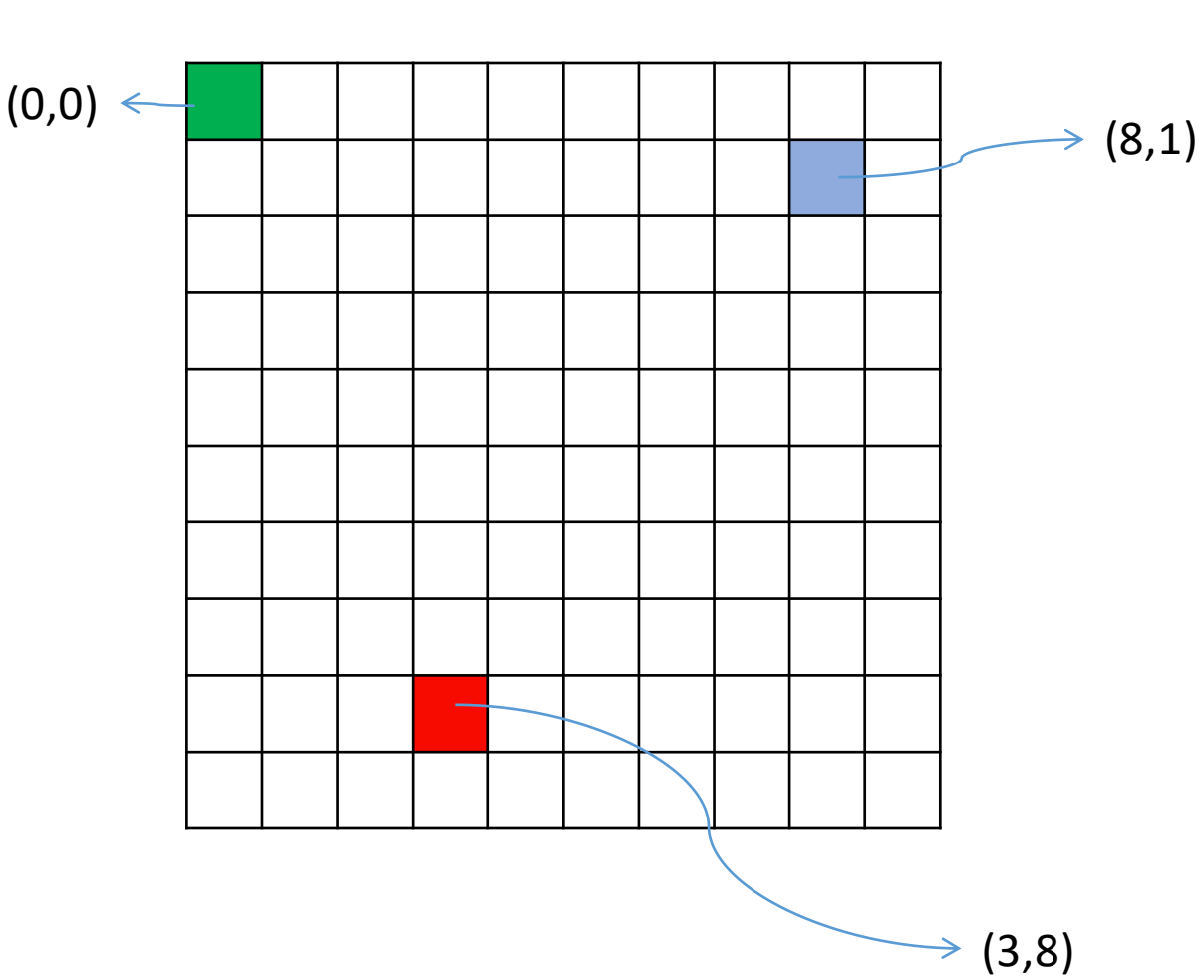
```xml
<annotation>
    <folder>B0123_N1chn120180517183908</folder>
    <filename>B0123_N1chn120180517183908 005.jpg</filename>
    <path>D:\car-video\0926\B0123_N1chn120180517183908\B0123_N1chn120180517183908 005.jpg</path>
    <source>
        <database>Unknown</database>
    </source>
    <size>
        <width>1280</width>
        <height>720</height>
        <depth>3</depth>
    </size>
    <segmented>0</segmented>
    <object>
        <name>c</name>
        <pose>Unspecified</pose>
        <truncated>0</truncated>
        <difficult>1</difficult>
        <bndbox>
            <xmin>584</xmin>
            <ymin>281</ymin>
            <xmax>639</xmax>
            <ymax>308</ymax>
        </bndbox>
    </object>
    <object>
```

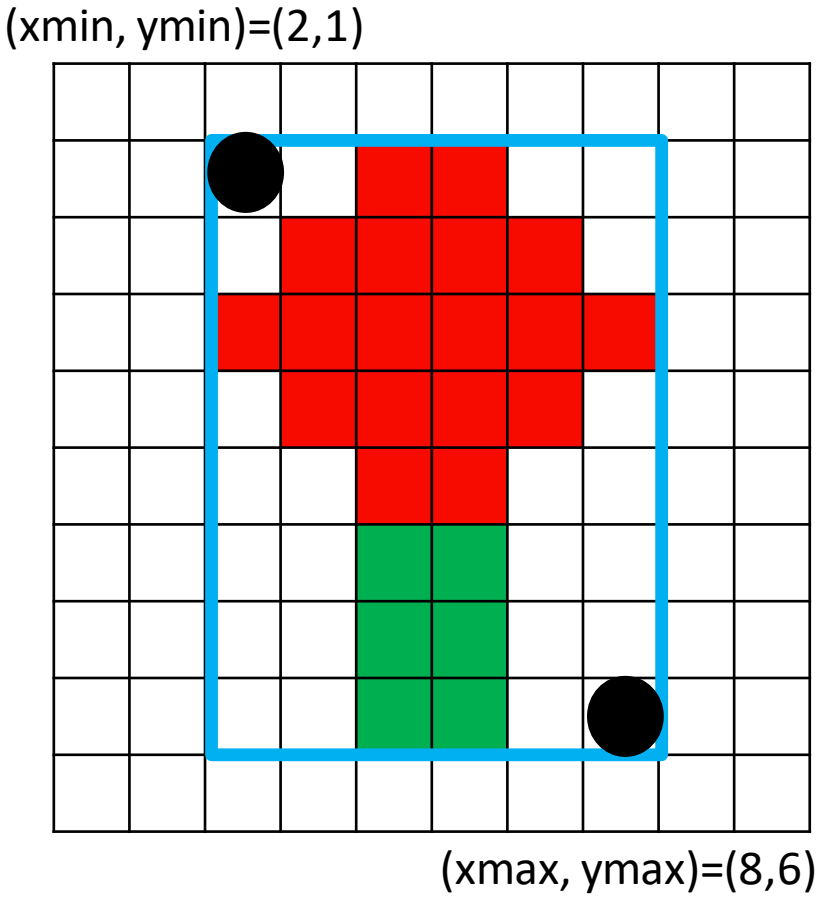
Label圖像的大小

(xmin, ymin)

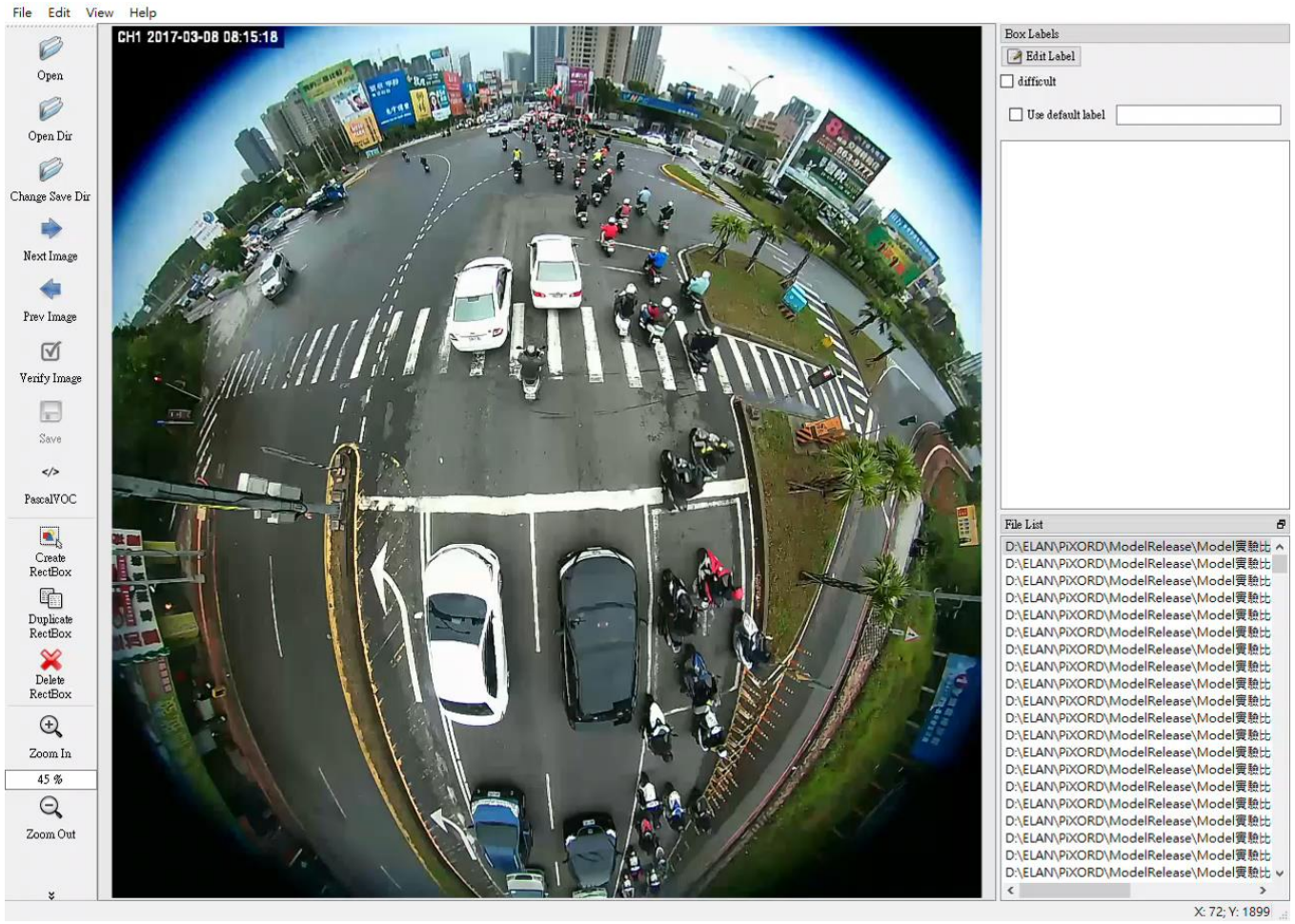
(xmax, ymax)

電腦對圖像的座標表示法

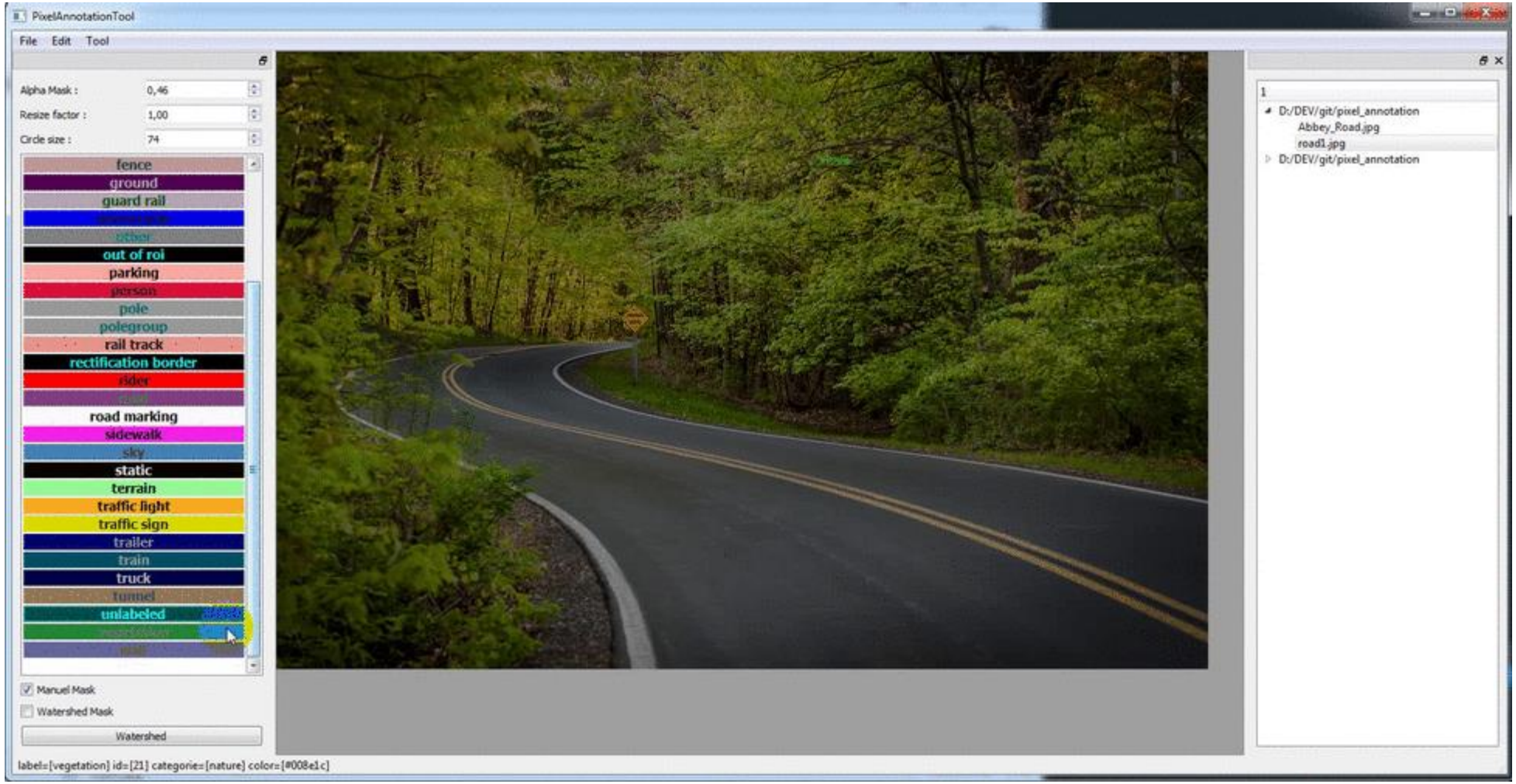




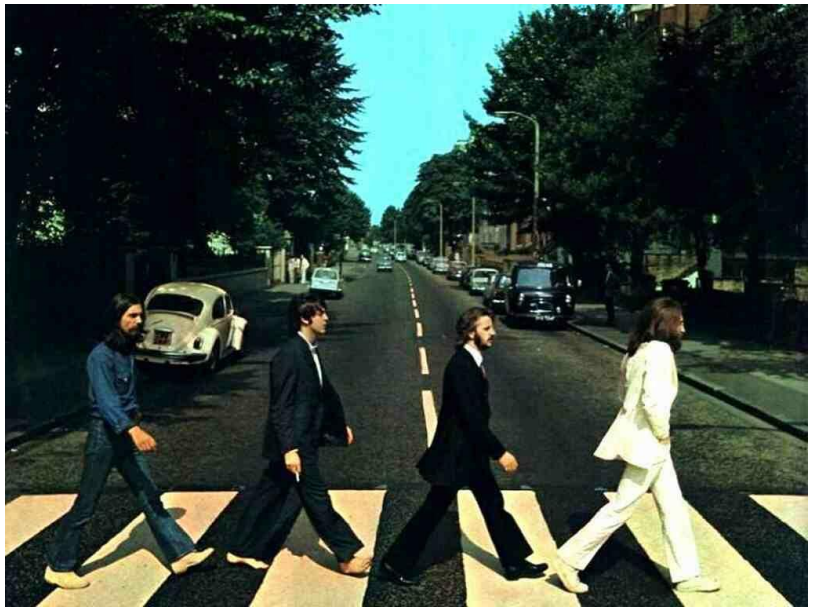
LabelImg


File
Edit
View
Help
Open
Open Dir
Change Save Dir
Next Image
Prev Image
Verify Image
Save
PascalVOC
Create RectBox
Duplicate RectBox
Delete RectBox
Zoom In
45 %
Zoom Out
CH1 2017-03-08 08:15:18
Box Labels
Edit Label
difficult
Use default label
File List
D:\ELAN\PiXORD\ModelRelease\Model實驗比
X: 72; Y: 1899

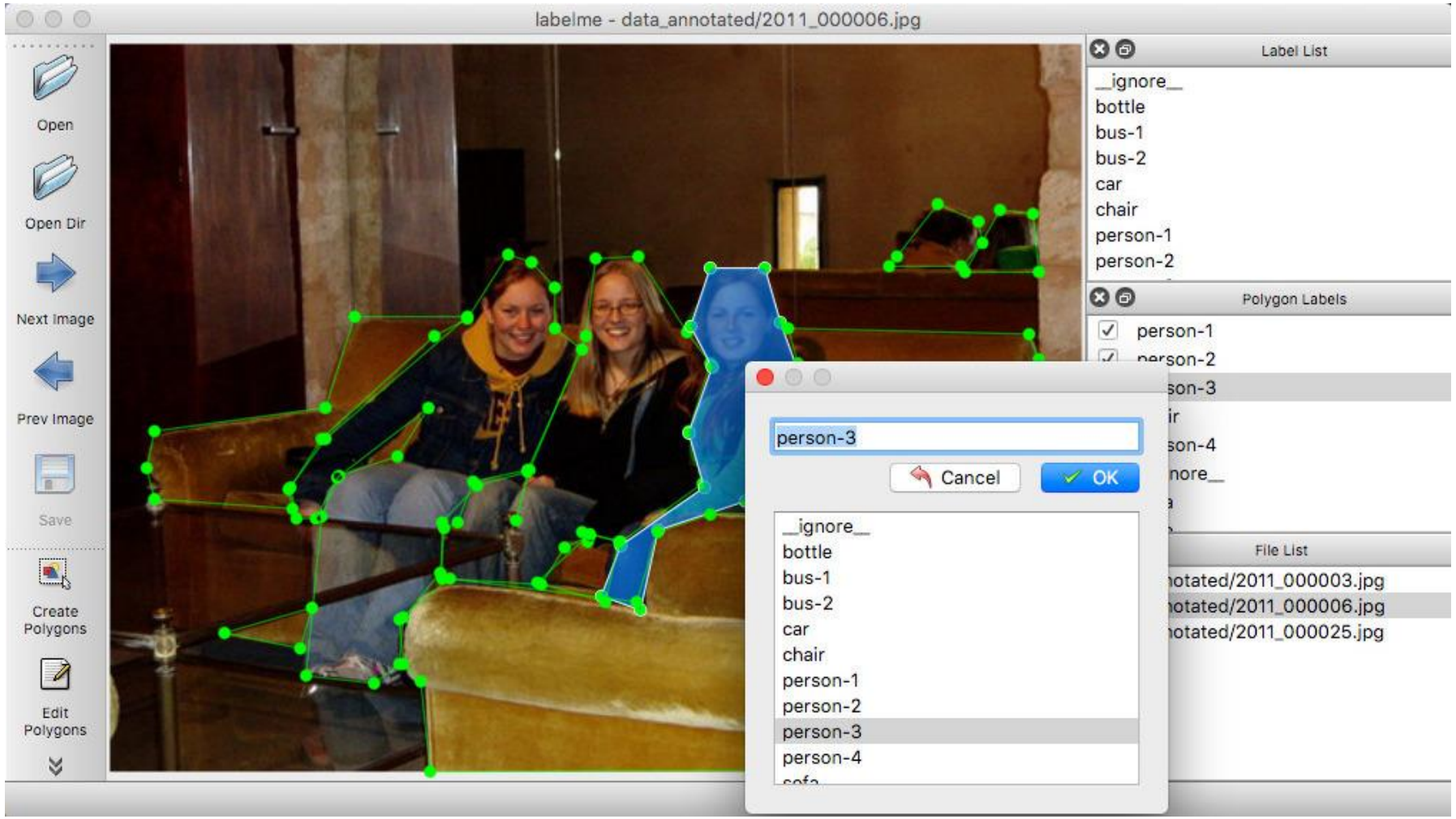
PixelAnnotationTool



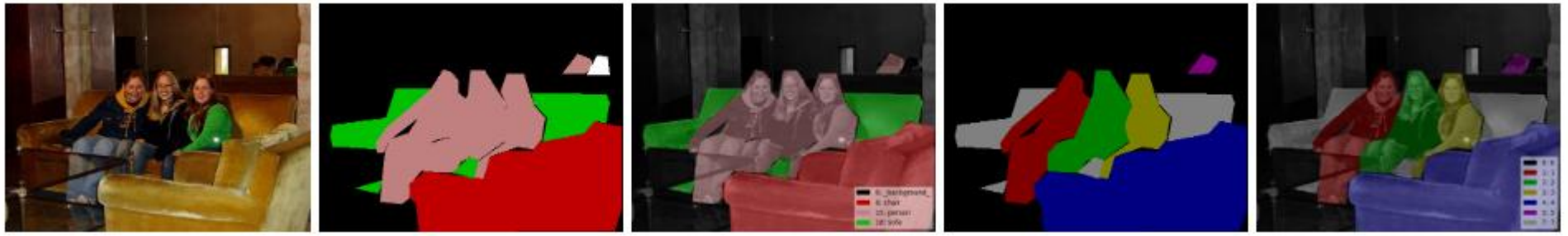
PixelAnnotationTool



Labelme


labelme - data_annotated/2011_000006.jpg
Open
Open Dir
Next Image
Prev Image
Save
Create Polygons
Edit Polygons
Label List
__ignore__
bottle
bus-1
bus-2
car
chair
person-1
person-2
Polygon Labels
person-1
person-3
Cancel
OK
__ignore__
bottle
bus-1
bus-2
car
chair
person-1
person-2
person-3
person-4
File List
otated/2011_000003.jpg
otated/2011_000006.jpg
otated/2011_000025.jpg

Labelme



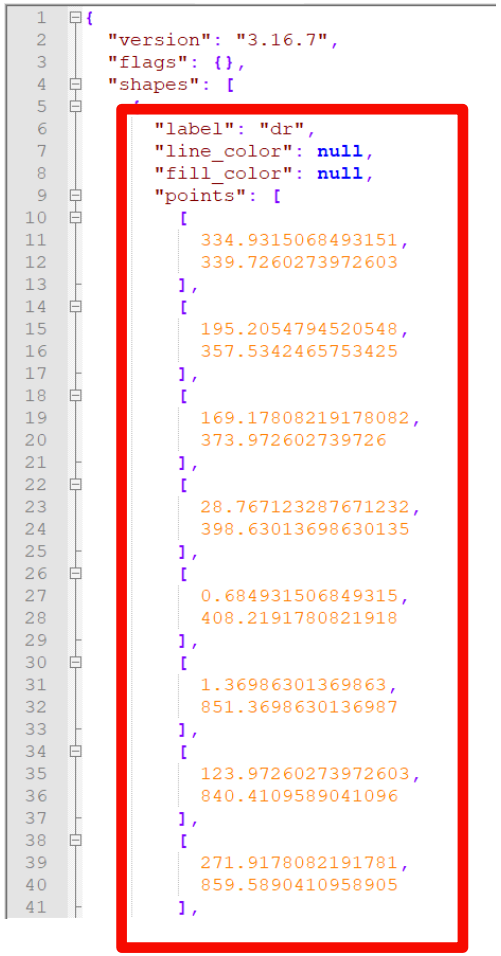
VOC dataset example of instance segmentation.

Other examples (semantic segmentation, bbox detection, and classification).

Labelme

Various primitives (polygon, rectangle, circle, line, and point).

Json files in lableme format



```
{
  "version": "3.16.7",
  "flags": {},
  "shapes": [
    {
      "label": "dr",
      "line_color": null,
      "fill_color": null,
      "points": [
        [
          334.9315068493151,
          339.7260273972603
        ],
        [
          195.2054794520548,
          357.5342465753425
        ],
        [
          169.17808219178082,
          373.972602739726
        ],
        [
          28.767123287671232,
          398.63013698630135
        ],
        [
          0.684931506849315,
          408.2191780821918
        ],
        [
          1.36986301369863,
          851.3698630136987
        ],
        [
          123.97260273972603,
          840.4109589041096
        ],
        [
          271.9178082191781,
          859.5890410958905
        ],
```

label: 被框起來的前景類別。
point: 多邊形點座標

Json files in lableme format