# 基於人工智能的中藥材檢測系統

Yuhan Zhang Peilun Lyu

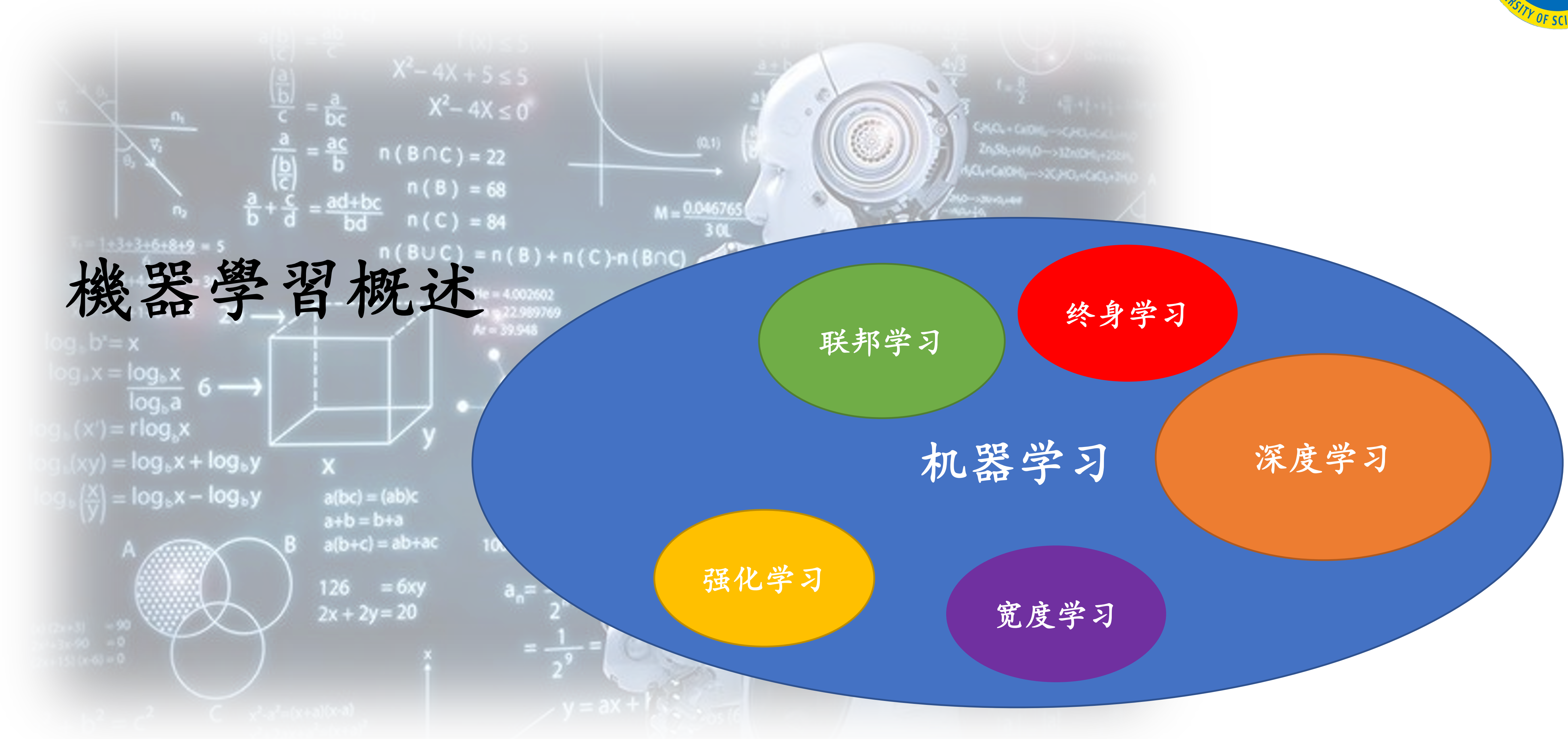
Faculty of Information Technology

Macau University of Science and Technology

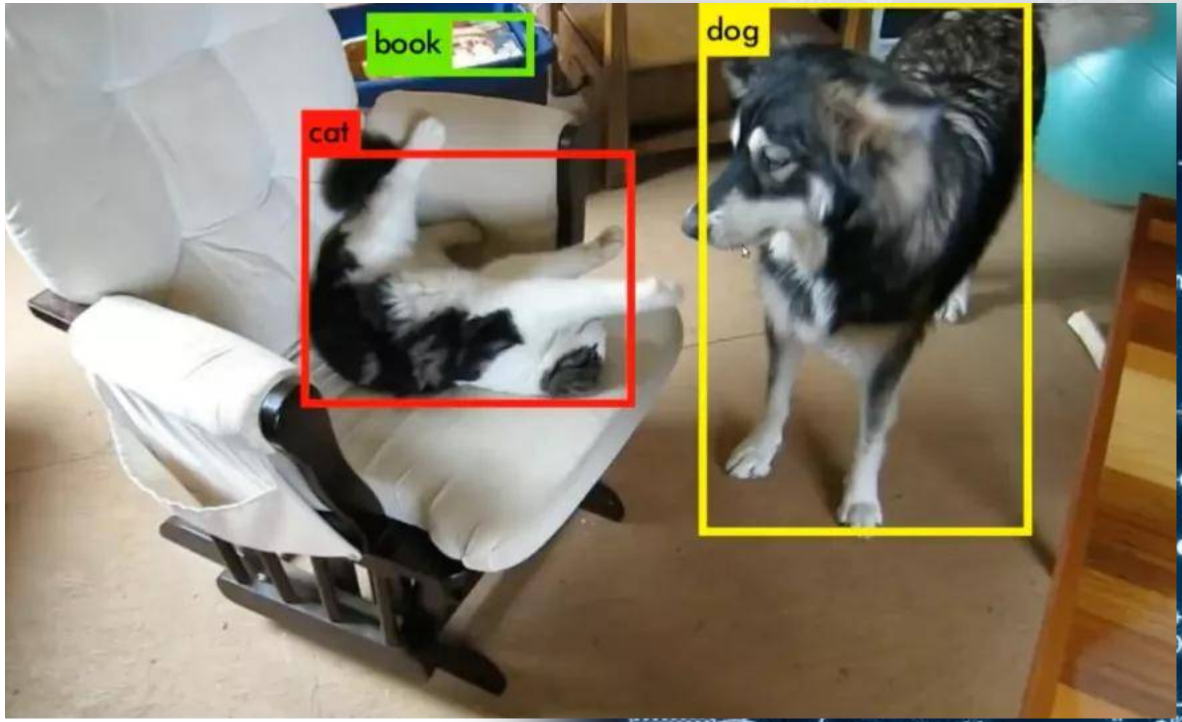
# 内容

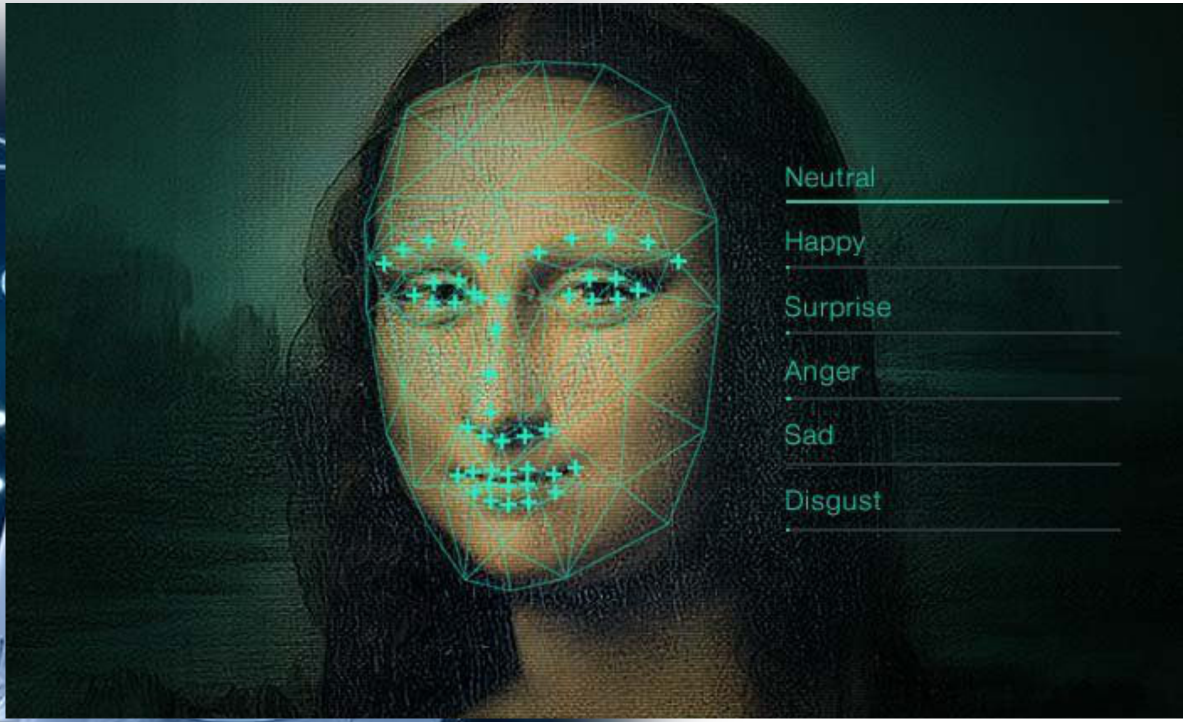
- 介紹
- 中藥目標檢測數據集製作
- 基於目標檢測的人工智能算法
- 算法表現
- 應用前景

# 何為機器學習？

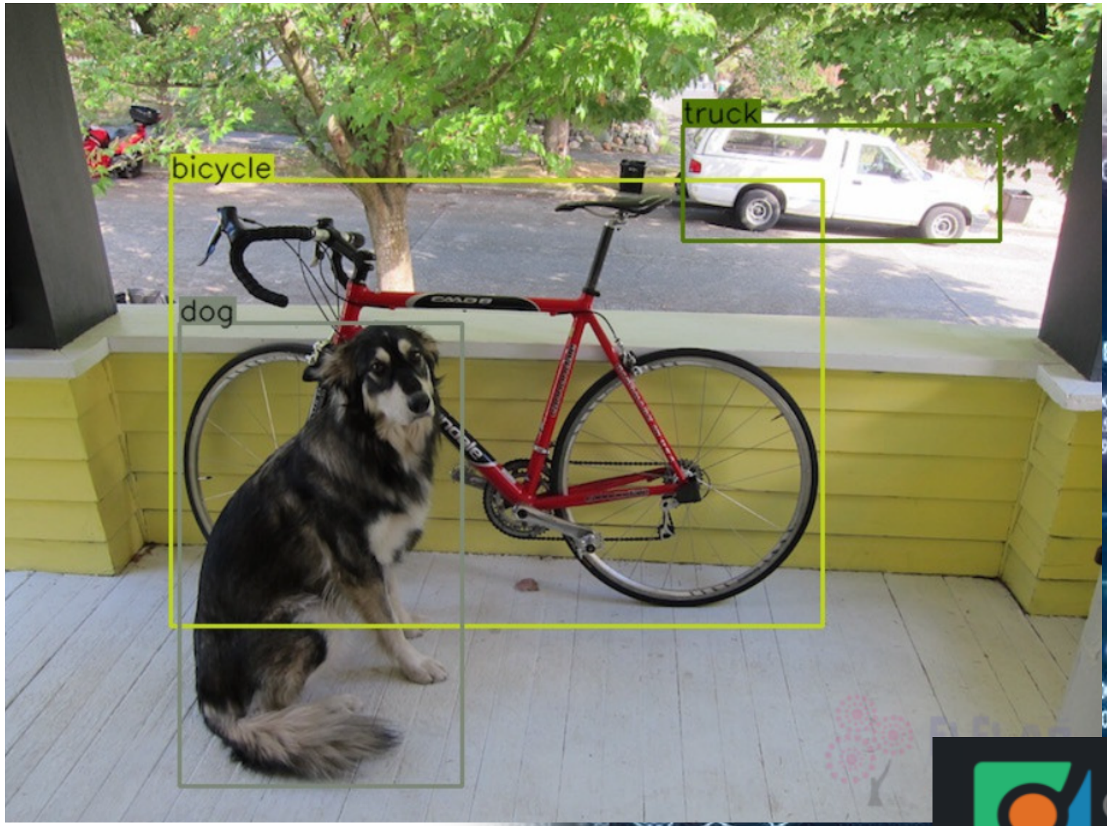


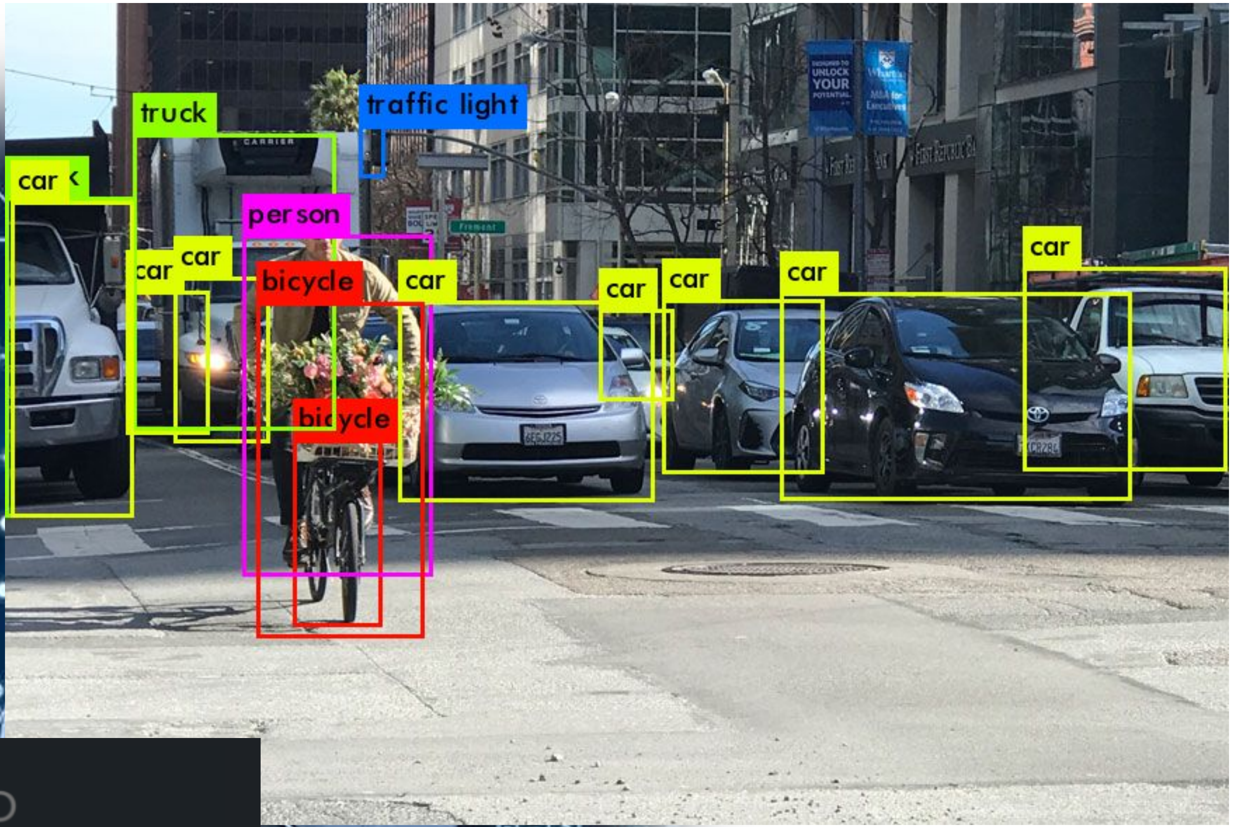
# 介紹



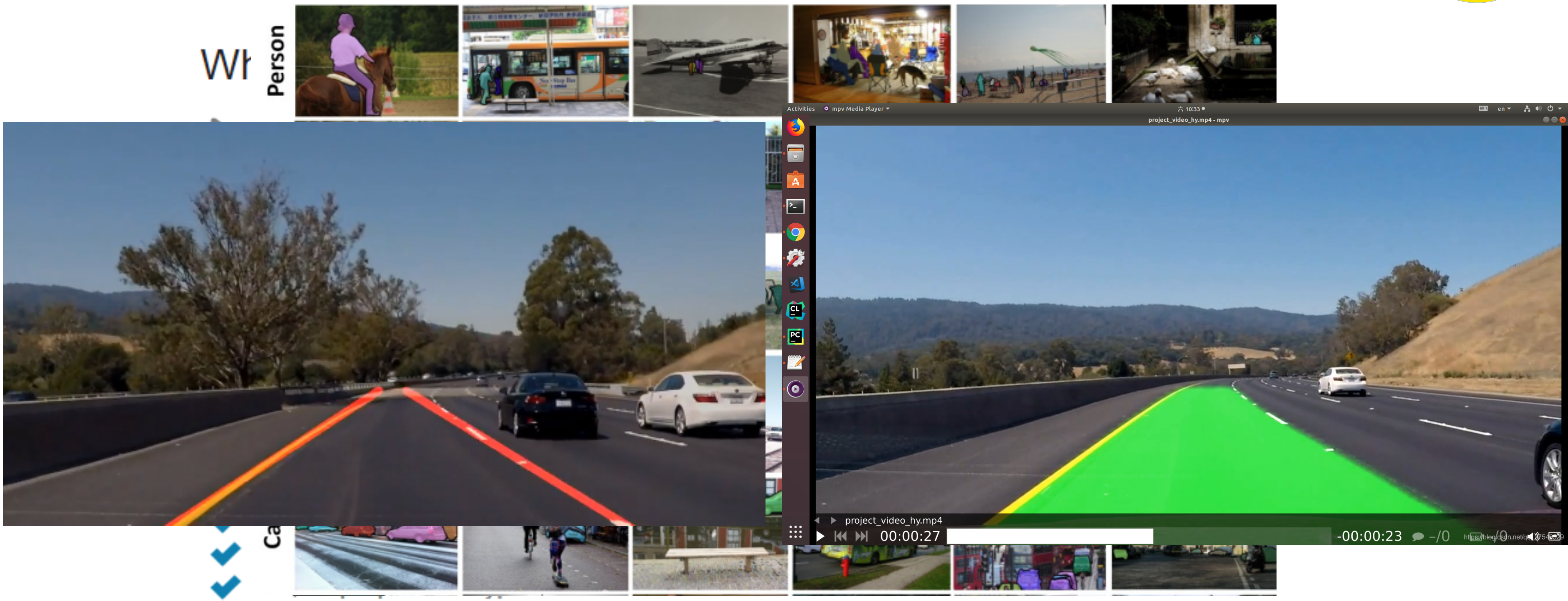
# 介紹




COCO
Common Objects in Context

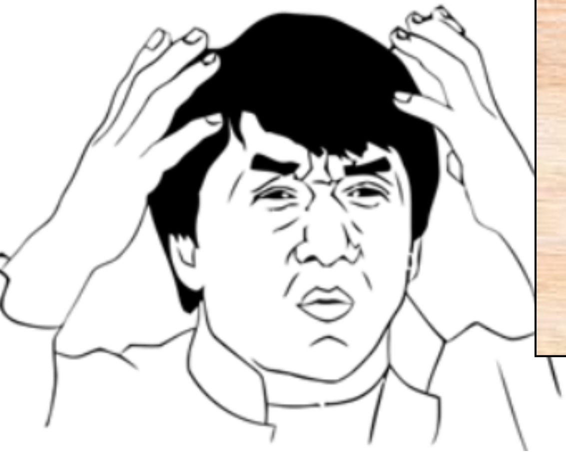
# 介紹




主流目標檢測數據集：COCO
以及基於機器視覺的自動駕駛應用

# 中藥目標檢測數據集的表示

?



# 研究基礎

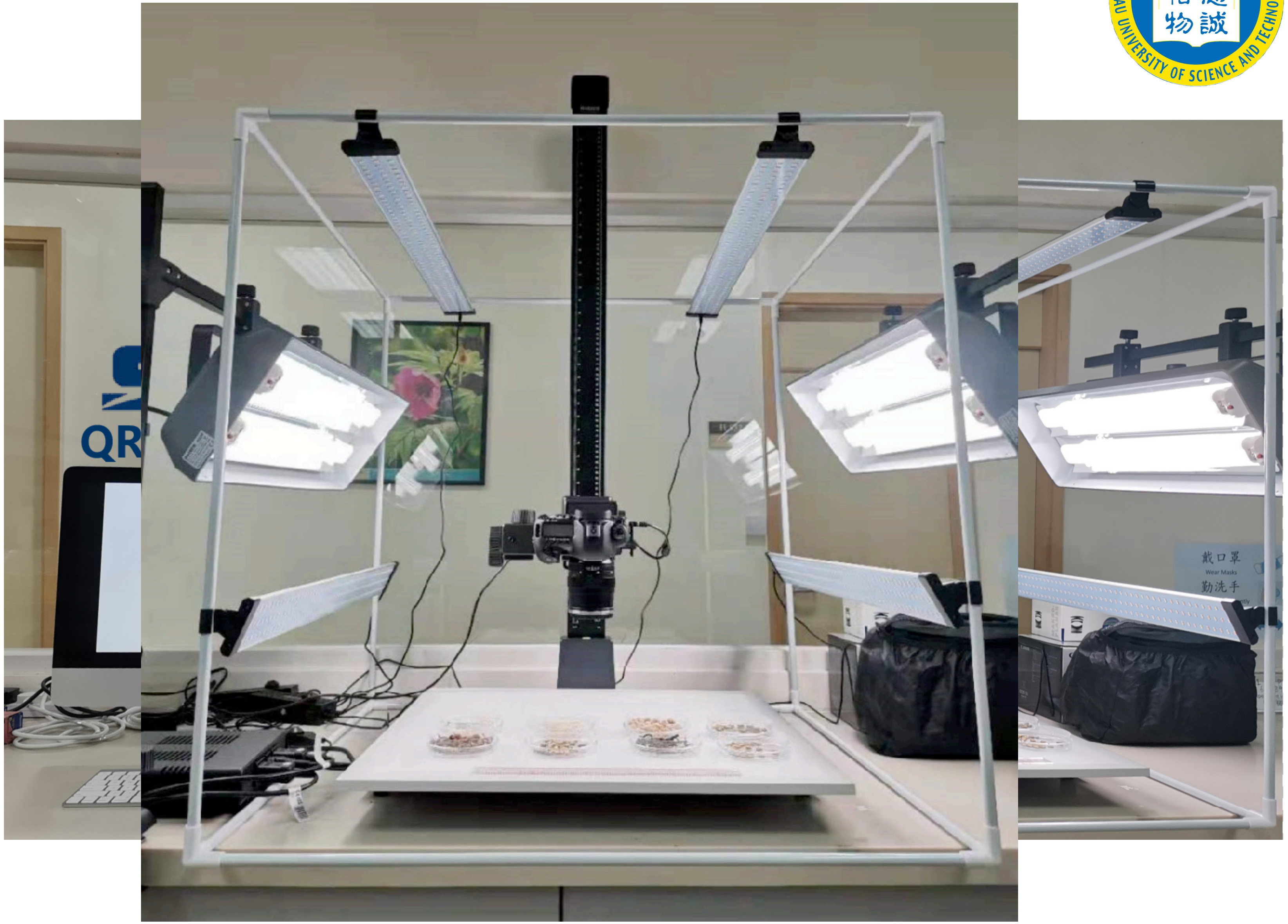

**A. Image Recognition of Chinese herbal pieces Based on Multi-task Learning Model**


**B. Automatic Classification of Chinese Herbal Based on Deep Learning Method**

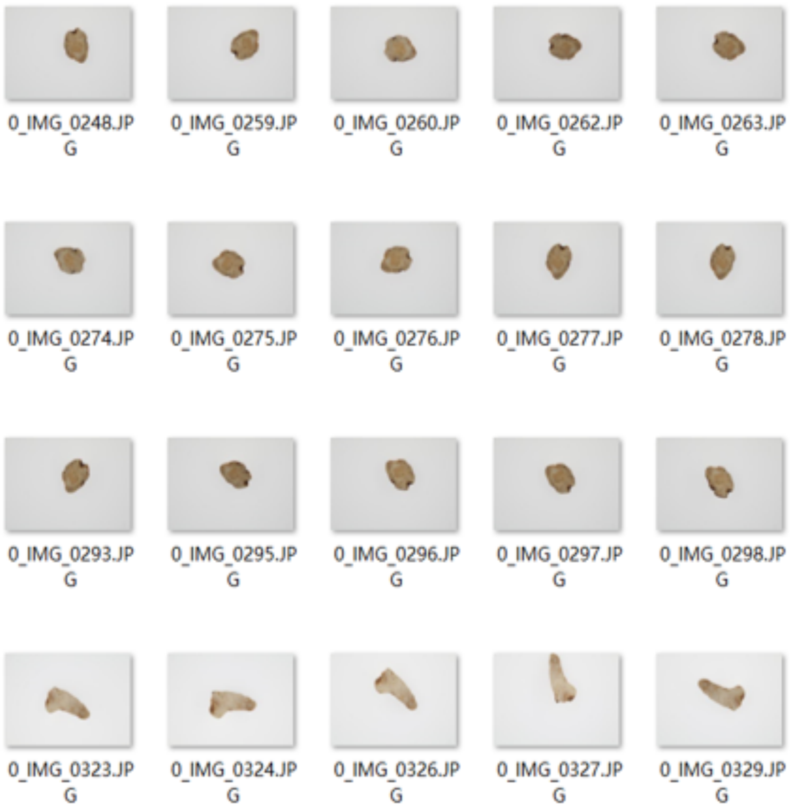

**C. Identification of Chinese herbal based on convolutional neural network**

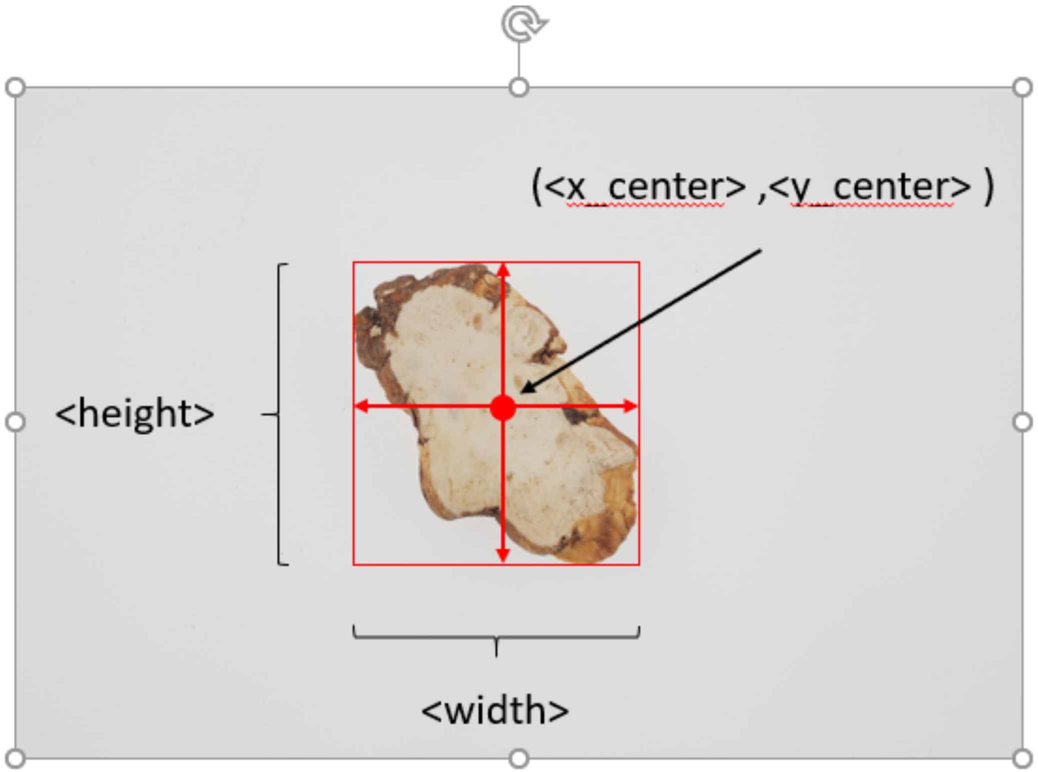
- The method used
  - SVM
  - LeNet
  - Inception-v3
  - Multi-task Learning

# 中藥目標檢測數據集製作



# 中藥目標檢測數據集的表示



# 數據集標簽示例

松貝

豆蔻

北柴胡

冬蟲夏草（野生）

# 目標檢測算法主要流程

**特徵提取**

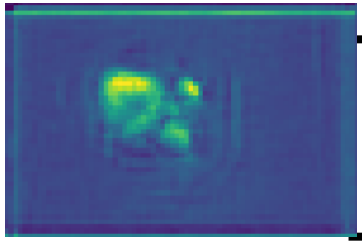
提取輸入圖像的特徵圖

**特徵融合**

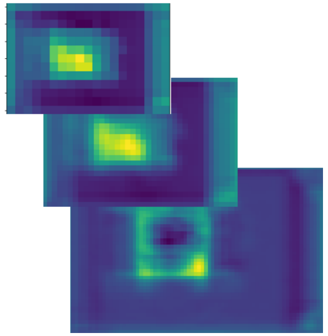
將提取到的不同尺寸的特徵進行整合

**檢測輸出**

精細微調識別框獲取目標類別資訊



**卷積神經網路**
（骨幹網）



**特徵金字塔**
（網路瓶頸層）


**檢測器**
（輸出類別）

# 基礎方法實驗結果（單目標）









**Environment:**
GPU: Nvidia V100
OS: Ubuntu 16.04 with docker Jupyterlab

# 基礎方法實驗結果（多目標）

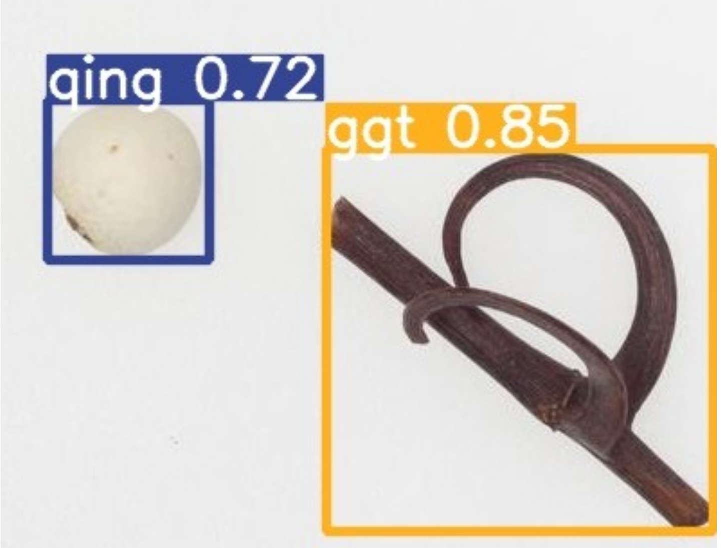




**實驗服務器環境:**
GPU: Nvidia V100
OS: Ubuntu 16.04 with docker Jupyterlab

# 基於BiFPN 優化的特徵融合方式

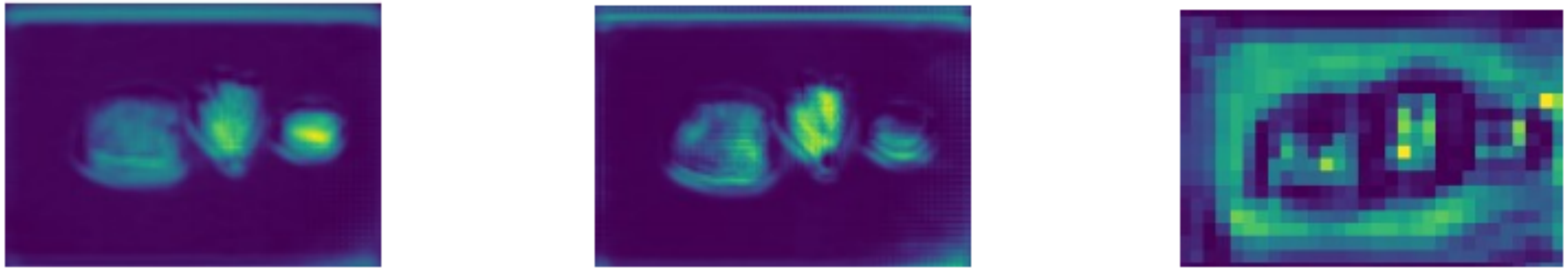




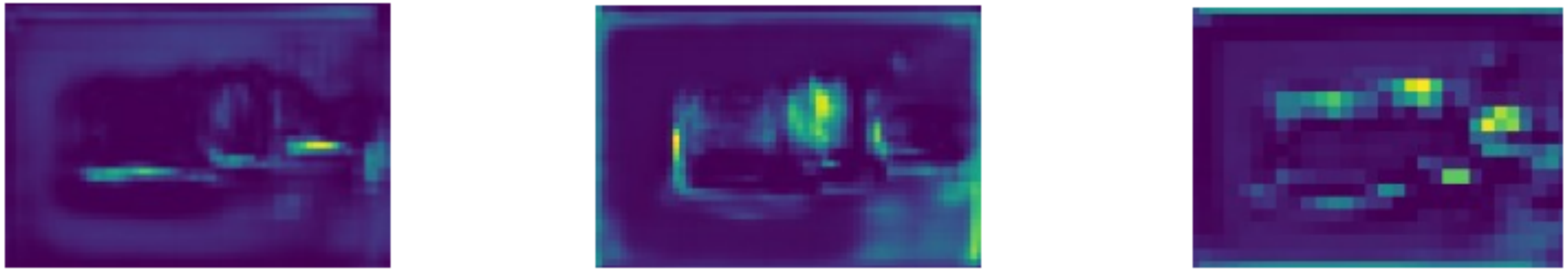



**Environment:**
GPU: Nvidia V100
OS: Ubuntu 16.04 with docker
Jupyterlab
Model: YOLOv5x baseline+BiFPN

# 特徵圖結果對比：改進方法vs 基礎方法



(a) BiFPN Feature fusion C3 neck



(b) PANet

**實驗環境:**

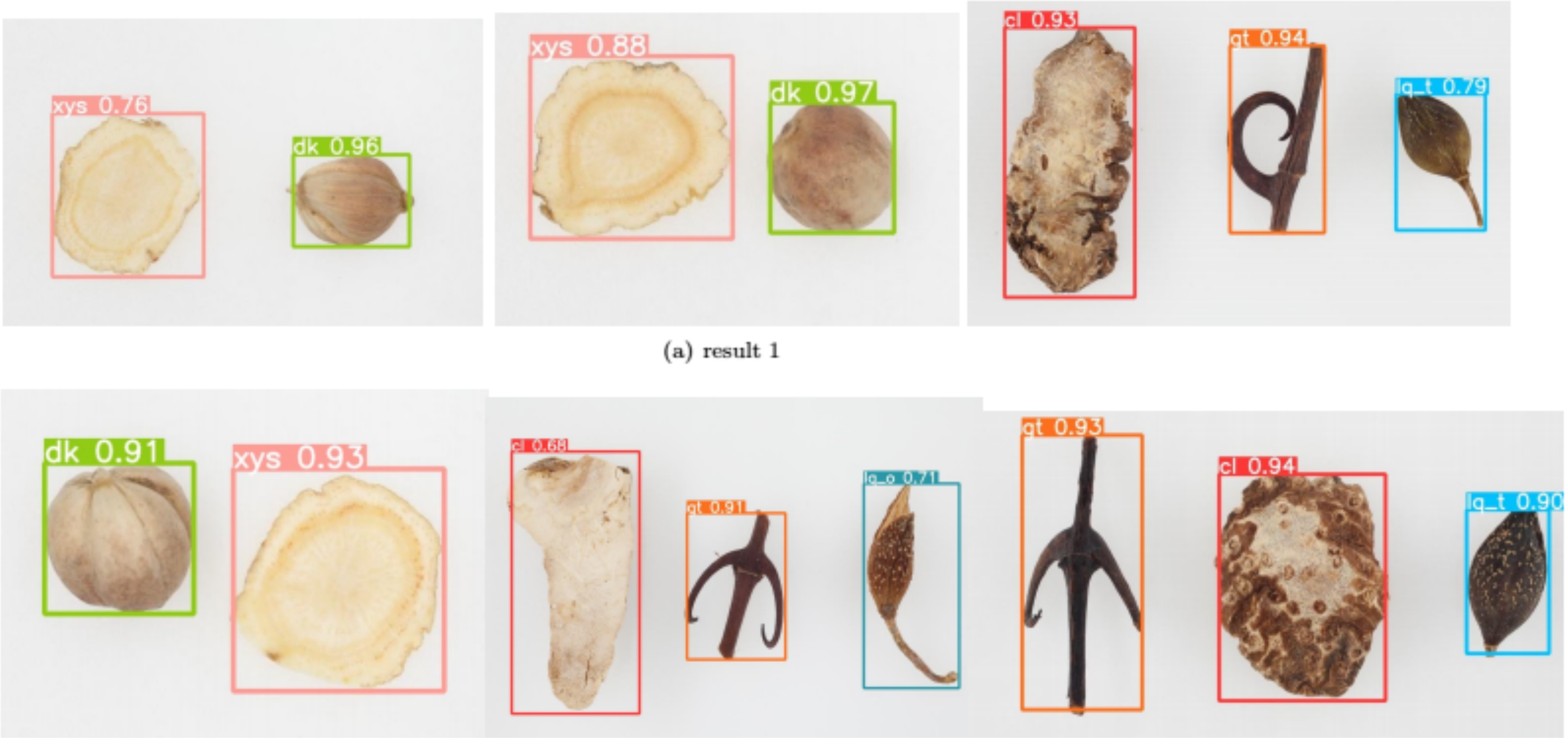
GPU: Nvidia V100

OS: Ubuntu 16.04 with docker

Jupyterlab

Model: YOLOv5x baseline+BiFPN

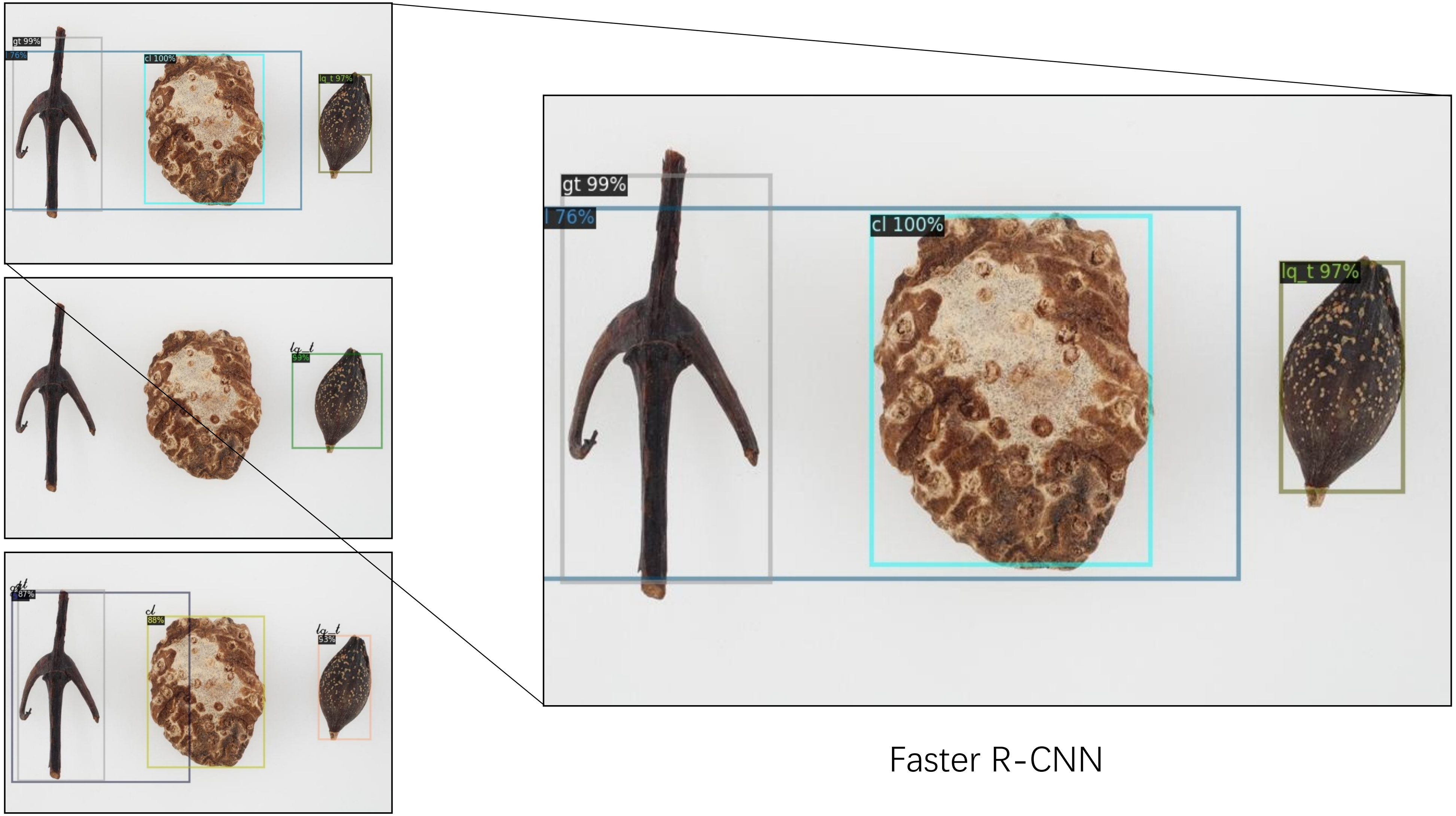
# 傳統卷積算法 vs 可變性卷積算法




(a) result 1

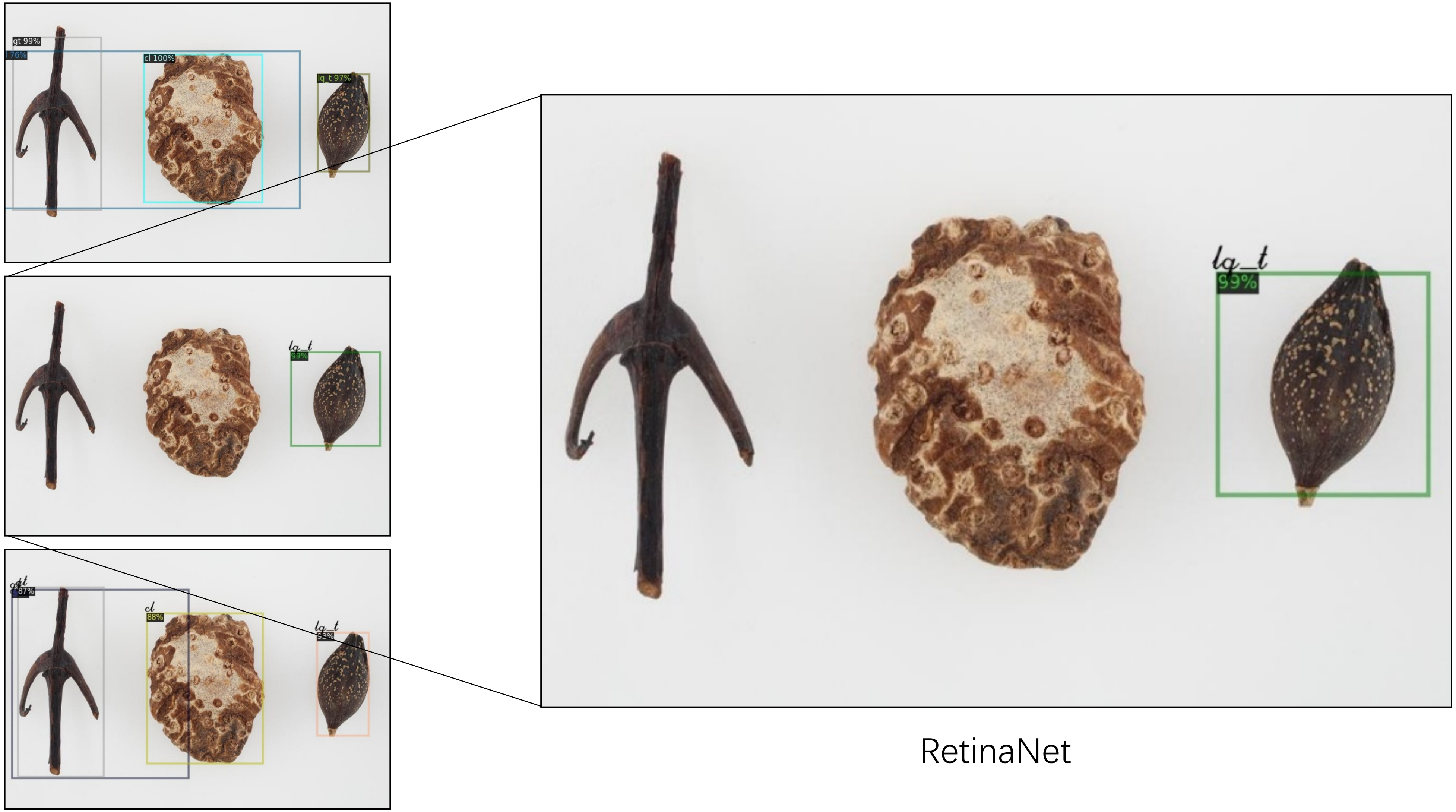
**實驗環境:**
GPU: Nvidia V100
OS: Ubuntu 16.04 with docker
Jupyterlab
Model: YOLOv5x
baseline+BiFPN+deformed conv

# 各種基礎網絡結果對比




Faster R-CNN

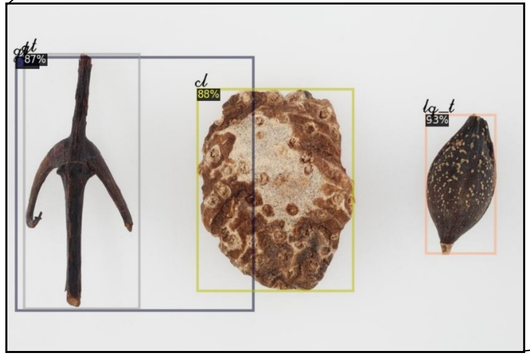
# 各種網絡結果對比




RetinaNet

# 各種基礎網絡結果對比

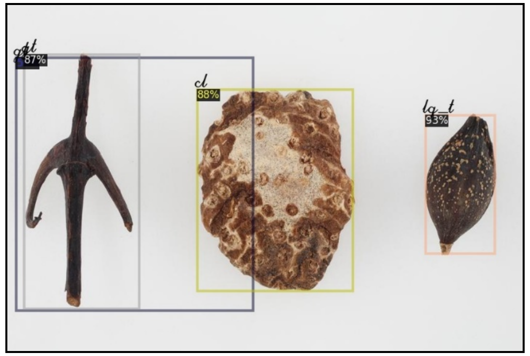






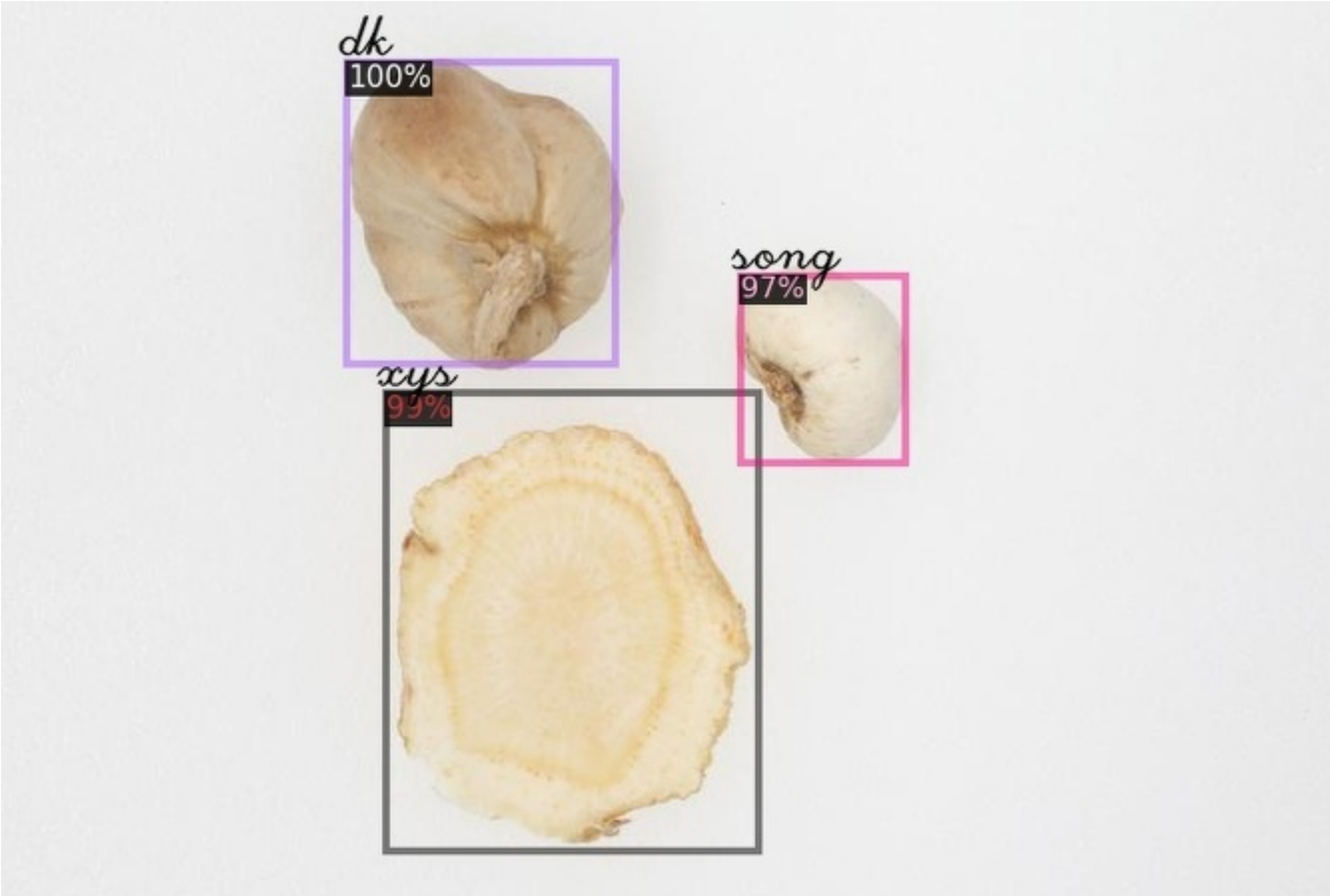
FCOS

# 各種基礎網絡結果對比

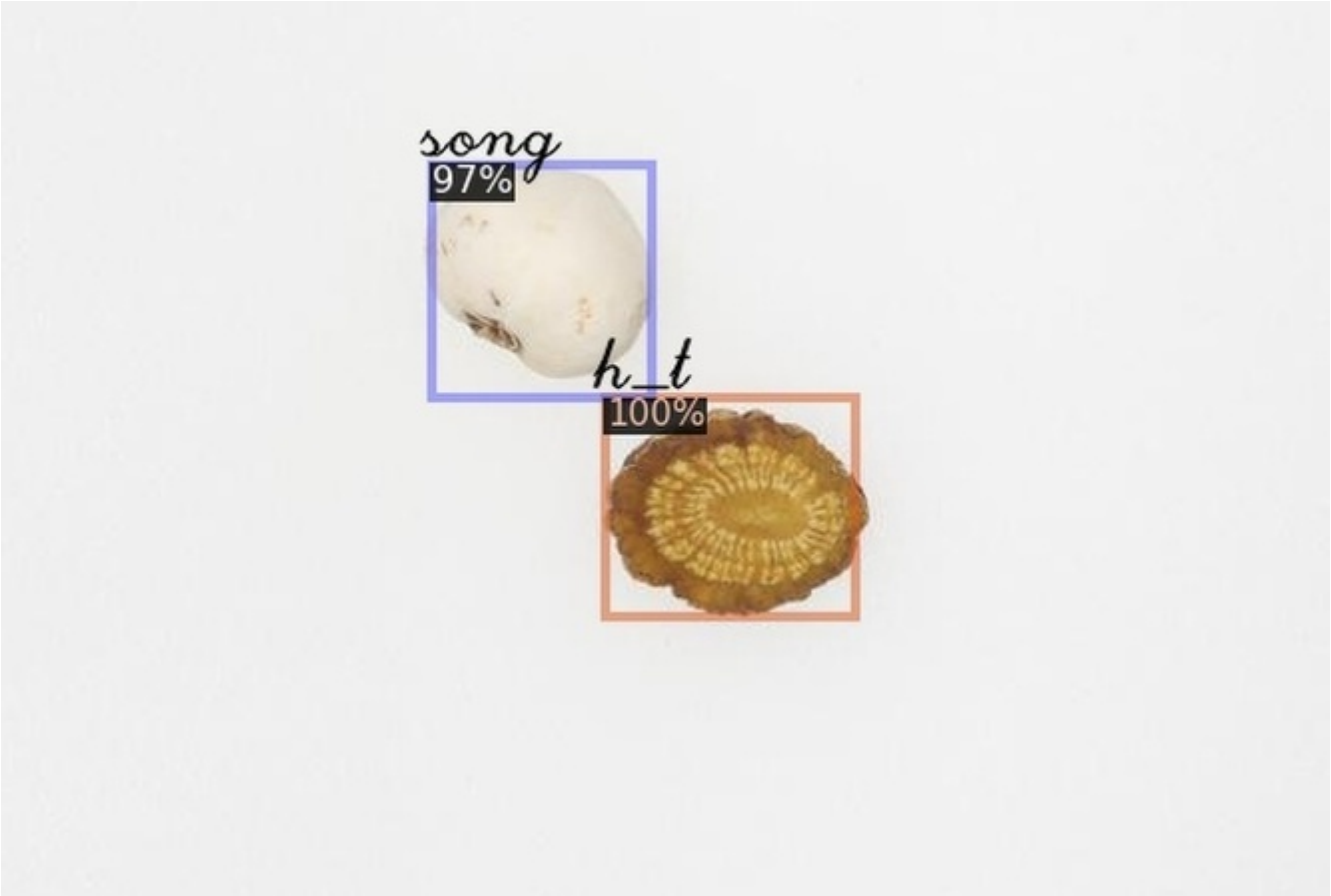




CHM識別網路

# CHM識別網路識別結果

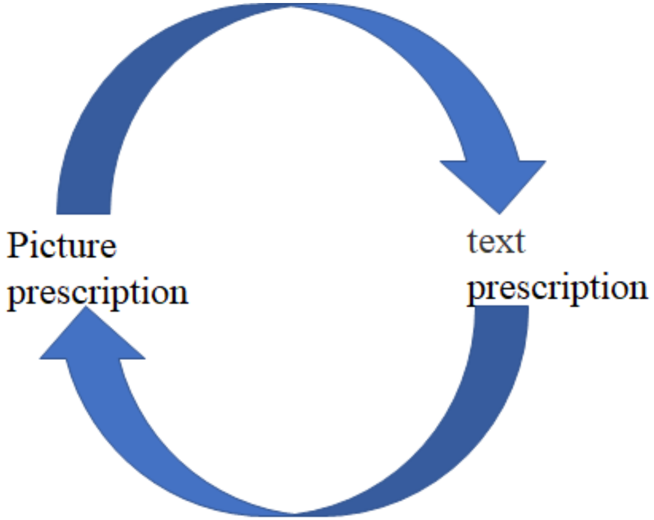


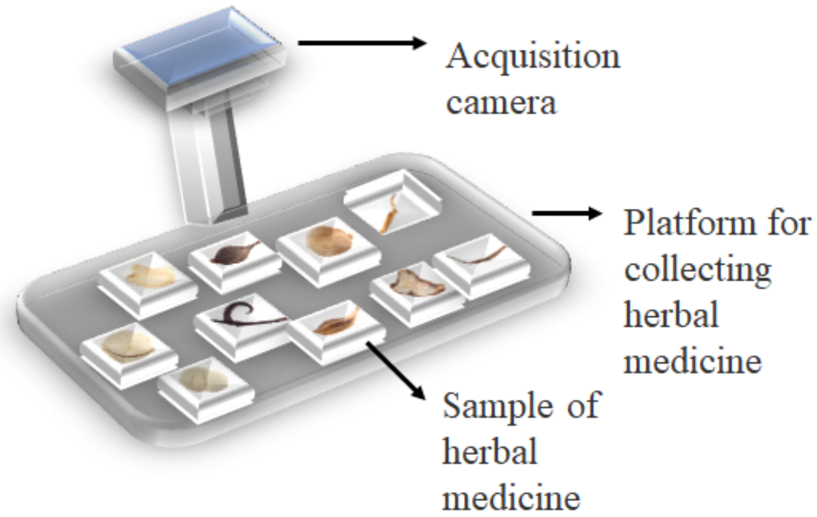
# CHM識別網路識別結果

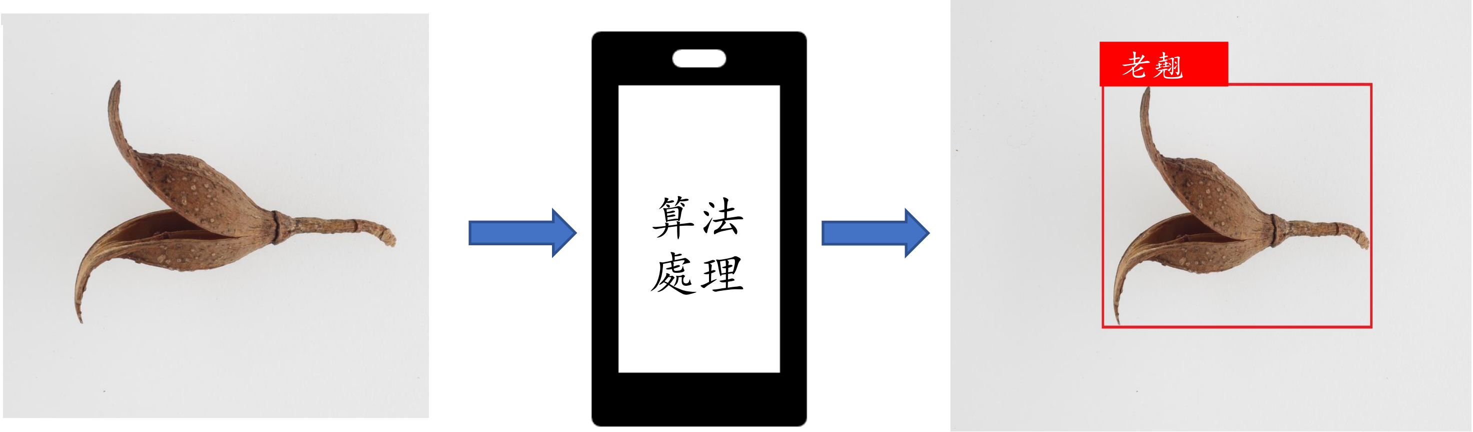


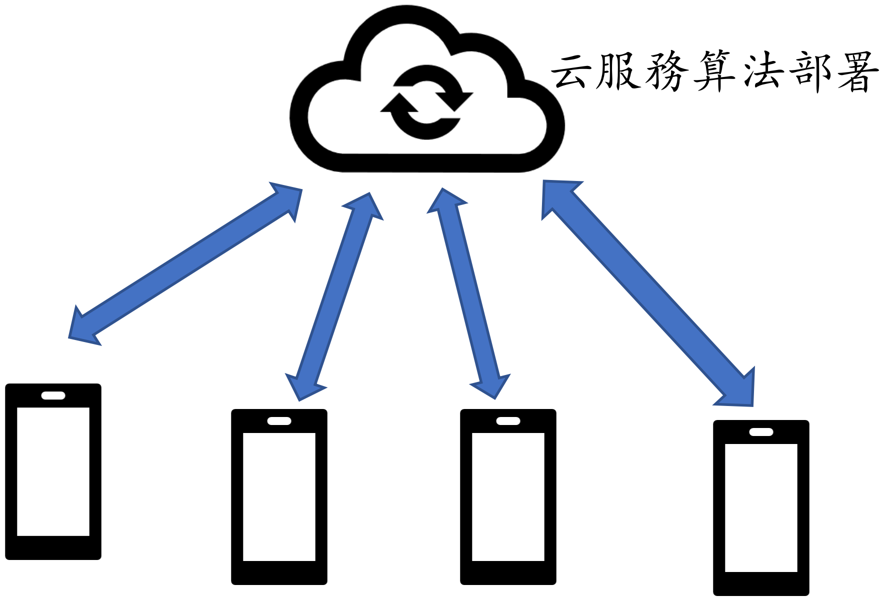
# CHM識別網路識別結果

# 應用前景


Picture prescription
text prescription


Acquisition camera
Platform for collecting herbal medicine
Sample of herbal medicine


算法處理
老翹


云服務算法部署

# Thank You!

感謝澳門科學技術發展基金資助