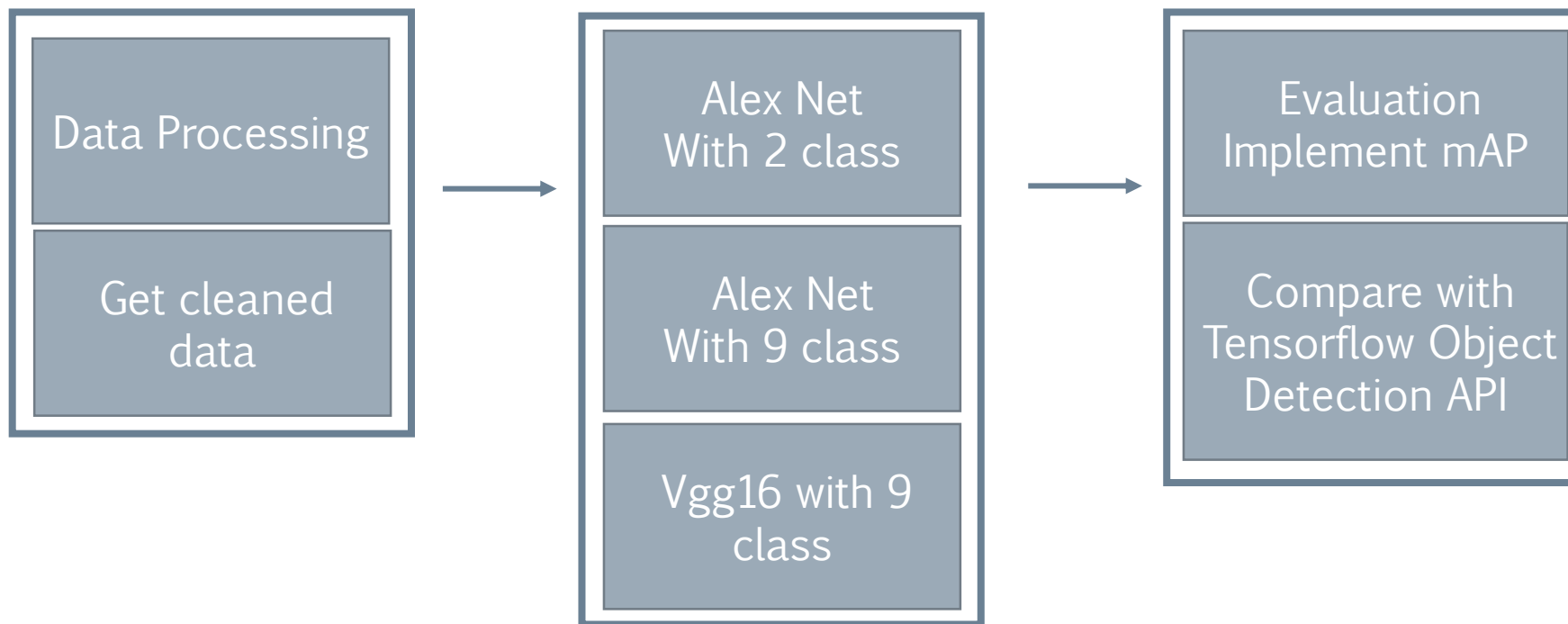


Final Project

Traffic Sign Detection

蔡昀芸 A061054

π



Data Set

- › Single Shot MultiBox Detector (SSD) in TensorFlow
- › Use LISA Traffic Sign Dataset 47 distinct traffic sign class
- › 10 class
 - › 1,stop
 - › 2,pedestrianCrossing
 - › 3,keepRight
 - › 4,laneEnds
 - › 5,merge
 - › 6,signalAhead
 - › 7,speedLimit25
 - › 8,speedLimit35
 - › 9,yield

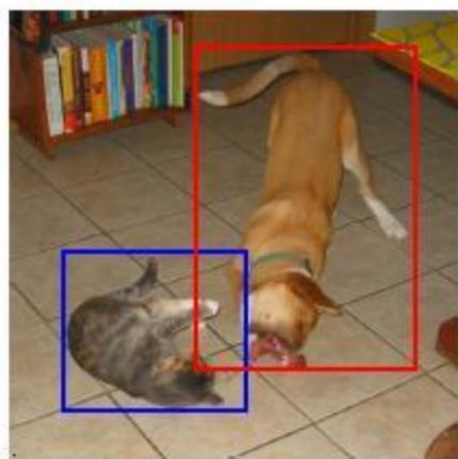
Table 3.1: The content of the LISA Traffic Sign Dataset broken down by sign type.

294	addedLane	34	slow
37	curveLeft	11	speedLimit15
50	curveRight	349	speedLimit25
35	dip	140	speedLimit30
23	doNotEnter	538	speedLimit35
9	doNotPass	73	speedLimit40
2	intersection	141	speedLimit45
331	keepRight	48	speedLimit50
210	laneEnds	2	speedLimit55
266	merge	74	speedLimit65
47	noLeftTurn	132	speedLimitUrdbl
26	noRightTurn	1821	stop
1085	pedestrianCrossing	168	stopAhead
11	rampSpeedAdvisory20	5	thruMergeLeft
5	rampSpeedAdvisory35	7	thruMergeRight
3	rampSpeedAdvisory40	19	thruTrafficMergeLeft
29	rampSpeedAdvisory45	60	truckSpeedLimit55
16	rampSpeedAdvisory50	32	turnLeft
3	rampSpeedAdvisoryUrdbl	92	turnRight
77	rightLaneMustTurn	236	yield
53	roundabout	57	yieldAhead
133	school	21	zoneAhead25
105	schoolSpeedLimit25	20	zoneAhead45
925	signalAhead		

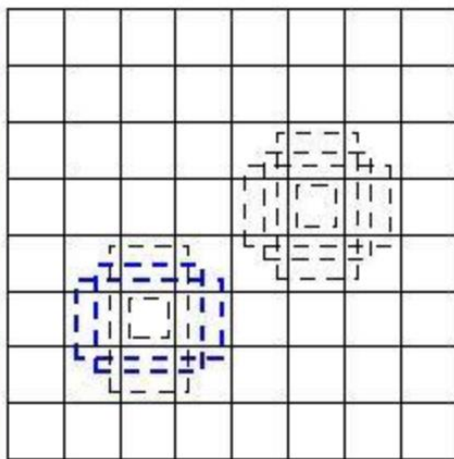
In total: 7855 sign annotations

Object Detection: SSD

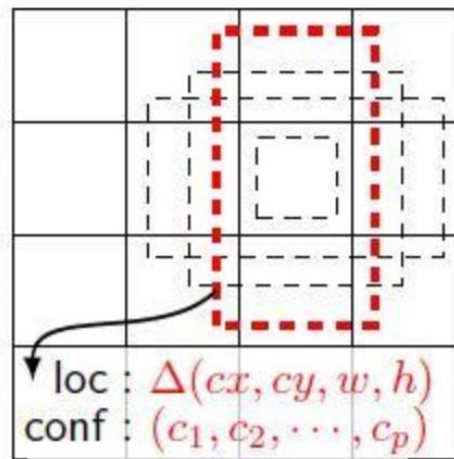
- › Single Shot Multibox Detector
- › 直接預測 Bounding Box 座標 和 類別
- › 沒有生成 proposal 的過程
- › 在每一個 convolution layer 產生的 feature map 加入 default box
- › 根據 feature map 的大小去 scale 若干個相對應大小的 Default box



(a) Image with GT boxes



(b) 8×8 feature map



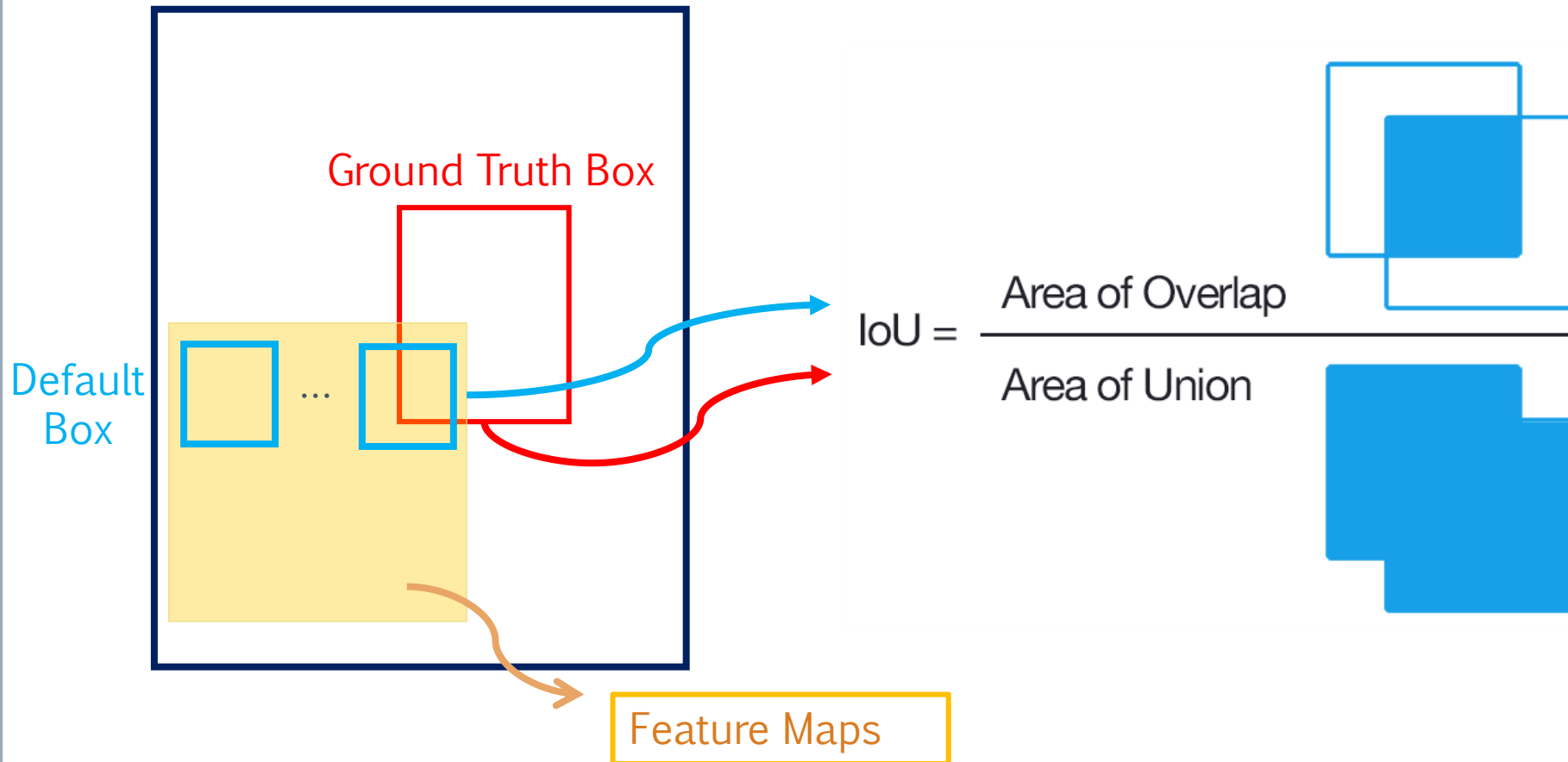
(c) 4×4 feature map

Data Preprocessing

- › Split Data : Train => 95 Test => 5
- › Scale to Gray scale
- › Resized into 400 * 260
- › Find matching default box
- › Sign_Class & Box Coordinates
- › Stop.png {Class : 1, Coords: [100,140,105,135]}

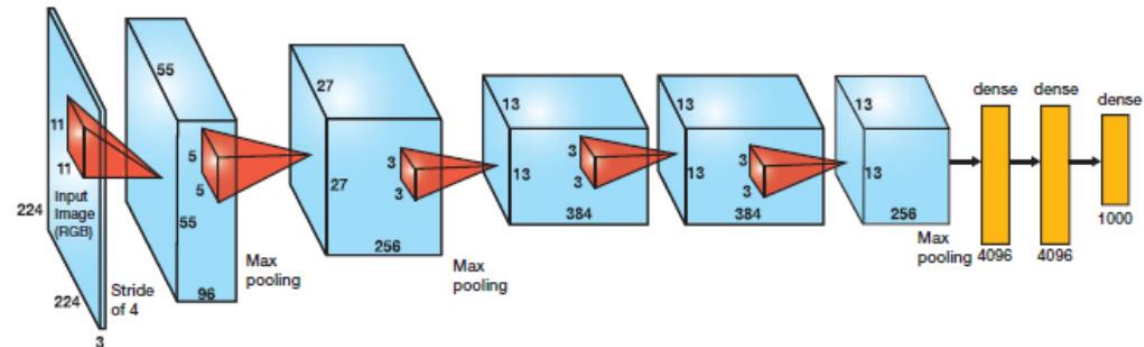
π

Data Preprocessing



π

Alex Net



AP for 1 = 0.0225
AP for 2 = 0.0000
AP for 3 = 0.2969
AP for 4 = 0.2267
AP for 5 = 0.0055
AP for 6 = 0.0746
AP for 7 = 0.0588
AP for 8 = 0.0293
AP for 9 = 0.0909
Mean AP = 0.0895

Figure 1

Epoch : 50

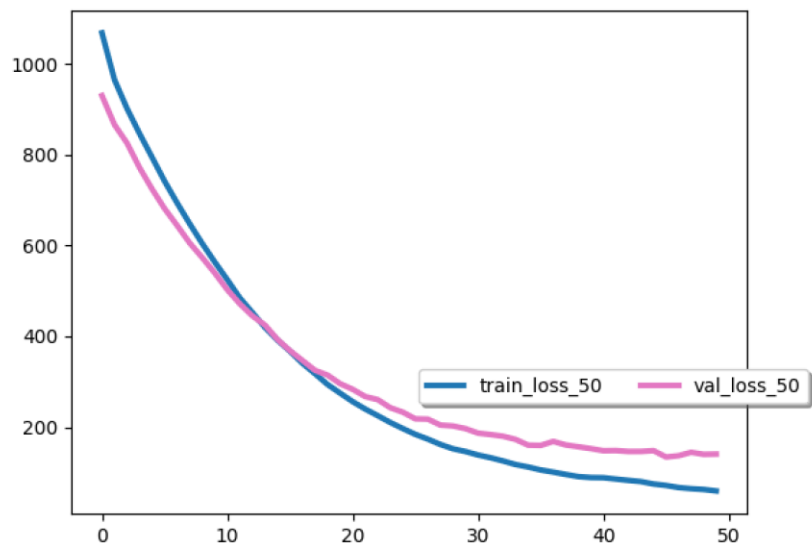
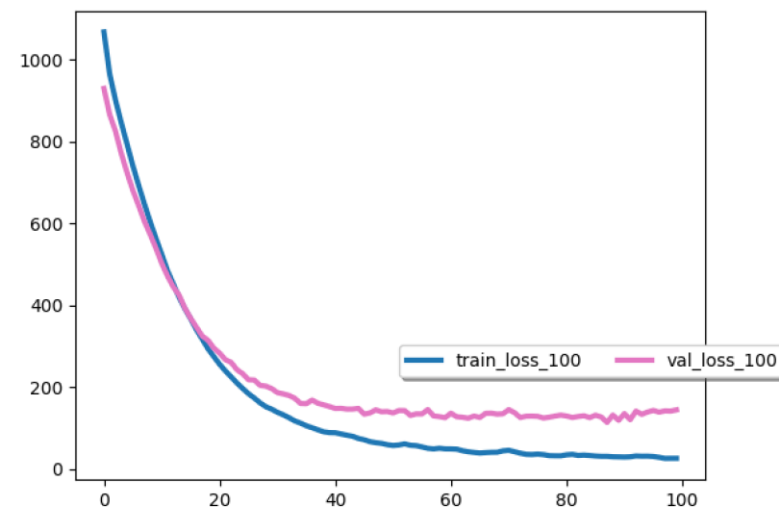


Figure 1

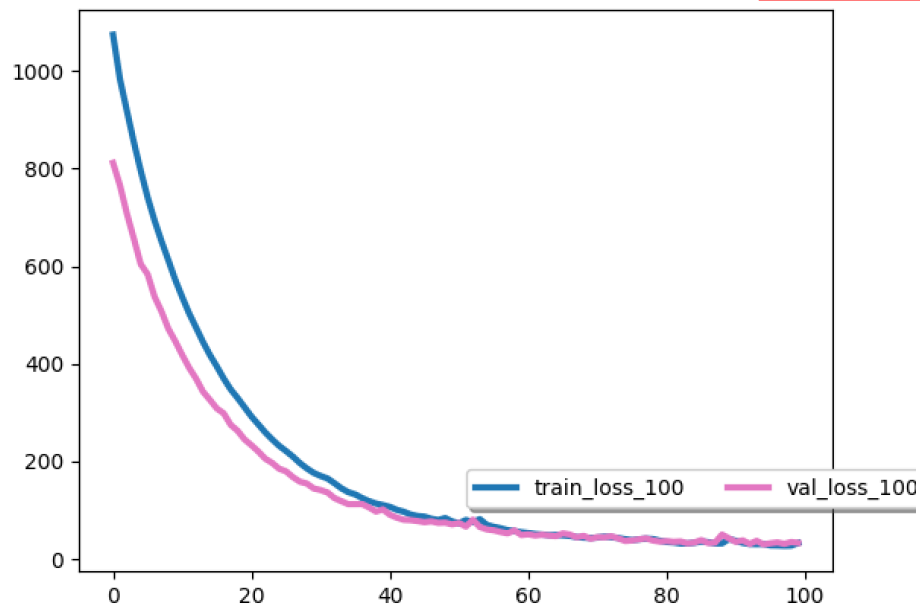
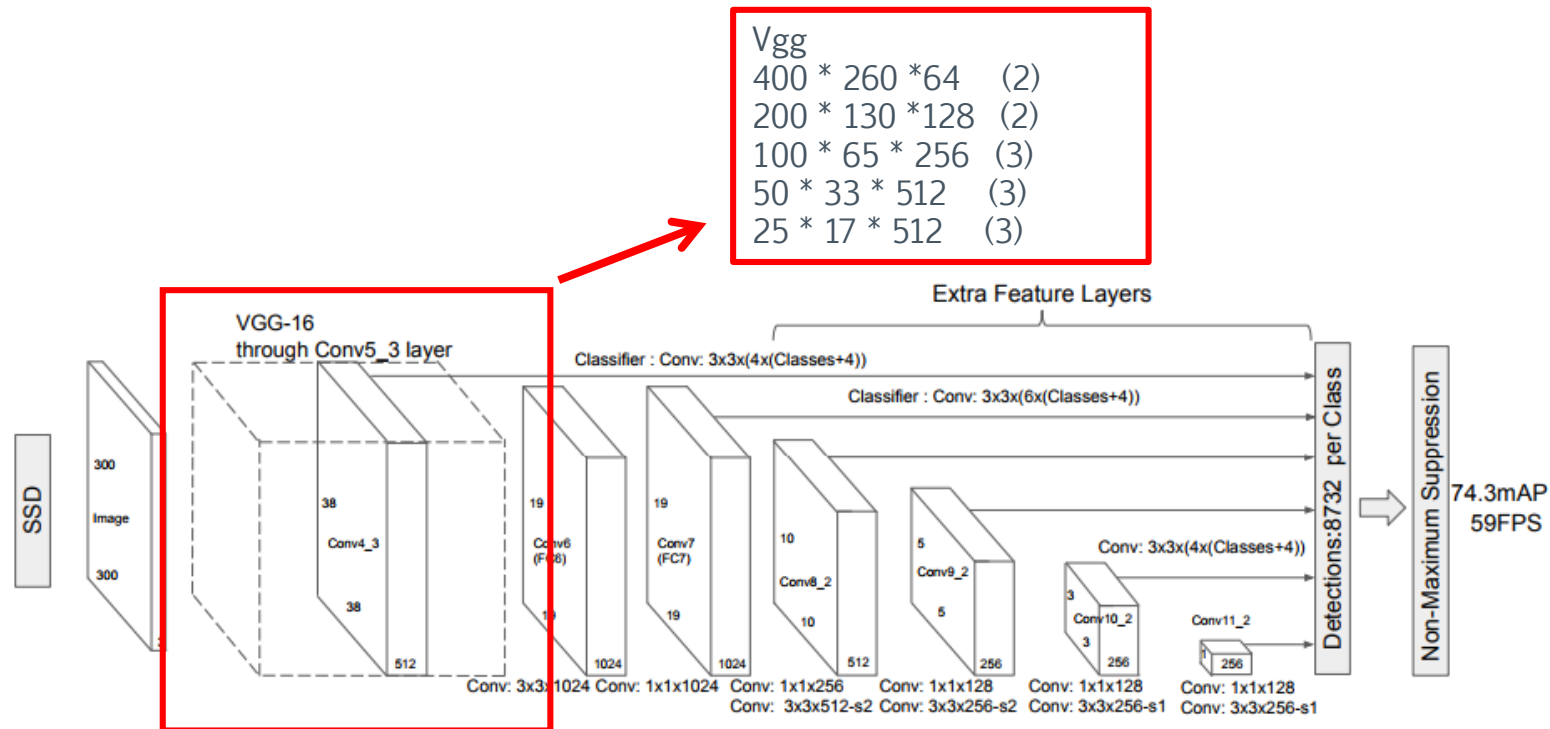
Epoch : 100



π

VGG16 + SSD

Figure 1



Epoch : 90

AP for 1 = 0.5036
AP for 2 = 0.0000
AP for 3 = 0.2455
AP for 4 = 0.5514
AP for 5 = 0.6308
AP for 6 = 0.5072
AP for 7 = 0.5376
AP for 8 = 0.6463
AP for 9 = 0.0624
Mean AP = 0.4094

Epoch : 100

AP for 1 = 0.4092
AP for 2 = 0.0000
AP for 3 = 0.6024
AP for 4 = 0.7667
AP for 5 = 0.6308
AP for 6 = 0.4113
AP for 7 = 0.8603
AP for 8 = 0.6553
AP for 9 = 0.1515
Mean AP = 0.4986

π

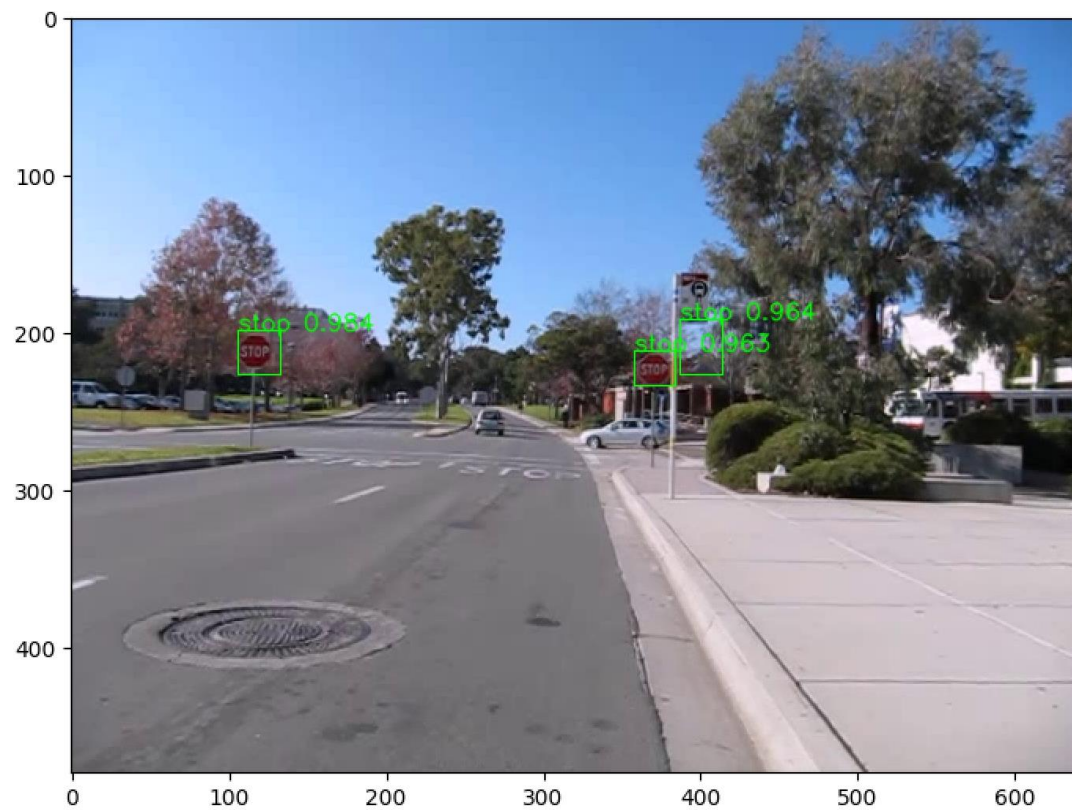
Compare : Tensorflow ObjectDetection API

```
AP for 1 = 0.4554  
AP for 2 = 0.0000  
AP for 3 = 0.6024  
AP for 4 = 0.6709  
AP for 5 = 0.7063  
AP for 6 = 0.3541  
AP for 7 = 0.8603  
AP for 8 = 0.6638  
AP for 9 = 0.2471  
Mean AP = 0.5067
```



π

AlexNet Epoch:100



Vgg16 Epoch:100



π

AlexNet Epoch:100



Vgg16 Epoch:100

