AI를 활용한 Container 번호 인식

목차

Container 번호 의미 ?

Container 소유자(업체)들은 Container 의 국제적인 식별 부호를
"BIC[Bureau International des Containers et du Transport Intermodal (B.I.C.) Codes]" 또는 "ISO Alpha-codes" 라고 부르고 있다

1. PREFIX 의 영문자 네자리를 아래 표를 이용하여 숫자로 환산 한다

A 10	H 18	O 26	V 34
B 12	I 19	P 27	W 35
C 13	J 20	Q 28	X 36
D 14	K 21	R 29	Y 37
E 15	L 23	S 30	Z 38
F 16	M 24	T 31	
G 17	N 25	U 32	

ex) KDCU916012 : 21, 14, 13, 32, 9, 1, 6, 0, 1, 2

2. 각 나열된 수의 자리에 가중인수(weighing-factor)를 곱하여 총 더한 합을 계산한다 ex) 첫째 자리수에는 x 1, 둘째 자리수에는 x 2, 셋째 자리수에는 x 4 로 진행한다.

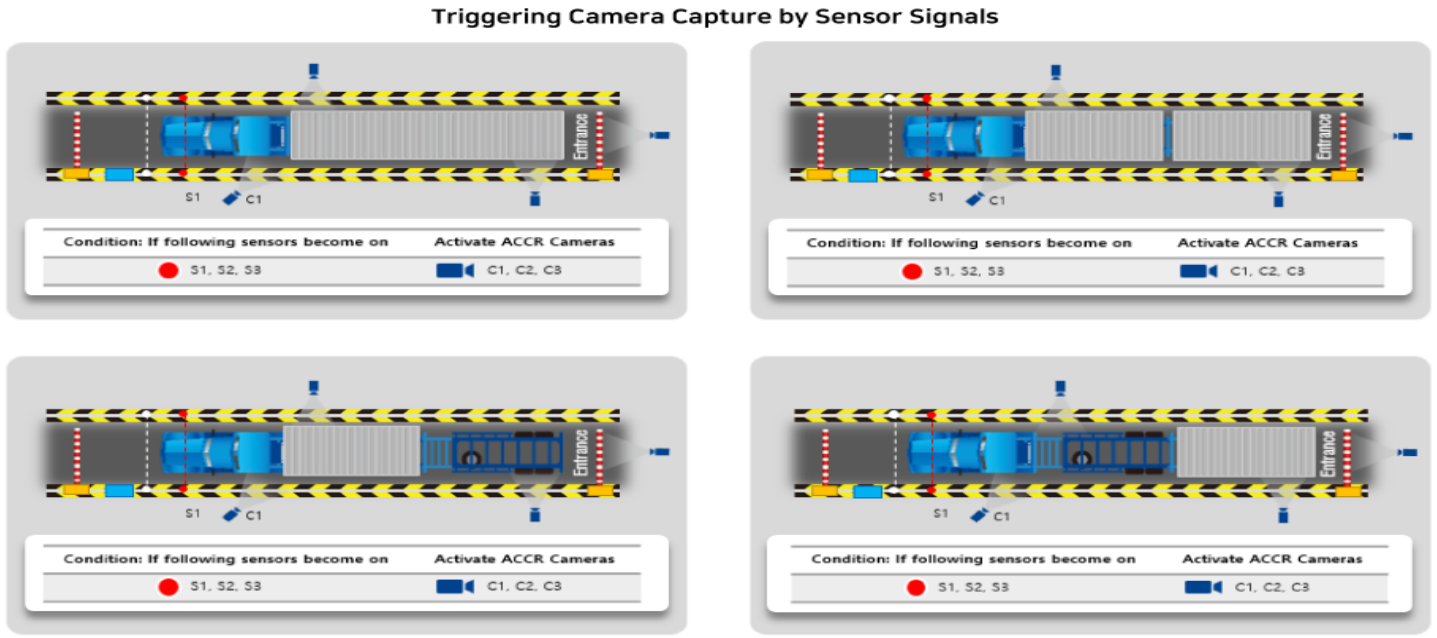
(21x1)+(14x2)+(13x4)+(32x8)+(9x16)+(1x32)+(6x64)+(0x128) +(1x256) +(2x512) = 2197

3. 2번의 총합(2197)에서 11(고정상수)를 나눈 나머지를 구한다.
ex) 2197/11 = 199(나머지 8) -→ 나머지가 10 이면 0 으로 표기 [즉 "0 ~ 9" 까지만 사용]

4. 2번의 총합(2197)에서 11(고정상수)를 나눈 나머지를 구한다.
ex) 2197/11 = 199 (나머지 8)

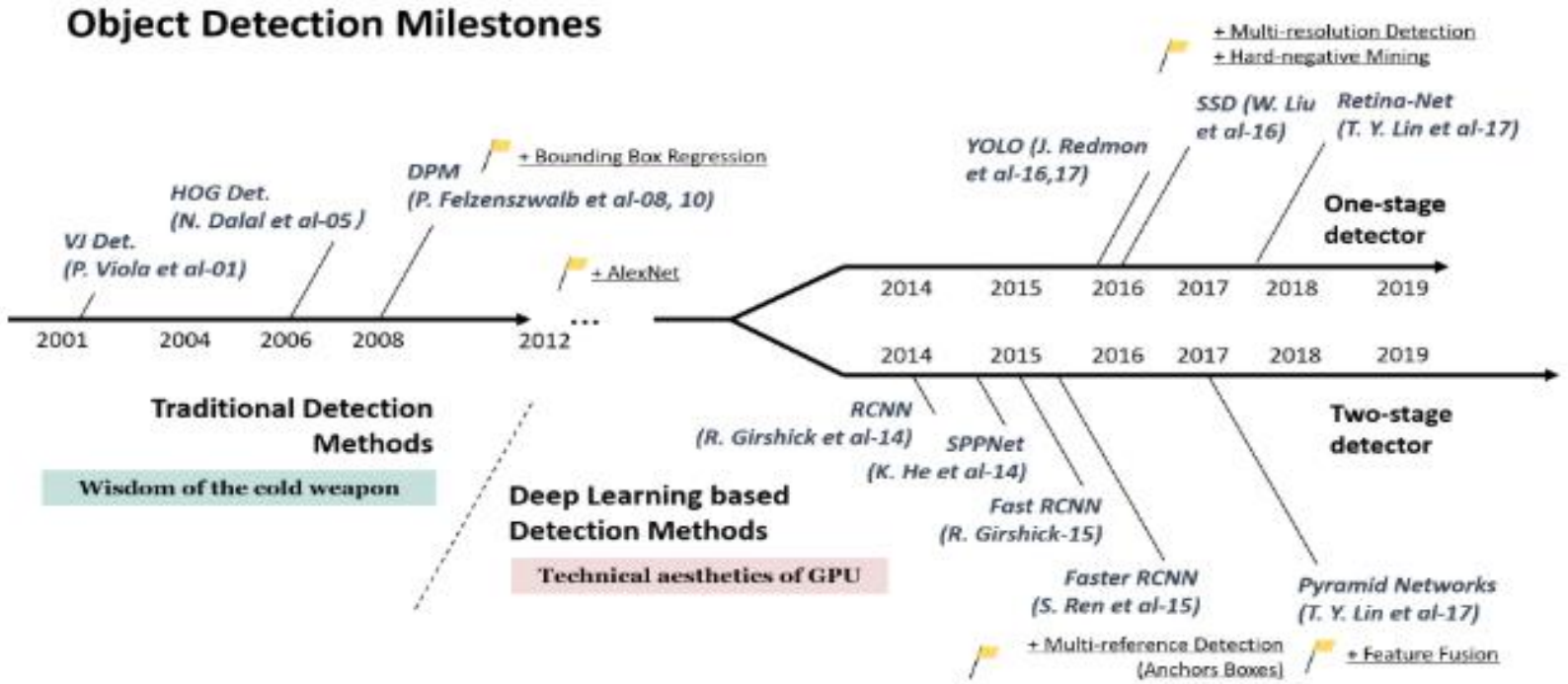
기존 시스템

1. “고정” 적
2. “위치” 적
3. “장치” 적



고안된 시스템의 장점

1. 쉽게 접근이 가능한 Web interface 제공.
2. Catch 된 영상을 Event 화 하여 쉽게 검색 및 확인 할 수 있는 기능 포함.
3. 시스템의 간편한 구성 -> 이동성 에서도 용이함.
4. 원격(Remote)로 서버 제어.
5. 알고리즘 적용 용이.



Step 1: choose and marking the training image Data

Step 2: Configuration set up for Labeling

```
classes= 2
train  = data/train.txt
valid  = data/train.txt
names = data/obj.names
backup = backup/
```

[Object data file]

```
inermis
wild boar
dog
```

[Object name file]

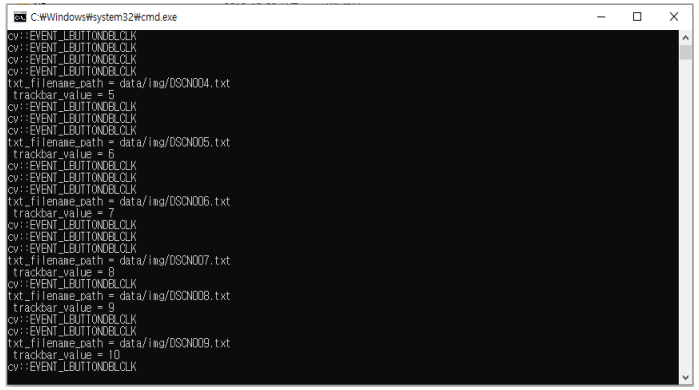
```
[convolutional]
size=1
stride=1
pad=1
filters=40
activation=linear

[region]
anchors = 1.08,1.19,  3.42,4.41,  6.63,11.38,  9.42,5.11,  16.62,10.52
bias_match=1
classes=3
coords=4
num=5
softmax=1
jitter=.2
rescore=1

object_scale=5
noobject_scale=1
class_scale=1
coord_scale=1
```

[.cfg] [Object list file]

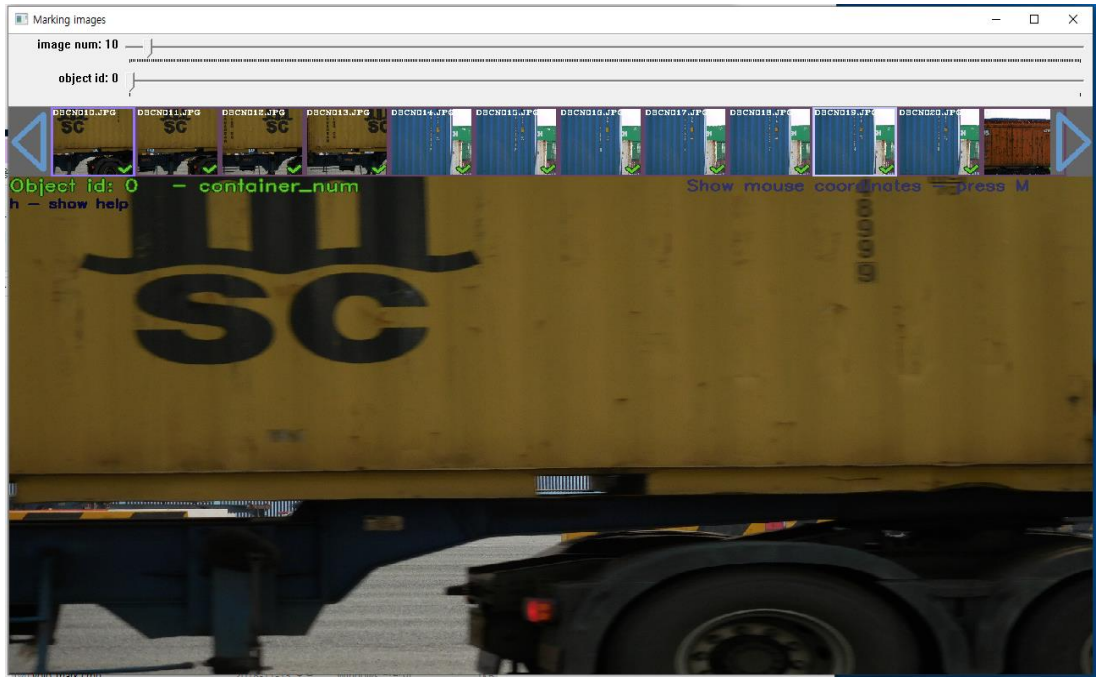
Step 3: training

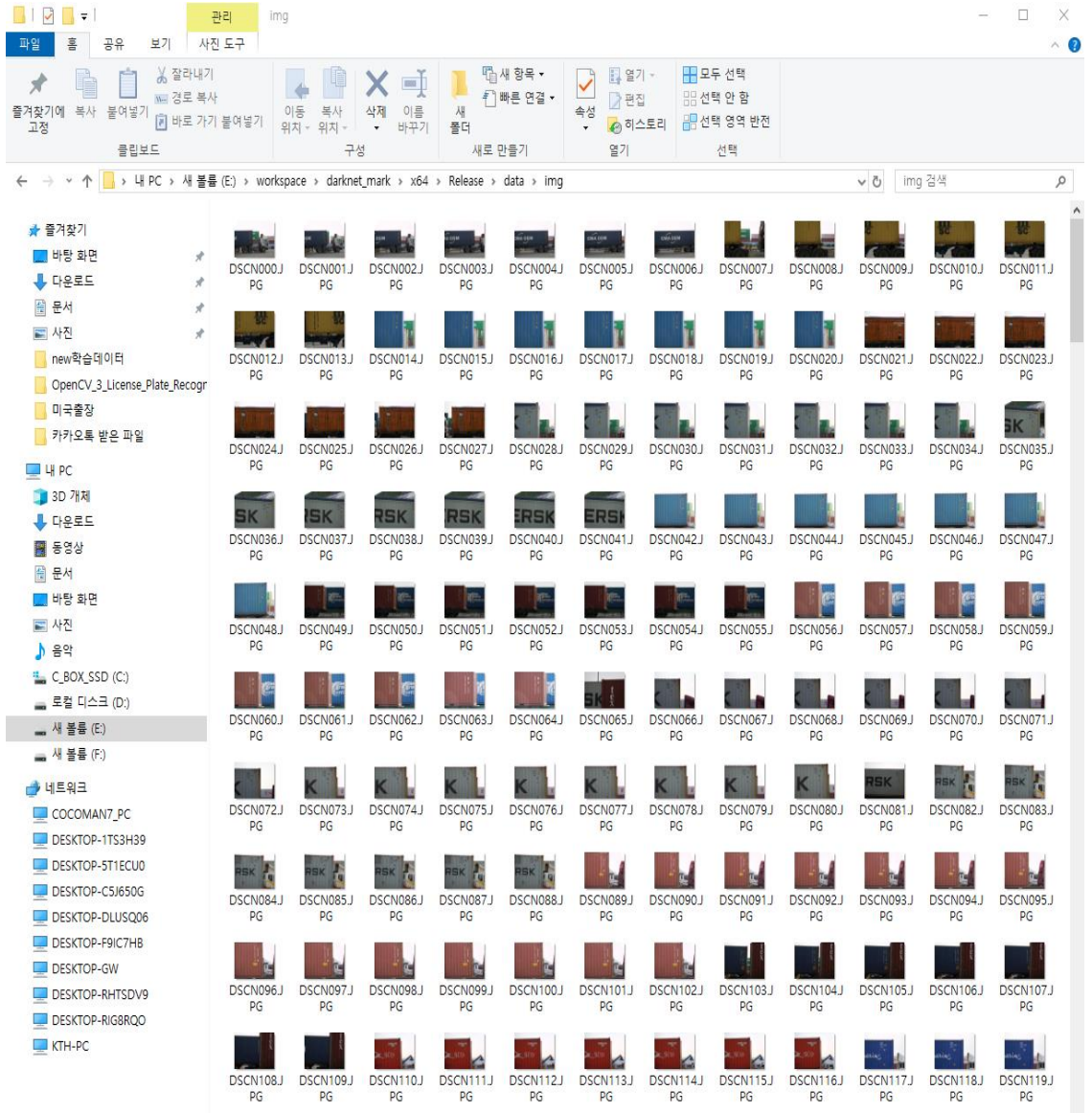
./darknet detector train data/obj.data yolo-obj.cfg darknet19_448.conv.23

Image Data Training



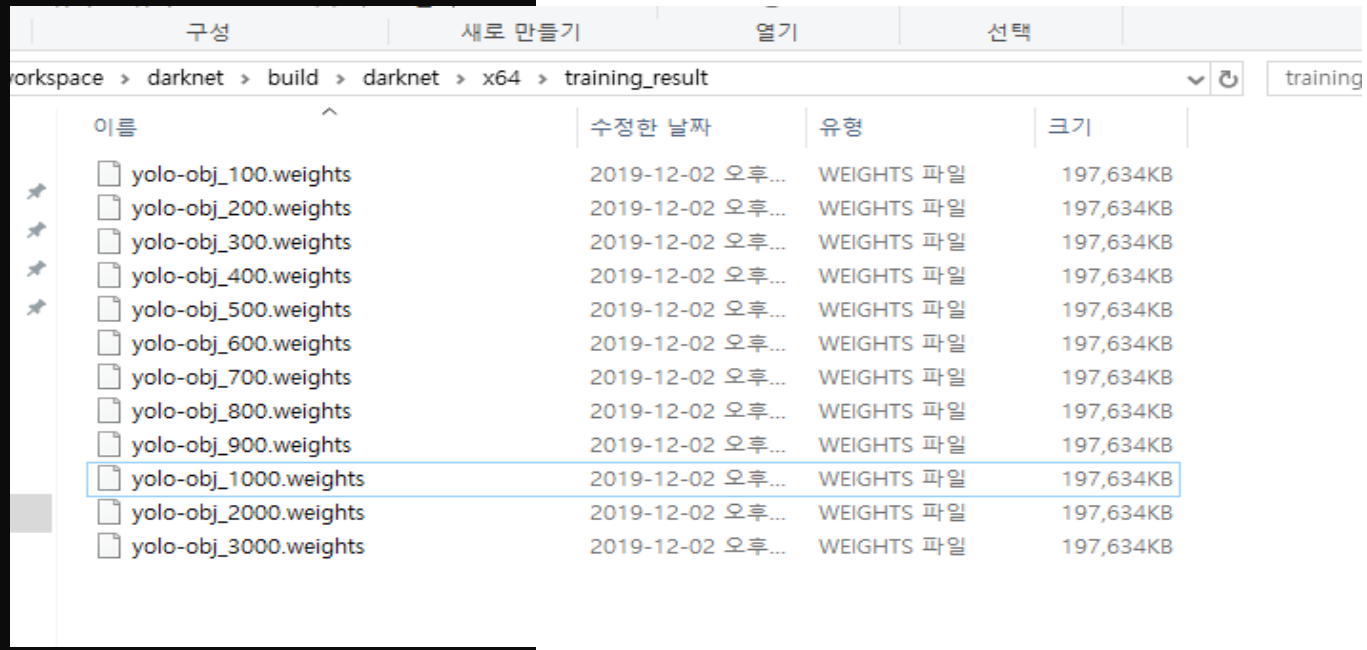
학습 데이터 : 시료 이미지 527개중





Training 과정

```
E:₩workspace₩darknet₩build₩darknet₩x64>darknet.exe detector train data/obj.data yolo-obj.cfg darknet19_448.conv.2
yolo-obj
layer     filters    size              input                output
    0 conv     32  3 x 3 / 1   416 x 416 x   3   ->   416 x 416 x  32
    1 max          2 x 2 / 2   416 x 416 x  32   ->   208 x 208 x  32
    2 conv     64  3 x 3 / 1   208 x 208 x  32   ->   208 x 208 x  64
    3 max          2 x 2 / 2   208 x 208 x  64   ->   104 x 104 x  64
    4 conv    128  3 x 3 / 1   104 x 104 x  64   ->   104 x 104 x 128
    5 conv     64  1 x 1 / 1   104 x 104 x 128   ->   104 x 104 x  64
    6 conv    128  3 x 3 / 1   104 x 104 x  64   ->   104 x 104 x 128
    7 max          2 x 2 / 2   104 x 104 x 128   ->    52 x  52 x 128
    8 conv    256  3 x 3 / 1    52 x  52 x 128   ->    52 x  52 x 256
    9 conv    128  1 x 1 / 1    52 x  52 x 256   ->    52 x  52 x 128
   10 conv    256  3 x 3 / 1    52 x  52 x 128   ->    52 x  52 x 256
   11 max          2 x 2 / 2    52 x  52 x 256   ->    26 x  26 x 256
   12 conv    512  3 x 3 / 1    26 x  26 x 256   ->    26 x  26 x 512
   13 conv    256  1 x 1 / 1    26 x  26 x 512   ->    26 x  26 x 256
   14 conv    512  3 x 3 / 1    26 x  26 x 256   ->    26 x  26 x 512
   15 conv    256  1 x 1 / 1    26 x  26 x 512   ->    26 x  26 x 256
   16 conv    512  3 x 3 / 1    26 x  26 x 256   ->    26 x  26 x 512
   17 max          2 x 2 / 2    26 x  26 x 512   ->    13 x  13 x 512
   18 conv   1024  3 x 3 / 1    13 x  13 x 512   ->    13 x  13 x1024
   19 conv    512  1 x 1 / 1    13 x  13 x1024   ->    13 x  13 x 512
   20 conv   1024  3 x 3 / 1    13 x  13 x 512   ->    13 x  13 x1024
   21 conv    512  1 x 1 / 1    13 x  13 x1024   ->    13 x  13 x 512
   22 conv   1024  3 x 3 / 1    13 x  13 x 512   ->    13 x  13 x1024
   23 conv   1024  3 x 3 / 1    13 x  13 x1024   ->    13 x  13 x1024
   24 conv   1024  3 x 3 / 1    13 x  13 x1024   ->    13 x  13 x1024
   25 route  16
   26 reorg              / 2    26 x  26 x 512   ->    13 x  13 x2048
   27 route  26 24
   28 conv   1024  3 x 3 / 1    13 x  13 x3072   ->    13 x  13 x1024
   29 conv     15  1 x 1 / 1    13 x  13 x1024   ->    13 x  13 x  15
   30 detection
Loading weights from darknet19_448.conv.23...
 seen 32
Done!
Learning Rate: 0.0001, Momentum: 0.9, Decay: 0.0005
Loaded: 11.146000 seconds
Region Avg IOU: 0.391491, Class: 1.000000, Obj: 0.540702, No Obj: 0.503114, Avg Recall: 0.000000,  count: 8
Region Avg IOU: 0.301953, Class: 1.000000, Obj: 0.539793, No Obj: 0.513981, Avg Recall: 0.125000,  count: 8
Region Avg IOU: 0.262426, Class: 1.000000, Obj: 0.596791, No Obj: 0.519048, Avg Recall: 0.000000,  count: 7
Region Avg IOU: 0.291210, Class: 1.000000, Obj: 0.468578, No Obj: 0.511746, Avg Recall: 0.000000,  count: 8
Region Avg IOU: 0.336659, Class: 1.000000, Obj: 0.545744, No Obj: 0.509816, Avg Recall: 0.285714,  count: 7
Region Avg IOU: 0.248075, Class: 1.000000, Obj: 0.503925, No Obj: 0.510735, Avg Recall: 0.000000,  count: 8
Region Avg IOU: 0.397457, Class: 1.000000, Obj: 0.564982, No Obj: 0.513117, Avg Recall: 0.285714,  count: 7
Region Avg IOU: 0.261218, Class: 1.000000, Obj: 0.556291, No Obj: 0.512715, Avg Recall: 0.000000,  count: 7
1: 15.621772, 15.621772 avg, 0.000100 rate, 7.472000 seconds, 64 images
```

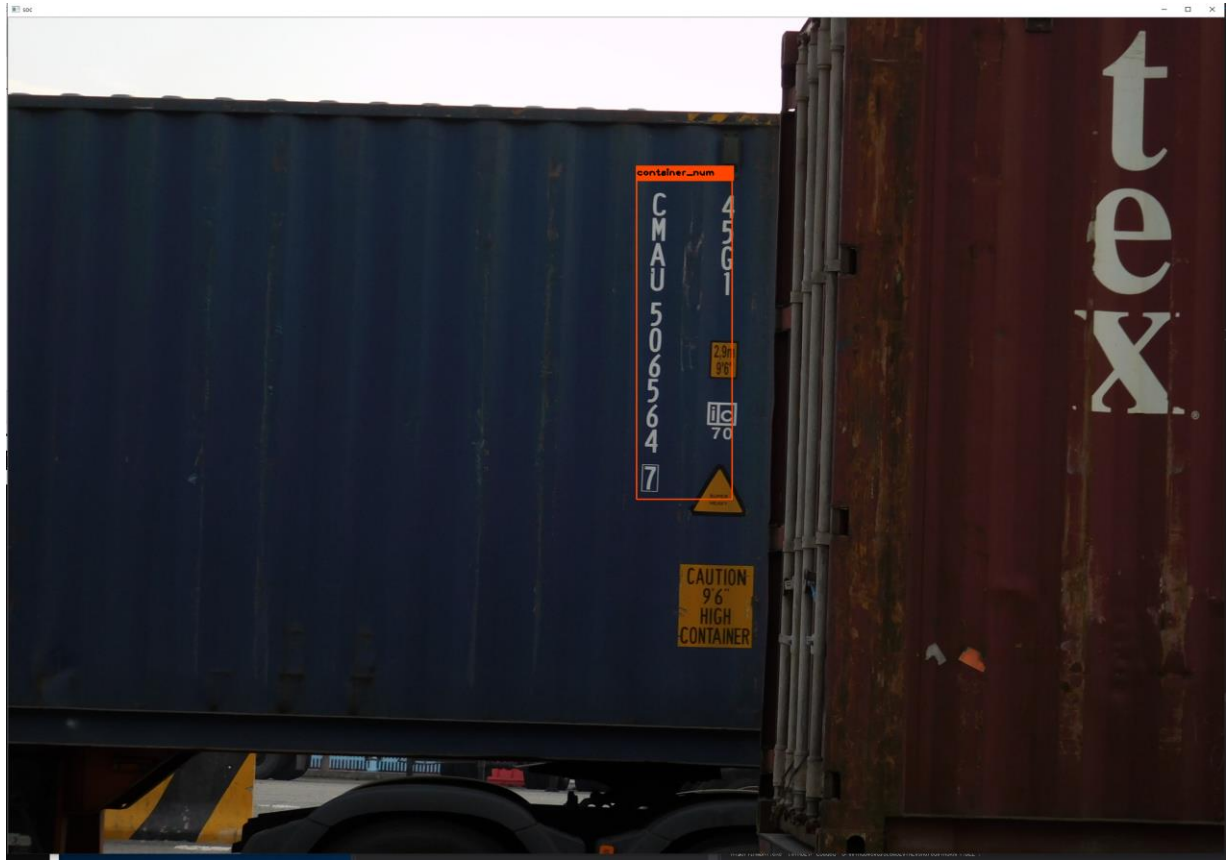


Inference Result

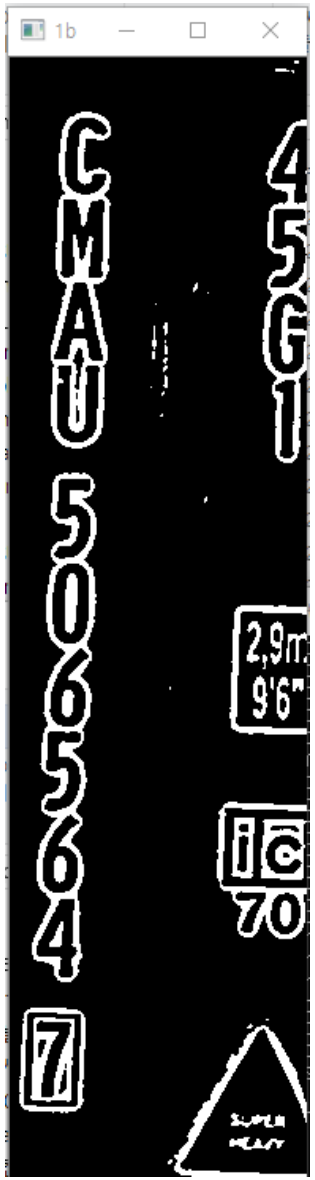
Application Processing - Type of number Plate

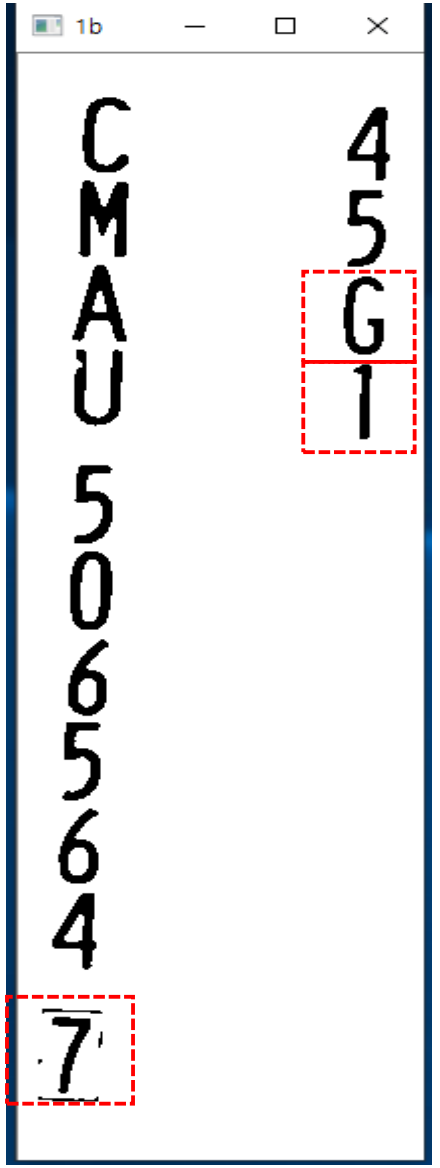
F:₩Contaninor₩AlgorithmBMT₩x64₩Release₩AlgorithmBMT.exe

```
====================  create DNN process  ====================
 Used GPU 0
layer     filters    size              input                output
   0 conv     32  3 x 3 / 1   416 x 416 x   3   ->   416 x 416 x  32 0.299 BF
   1 max          2 x 2 / 2   416 x 416 x  32   ->   208 x 208 x  32 0.006 BF
   2 conv     64  3 x 3 / 1   208 x 208 x  32   ->   208 x 208 x  64 1.595 BF
   3 max          2 x 2 / 2   208 x 208 x  64   ->   104 x 104 x  64 0.003 BF
   4 conv    128  3 x 3 / 1   104 x 104 x  64   ->   104 x 104 x 128 1.595 BF
   5 conv     64  1 x 1 / 1   104 x 104 x 128   ->   104 x 104 x  64 0.177 BF
   6 conv    128  3 x 3 / 1   104 x 104 x  64   ->   104 x 104 x 128 1.595 BF
   7 max          2 x 2 / 2   104 x 104 x 128   ->    52 x  52 x 128 0.001 BF
   8 conv    256  3 x 3 / 1    52 x  52 x 128   ->    52 x  52 x 256 1.595 BF
   9 conv    128  1 x 1 / 1    52 x  52 x 256   ->    52 x  52 x 128 0.177 BF
  10 conv    256  3 x 3 / 1    52 x  52 x 128   ->    52 x  52 x 256 1.595 BF
  11 max          2 x 2 / 2    52 x  52 x 256   ->    26 x  26 x 256 0.001 BF
  12 conv    512  3 x 3 / 1    26 x  26 x 256   ->    26 x  26 x 512 1.595 BF
  13 conv    256  1 x 1 / 1    26 x  26 x 512   ->    26 x  26 x 256 0.177 BF
  14 conv    512  3 x 3 / 1    26 x  26 x 256   ->    26 x  26 x 512 1.595 BF
  15 conv    256  1 x 1 / 1    26 x  26 x 512   ->    26 x  26 x 256 0.177 BF
  16 conv    512  3 x 3 / 1    26 x  26 x 256   ->    26 x  26 x 512 1.595 BF
  17 max          2 x 2 / 2    26 x  26 x 512   ->    13 x  13 x 512 0.000 BF
  18 conv   1024  3 x 3 / 1    13 x  13 x 512   ->    13 x  13 x1024 1.595 BF
  19 conv    512  1 x 1 / 1    13 x  13 x1024   ->    13 x  13 x 512 0.177 BF
  20 conv   1024  3 x 3 / 1    13 x  13 x 512   ->    13 x  13 x1024 1.595 BF
  21 conv    512  1 x 1 / 1    13 x  13 x1024   ->    13 x  13 x 512 0.177 BF
  22 conv   1024  3 x 3 / 1    13 x  13 x 512   ->    13 x  13 x1024 1.595 BF
  23 conv   1024  3 x 3 / 1    13 x  13 x1024   ->    13 x  13 x1024 3.190 BF
  24 conv   1024  3 x 3 / 1    13 x  13 x1024   ->    13 x  13 x1024 3.190 BF
  25 route  16
  26 reorg              / 2    26 x  26 x 512   ->    13 x  13 x2048
  27 route  26 24
  28 conv   1024  3 x 3 / 1    13 x  13 x3072   ->    13 x  13 x1024 9.569 BF
  29 conv     30  1 x 1 / 1    13 x  13 x1024   ->    13 x  13 x  30 0.010 BF
  30 detection
mask_scale: Using default '1.000000'
Total BFLOPS 34.876
Loading weights from F:₩Contaninor₩inference_data₩obj.weights...
 seen 32
Done!
====================  complete DNN Process  ====================
====================  create OCR process  ====================
====================  complete OCR Process ====================
Warning: Parameter not found: enable_new_segsearch
Warning: Parameter not found: save_raw_choices
Error: LSTM requested, but not present!! Loading tesseract.
Warning: Invalid resolution 0 dpi. Using 70 instead.
Estimating resolution as 616
Warning: Invalid resolution 0 dpi. Using 70 instead.
Estimating resolution as 625
 TYPE AAAAAAAAAA =
 first number is = CMAU
 Second number is = 506564
 Third number is = 456]
 CRC number is = r
```

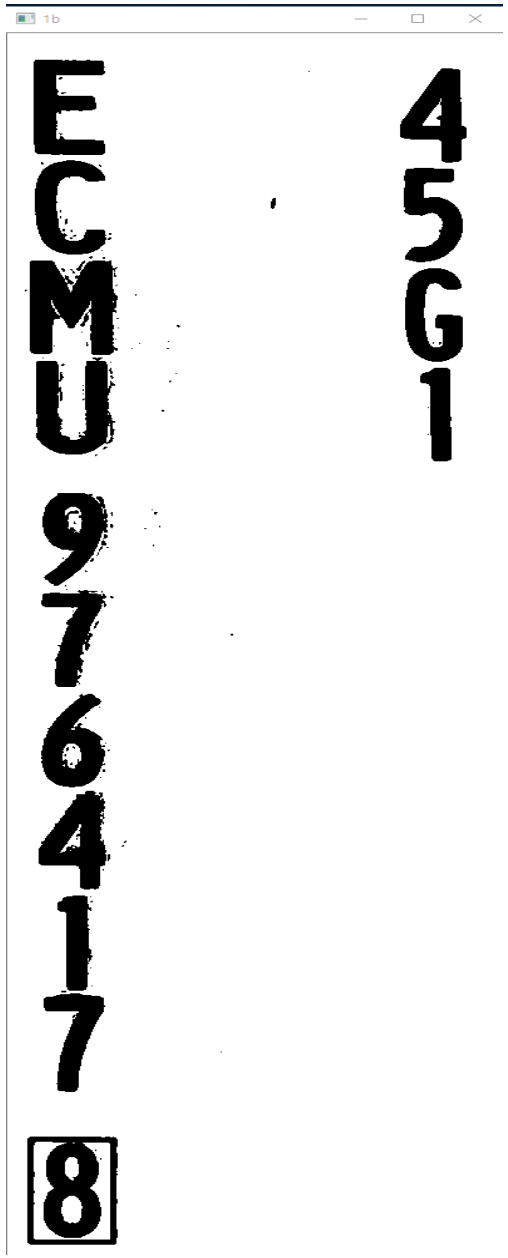


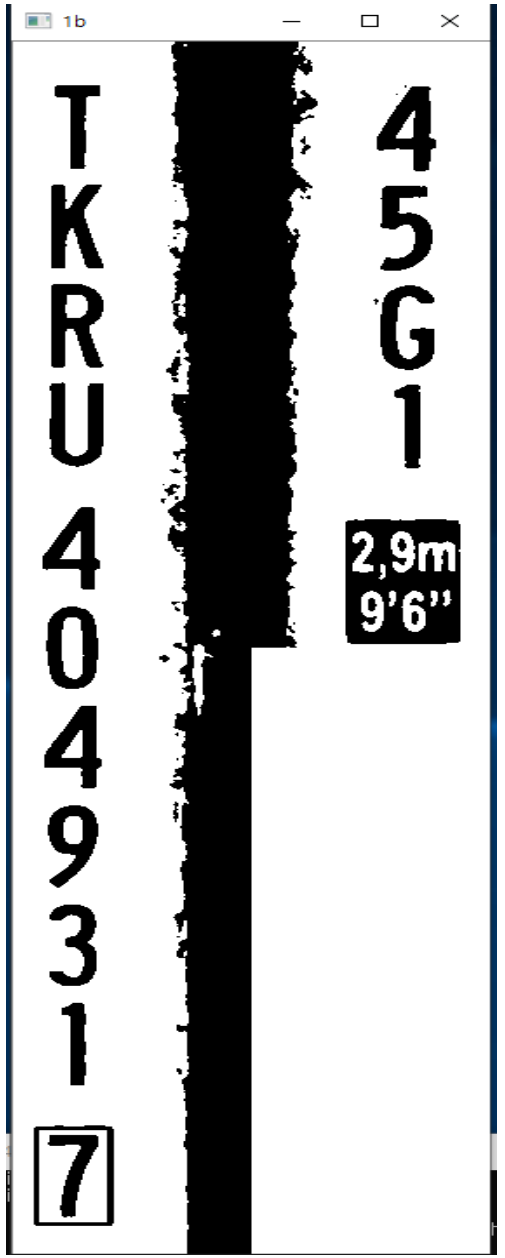
Application Processing – Type A



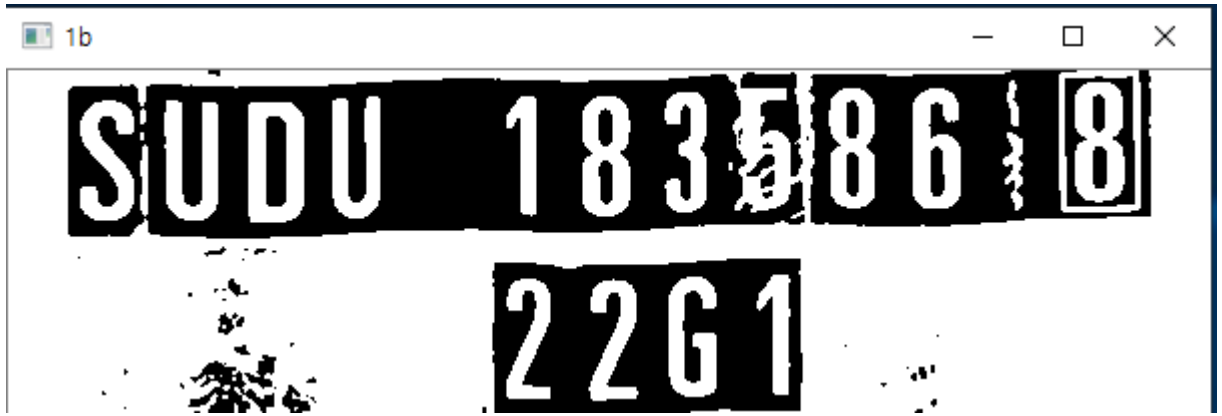


Application Processing – Type A

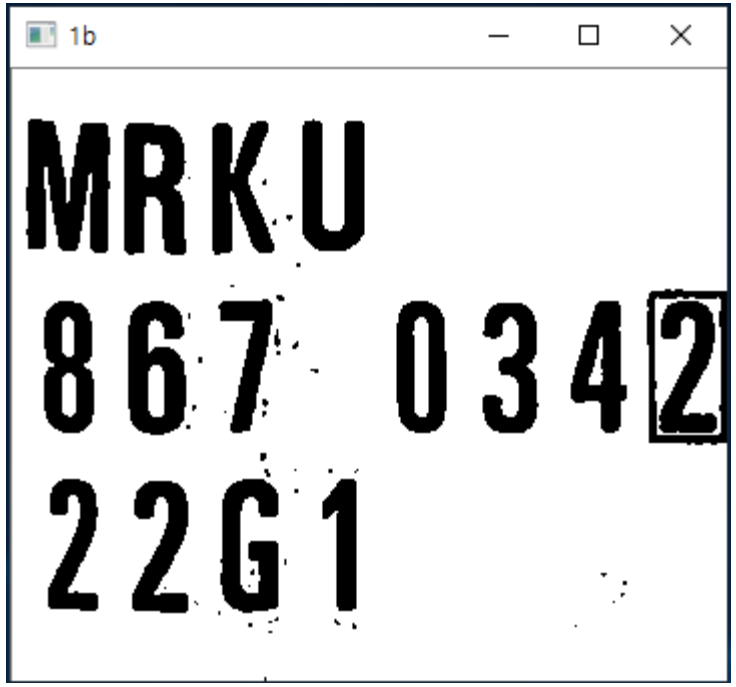


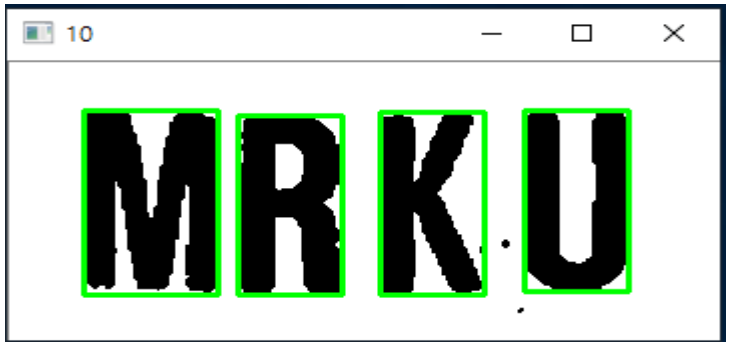


Application Processing – Type A



Application Processing – Type C





Application Processing – Type C