Term Project: ICE 6059 DNN for Visual Recognition

License plate Detection and Recognition

Team-3

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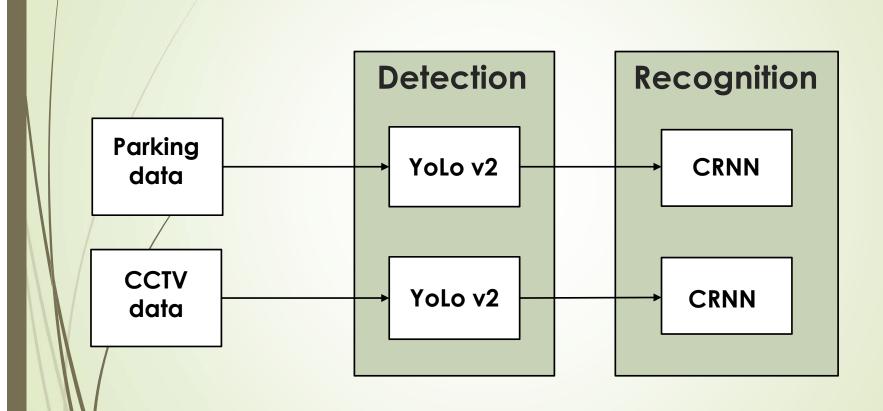
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Contents

- 1. Model
- **2.** Detection
- **■** 3. Recognition
- 4. Result analysis

Model



Detection (YoLo v2)

Benefits of Yolo:

- > Fast, Good for real-time processing.
- Predictions are made from one single network
- YOLO is more generalized

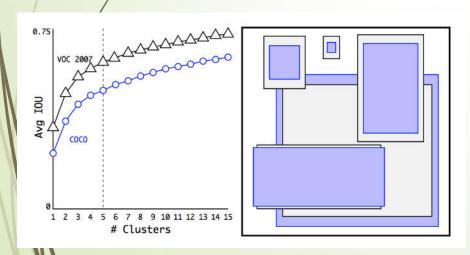
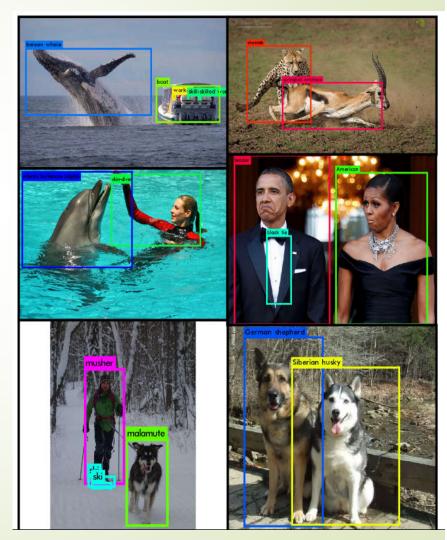


Fig: Clustering box dimensions on VOC and



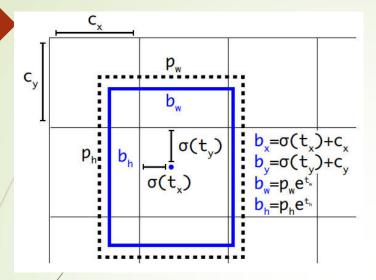


Fig: Bounding boxes with dimension priors and location prediction

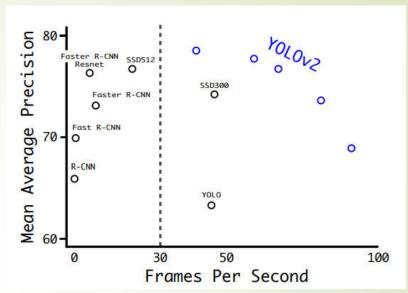
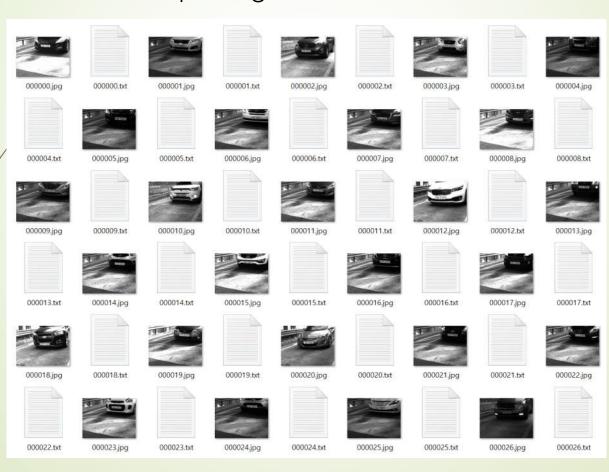


Fig: Accuracy and speed on VOC 2007

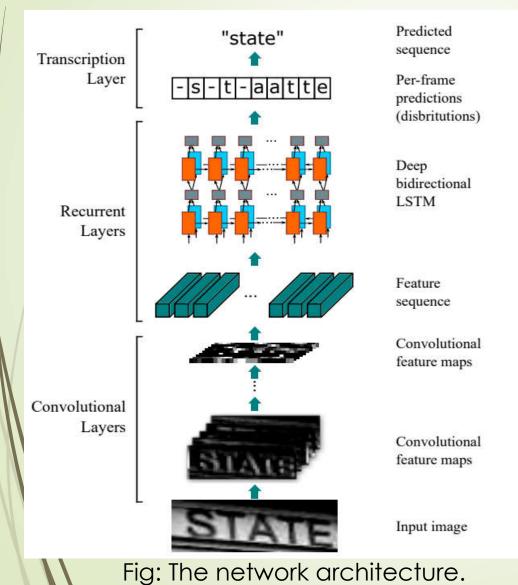
	YOLO								YOLOv2
batch norm?		1	1	✓	✓	✓	√	✓	✓
hi-res classifier?			✓	1	1	✓	✓	✓	✓
convolutional?				1	1	1	✓	1	✓
anchor boxes?				1	1				
new network?					1	1	✓	\	✓
dimension priors?						1	✓	1	✓
location prediction?						✓	✓	✓	✓
passthrough?							✓	1	✓
multi-scale?								1	V
hi-res detector?									✓
VOC2007 mAP	63.4	65.8	69.5	69.2	69.6	74.4	75.4	76.8	78.6

Detection (YoLo v2) - Training

Whole set of parking and cctv



Recognition(CRNN)



Feature Sequence
...
Receptive field

Fig: The receptive Field

Benefits of CRNN:

- > End-to-end learning is possible.
- Sequence data of arbitrary length can be processed because of LSTM which is free in size of input and output sequence.
- > There is no need for a detector or cropping technique to find each character one by one.

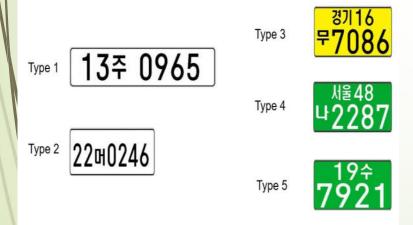


Fig: Korean license plates



Fig: Recognition Using CRNN

Recognition(CRNN) - Training

89¢ 9661 000005.jpg

000011.jpg

000017.jpg

000023.jpg

000029.jpg

000041.jpg

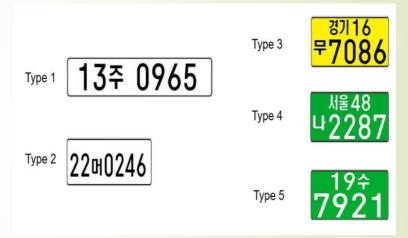
000047.jpg

000065.jpg

Plate from parking and cctv

	-33% 7185*	13÷ 3589 1	•47보 9270 • 000002.jpg	20H 6083	•12章 2850 • 000004.jpg	I
	879 4031	25려 6228	•16≑ 0944•	374 6511	03a 0915	
	000006.jpg	000007.jpg	000008.jpg	000009.jpg	000010.jpg •69星 0479 •	I
	000012.jpg	000013.jpg	000014.jpg	000015.jpg	000016.jpg	
$\ $	000018.jpg	000019.jpg	000020.jpg	000021.jpg	000022.jpg	
$\ $	000024.jpg	000025.jpg	000026.jpg	000027.jpg	000028.jpg	8
N	000030.jpg	000031.jpg	000032.jpg	000033.jpg	000034.jpg	
1	000036.jpg	000037.jpg	000038.jpg	000039.jpg	000040.jpg	
	000042.jpg	000043.jpg	000044.jpg	000045.jpg	000046.jpg	
	000048.jpg	000049.jpg	000050.jpg	000051.jpg	000052.jpg	
	000054.jpg	000055.jpg	000056.jpg	000057.jpg	000058.jpg	
	000060.jpg	000061.jpg	000062.jpg	000063.jpg	000064.jpg	
	000066.jpg	000067.jpg	000068.jpg	000069.jpg	000070.jpg	

Image generator from git





(exmaple) A18sk6897

A : 서울 sk : 나

Result analysis

1	1	A	В	С	1	Α	В
İ	1	Parking			1	CCTV	
	2				2		
Ì	3	num_bbox_examples	285		3	num_bbox_examples	451
ı	4	num_bbox_corrects	285		4	num_bbox_corrects	331
Ì	5	bbox_accuracy	100		5	bbox_accuracy	73.39
	6	num_rec_examples	285		6	num_rec_examples	436
	7	num_rec_corrects	161		7	num_rec_corrects	102
	8	rec_accuracy	56.49		8	rec_accuracy	23.39
İ	9	avg_pt	134.16		9	avg_pt	229.04
	10	score	153.08		10	score	83.88

Thanks