Information for Final Project

박사과정 김성빈 chengbinjin@inha.edu,
지도교수 김학일 교수 hikim@inha.ac.kr
인하대학교 컴퓨터비전 연구실

Grading Policy

Evaluation							
Mid Exam	Final Exam	Assignments	Class Activity (be present)	**Term Project**	Quiz	Presentation	Total
10 %	10 %	10%	5 %	**30 %**	25 %	10 %	100 %
2018.10.24	2018.12.05	Every week	Every week	**2018.12.12**	Every week	Every week	

Note:

1. Mid & final exam: lectures (PPT) & coding parts in assignments
2. Assignments: assignment 1~3 of the CS231n 2016 http://cs231n.stanford.edu/2016/syllabus.html
3. Class activity: attendance check before class
4. Term project:
   - (1) license plate detection and recognition; (2) on-road object detection
   - Scores will be evaluated based on the team ranking
   - No open or commercial library is allowed.
5. Quiz: will be taken in the beginning of every class to check students' pre-studying the CS231n video
6. Presentation: 2 or 3 students every week

Python Numpy Tutorial:
http://cs231n.github.io/python-numpy-tutorial/

Dataset

I. Parking Dataset

II. CCTV Dataset

License Plate Type

Type	License Plate		Type
1			P1
2			P2
3		서울52바3108	P3
4		서울52바3108	P4
5		43가6510	P5
6		부산27무6662	P6

I. Parking Dataset

789 473 343 76
46고7080

591 509 299 74
34구8107

756 419 310 86
62고9567

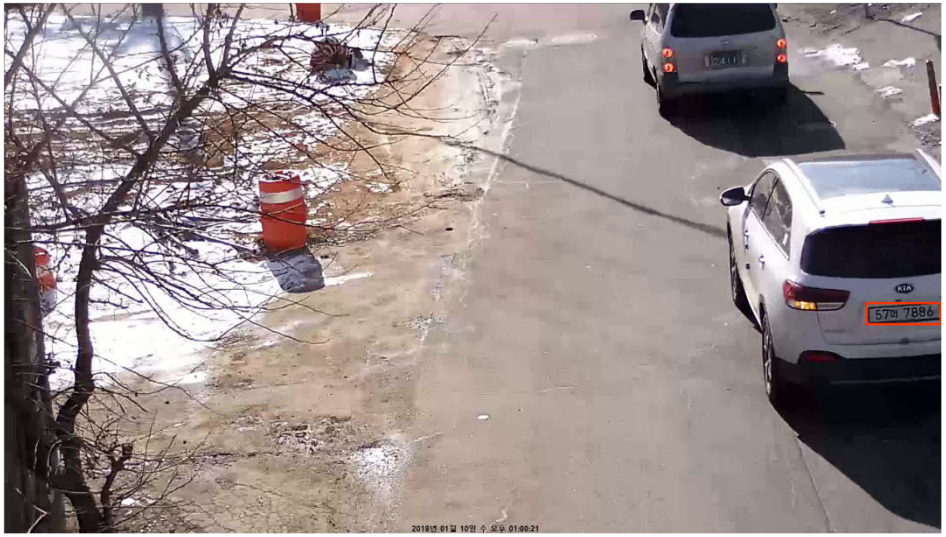
225 805 297 149
80조9523

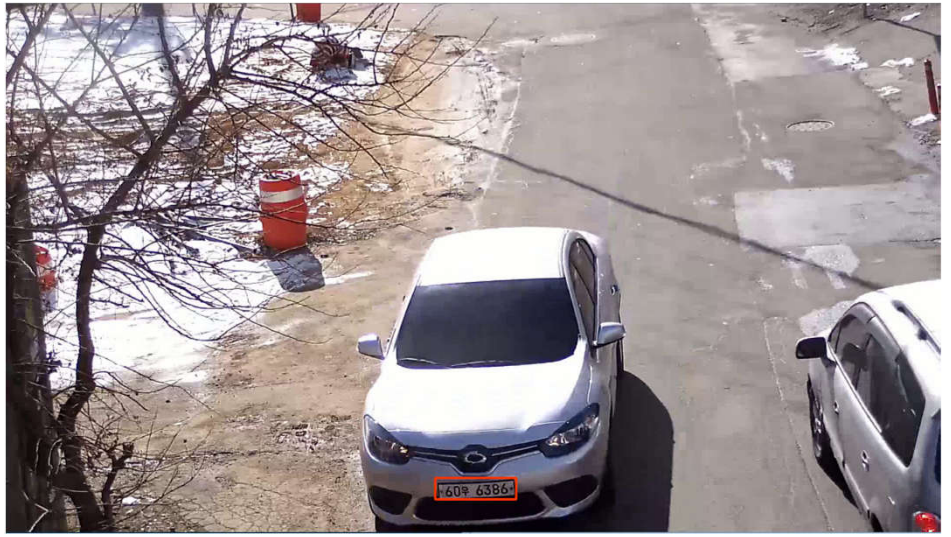
I. Parking Dataset


```
789 473 343 76
46고7080
```

- Ground-truths for parking dataset are saved as txt file.

II. CCTV Dataset





II. CCTV Dataset

```
<annotation>
    <folder>01_12131640</folder>
    <filename>00_00030_0000030.png</filename>
    <path>C:\workspace\project\labelImg\Object-Detection\images\01_12131640\00_00030_0000030.png</path>
    <source>
        <database>Unknown</database>
    </source>
    <size>
        <width>1920</width>
        <height>1080</height>
        <depth>3</depth>
    </size>
    <segmented>0</segmented>
    <object>
        <name>P1_10러0284</name>
        <pose>Unspecified</pose>
        <truncated>0</truncated>
        <difficult>0</difficult>
        <bndbox>
            <xmin>1412</xmin>
            <ymin>315</ymin>
            <xmax>1473</xmax>
            <ymax>330</ymax>
        </bndbox>
    </object>
</annotation>
```

- Ground-truths for cctv dataset are saved as xml file that follows PASCAL VOC GT format.

Metrics for Final Project

Final Project

Subject:

- License Plate Recognition (LPR)

Deep Learning Platform:

TensorFlow PYTORCH Keras

Definition of the Score

$$Score = Score_{park} + Score_{cctv} + 0.1 \times \left(100 - PT_{park}\right) + 0.1 \times \left(100 - PT_{cctv}\right)$$

$$PT = m\,\mathrm{sec}./image\,(average)$$

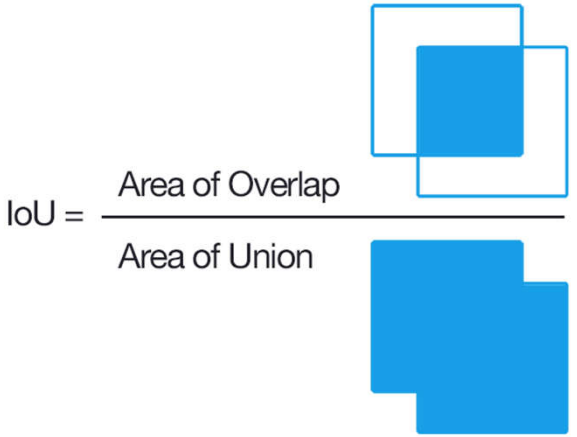
$$Score_i = Accuracy_{det} + Accuracy_{rec} \quad (i = park\ or\ cctv)$$

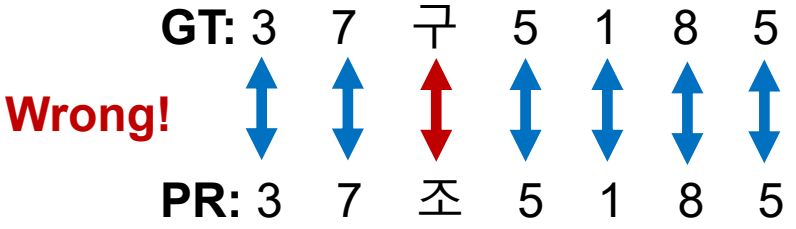
$$Accuracy_{det} = \frac{1}{n}\sum_{i=0}^{n-1} \frac{\#TP_{det} - \#FP_{det}}{\#GT} \times 100\%$$

$$Accuracy_{rec} = \frac{1}{n}\sum_{i=0}^{n-1} \frac{\#TP_{rec}}{\#GT} \times 100\%$$

- PT: average processing time of the model (unit: msec.)
- #TP_{det}: number of true positive for detection
- #FP_{det}: number o false positive for detection
- #TP_{rec}: number of true positive for recognition
- #GT: number of ground-truth

- TP_{det}: IoU >= θ, θ=0.7
- FP_{det}: IoU < θ





Rules

Processing Time

- Insert time check function in the for loop
- Start tic after read frame
- End toc after model forward
- But, if you have preprocess stage, preprocessing time is also included in time tic toc

Tensorflow example: python code

```
total_pt = 0.
num_iters = 100
for idx in range(num_iters):
    print('[{}] / [{}]'.format(idx, num_iters))
    tic = time.time()
    preds = model.predict(left_img, right_img)
    toc = time.time() - tic
    total_pt += toc
    print('Predicts: {}'.format(preds))

print('Avg. PT: {} ms.'.format(total_pt / num_iters * 1000))
```

Batch_Size in Test Mode

- Batch_size in training mode can be bigger than 1
- **But in test mode batch_size have to 1!**

TensorFlow Example

```
def __init__(self, sess, image_size=256,
             batch_size=1, sample_size=1, output_size=256,
             gf_dim=64, df_dim=64, L1_lambda=100,
             input_c_dim=3, output_c_dim=1, dataset_name='facades',
             checkpoint_dir=None, sample_dir=None):

                                        ...
                                        ...

self.real_data = tf.placeholder(tf.float32,
                                 [self.batch_size, self.image_size, self.image_size,
                                  self.input_c_dim + self.output_c_dim],
                                 name='real_A_and_B_images')
```

Write Prediction Results in CSV File

- **Prediction results should be written in “parking_analysis.csv” or “cctv_analysis.csv” file**
- Please refer to the write_csv.py function
  - https://github.com/ChengBinJin/License_plate_recognition
  - There are read_xml.py, write_csv.py, and eval.py function to help you

parcking_analysis.csv:

1	parking₩img_gt_1₩000000.jpg	46고7080	789	473	1132	549
2	parking₩img_gt_1₩000001.jpg	21도3971	929	505	1286	579
3	parking₩img_gt_1₩000002.jpg	16서1179	761	475	1087	558
4	parking₩img_gt_1₩000003.jpg	07부0441	747	474	1073	561
5	parking₩img_gt_1₩000004.jpg	36누4289	722	449	1065	542
6	parking₩img_gt_1₩000005.jpg	35소3169	590	446	924	532
7	parking₩img_gt_1₩000006.jpg	50마3480	607	479	925	552
8	parking₩img_gt_1₩000007.jpg	48보7976	586	516	890	594
9	parking₩img_gt_1₩000008.jpg	29러8820	810	488	1131	557
10	parking₩img_gt_1₩000009.jpg	57버2830	727	500	1061	578

img_file **recognition** **Bounding box** (x1, y1, x2, y2)

Competition

- **Equipment:** Use one server in the CVLab. (Room 525, Hi-Tech Building)

(Use same server to check **processing time** and run **evaluation function** to get accuracy on a test set)

- Program should be developed on **Ubuntu system** not Windows.

- **Time: December 6-8 (Thur. to Sat.)**
  - 09:30-11:30, 14:00-17:00, and 20:00-24:00

- Each team has the limited **60 minutes (very strict)** to finish all of the process including install necessary libraries and test.
- Each team can try **two times for one dataset** and select the most good one to record the score.

More information:

https://github.com/ChengBinJin/License_plate_recognition

I. Parking Dataset:

II. CCTV Dataset:

III. CCTV Raw Video:

Thank you for your attention!