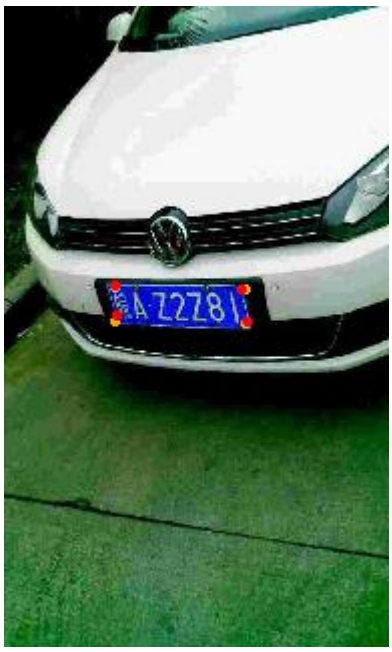
Homework4: License Plate Localization

Overview

For each image, there is one license plate. You are asked to localize the 4 corners of the license plate. That is, predict the (x, y) of each corner, 8 values in total. To reduce difficulties, you can download the reference code to have a simple solution. Please do not modify the notebook directly, you need to download it and upload it to your colab or jupyter account. Your final score will be based on your report and the perfomance of your model.

Example

Train	Valid	Test
		

Ground-truth are drawn in orange. Prediction are drawn in red.

Data

Go to Kaggle and download the dataset.

Data is organized as:

```
ccpd6000/
    train_images/
    test_images/
    train.csv
    sample.csv
```

There are 3000 images with annotation for training, 3000 images without label for testing. All images are taken from CCPD.

Each row in `train.csv` has following fields:

1. `name` specifies the name of the image, full path is `ccpd6000/train_images/<name>`
2. `BR_x`, `BR_y` is the position of bottom-right corner
3. `BL_x`, `BL_y` is the position of bottom-left corner
4. `TL_x`, `TL_y` is the position of top-left corner
5. `TR_x`, `TR_y` is the position of top-right corner

The origin is at the top-left of the image.

`sample.csv` serves as a sample submission. Your submission should have the same format as `sample.csv`. Note that `name` is sorted in alphabetical order.

Evaluation

The metric is the root mean-square error between the predicted locations and the ground-truth locations of the 3000 testing images:

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$$RMSE = \sqrt{\frac{1}{4N}\sum_{i=1}^{N}\sum_{j=1}^{4}\|\mathbf{p}_i^j - \hat{\mathbf{p}}_i^j\|^2}$$

where:

N is the number of images,
j is the index of the corner,
$\mathbf{p}_i^j$ is the predicted location (x, y) of the j-th corner of image i.
$\hat{\mathbf{p}}_i^j$ is the ground-truth location (x, y) of the j-th corner of image i.

Please submit your result to Kaggle to evaluate the performance. Your team name on kaggle should be studentID_name (110062537_廖品捷)

Homework

1. Fill in "TODO"

- Please finish "TODO" part in provided reference code.
- Pytorch guideline please reference pytorch document.

2. Modify the code to improve the performance

- Learning scheduler: LR(learning rate) decay or smaller LR.
- Train longer (typically until the validation loss is converged).
- Use deeper model, like ResNet18, to extract features.
- Different optimizer, loss, etc.
- Data augmentation.
- When using Colab, remember to change "Runtime Type" to "GPU" to accelerate training. For more information, please visit here.

Report

- Describe and compare the methods you have tried in this project. The report should be written in Jupyter Notebooks using Markdown cells for each problem. Please download your notebook and submit it to eeclass.

Score Evaluation

- Your result will be evaluated by comparing your Submission CSV to the ground truth Solution CSV using the RMSE Score.
- Final score: coding (7point) + report(3point) = total(10 point)
- The coding score will be given according to your place in the Leaderboard ranking:
    - Higher than baseline (7 point): 7 point
    - Higher than baseline (6 point): 6 point
    - Higher than baseline (5 point): 5 point
    - Below the baseline: 3 point
    - Didn't submit and finish the code: Get 0 point
- Please remember to write a report about your method, or your report score will be 0.