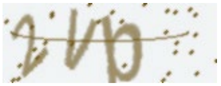
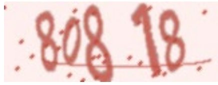
Final Project: Captcha Image Recognition





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Introduction

- Recognition of CAPTCHA characters by Deep Learning
  - Our goal is to recognize characters from the captcha image.

  - Each captcha image has a variable length of characters.
  - Please consider the variable-length captcha image.

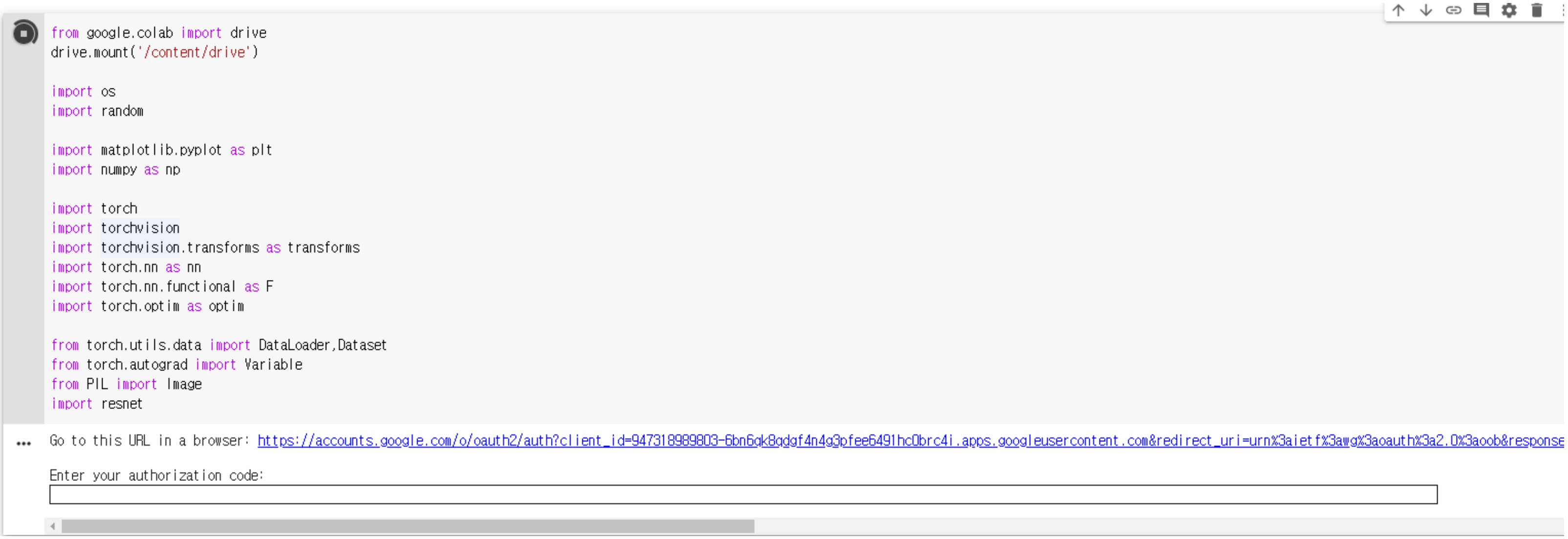
Dataset

- Captcha Image Dataset (not a public dataset)
  - 10,000 **training** images with length of 2-5.
  - 1000 **test** images with length 2-7.

- Data Utilization
  - Train your network only using given training images.
  - Find hyper-parameters, network architectures.
  - The ground truth of test images will not be available publicly.

Google Drive Mount

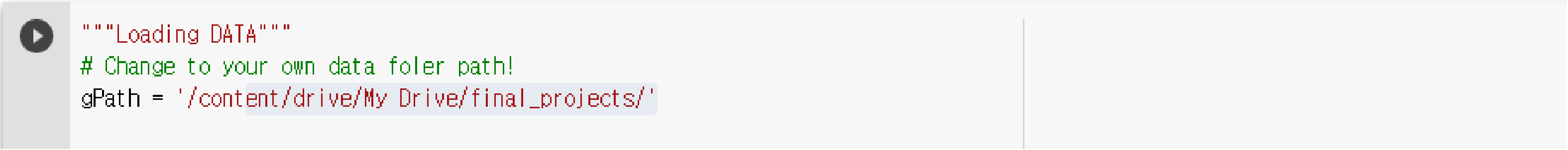
- Step1: upload data to google drive and execute drive.mount(‘/content/drive’)



```
from google.colab import drive
drive.mount('/content/drive')

import os
import random

import matplotlib.pyplot as plt
import numpy as np

import torch
import torchvision
import torchvision.transforms as transforms
import torch.nn as nn
import torch.nn.functional as F
import torch.optim as optim

from torch.utils.data import DataLoader,Dataset
from torch.autograd import Variable
from PIL import Image
import resnet
```

```
Go to this URL in a browser: https://accounts.google.com/o/oauth2/auth?client_id=947318989803-6bn6qk8qdgf4n4g3pfee6491hc0brc4i.apps.googleusercontent.com&redirect_uri=urn%3aietf%3awg%3aoauth%3a2.0%3aoob&response

Enter your authorization code:
```

- Step2: Copy and paste authorization code
- Step3: Write down your data path



```
"""Loading DATA"""
# Change to your own data foler path!
gPath = '/content/drive/My Drive/final_projects/'
```

Evaluation

- Evaluation Metric
  - Character recognition accuracy for test captcha images.
  - Word recognition accuracy for test captcha images.

File description

- Unzip the given file
  - Unzip 2020Spring_ML_final.zip

- 2020Spring_ML_final/Data
  - Contains train, and test captcha images

- 2020Sptring_ML_final/resnet.py
  - Replace default resnet to your own model from assignment3

- 2020Sptring_ML_final/main.ipynb
- 2020Sptring_ML_final/report latex format.zip
- 2020Sptring_ML_final/report word format.zip

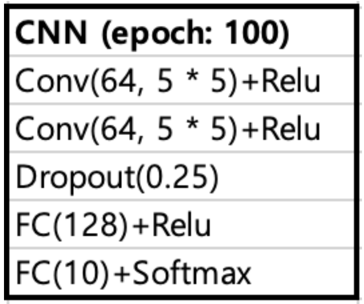
Assignment

- Problem 1:Design LSTM model for captcha image recognition. (10 points)

- Problem2.1: Connect CNN model to the designed RNN model. (5 points)
- Problem2.2: Replace ResNet to your own CNN model from assigment3. (10 points)

- Problem3: Find hyper-parameters. (25 points)

- Write report: (50 points)
  - Summarize your solution for each problem. For example:
  - Report test results of *char_correct* and *word_correct*



CNN (epoch: 100)
Conv(64, 5 * 5)+Relu
Conv(64, 5 * 5)+Relu
Dropout(0.25)
FC(128)+Relu
FC(10)+Softmax

Submission (Report)

- Report: CVPR format (In English)
  - Choose either **latex** or **word** format
  - Minimum 2 pages (No upper limit)
  - **Submit your report in PDF format (no matter working on which format (export))**
- Report List
  - No not copy codes directly (unless extremely important)

Report list	**Percentage**	
Paper name, authors		
Abstract & Introduction	10 %	
Methods	35 %	Write down the best model
Experiments & Discussion	35 %	Write down all trials (even if couldn't get improvement on performance))
Conclusion	10 %	
Report Configuration	10 %	Please write as carefully and neatly as you can

FAQ

- Q: 매 epoch 마다 accuracy도 찍어주면 좋을 것 같아요
- A: 아래의 코드를 필요한 부분에 넣어주세요
  - print('epoch:', epoch+1, 'loss:', loss.item())

- Q: 코드에서 건들면 안될 부분이 있나요?
- A: Problem1 및 problem2는 코드에 명시되어 있는 부분에 작성해주시면 됩니다. Prolem3은 나머지 "implement your code" 부분만 수정하셔도 높은 성능을 얻을 수 있습니다. 다른 부분을 수정하시고 싶으시면 수정하셔도 좋습니다. *어느 부분이 수정되었는지 꼭 명시 부탁 드립니다.

공지

- 개인 과제
- Due: 06/22 (23:59)
- Google first before ask on eTL
- 제출 방법
  - DO NOT clear the final outputs
  - 과제 완료 후:
    - ✓1. 학번.zip 를 eTL에 업로드
      - 1. 보고서 (e.g., 2020_12345.pdf)
      - 2. 최종 모델
      - 3.main.ipynb
- Q&A: ml.class.snu@gmail.com

Thank You!