CMPE 258
Individual Project: Design Hand Written Student ID Recognition System
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File Structure:
dlhw4.py
dlhw4_model.py
Requirement: Tensorflow Version : 2.7.0, Keras version : 2.7.0, Anaconda
(Package version is mandatory that Tensorflow and Keras are same with Requirement)
Environment: M1 (New chipset) Mac book Pro
handwritten digits video file: video1.mp4
mnist model: jihyeok2.h5
Completed File: **recorded_video_preprocessing**.mp4(3-a, 3-b, 3-c),
real_time_webcam_output.mp4(3-a, 3-b, 3-c), record_output.mp4(3-a, 3-c)[recorded by python
file directly as results]

Be sure detailed adequate information is provided for testing and verification purposes.
1. Upgrade or Install Tensorflow, Keras Package Version as 2.7.0.
   Because predict API does not work without these packages.
2. Running learning model (**Not Required, There is already attached jihyeok2.h5 file**)
   Running Command: python dlhw4_model.py
   jihyeok2.h5 will be made by this py file.
3. **Running handwritten digits recognition py file.**
   Running Command: python dlhw4.py
   Enter the option which is Real-time Web came mode or Recorded Video mode :
   Input 0 and enter: Real-time Web came mode
   To finish the program command: push the 'q' or Ctrl + c in terminal
   Input 1 and enter: Recorded Video mode (After completing running this mode, output file
   will be made. The file name will be **recorded_output.mp4**)

3. Your system should a. (2 pts) Display a bounding box on each individual digit (not one
bounding box for all digits); b. (2 pts) Display preprocessed square image for each digit as a
video ongoing process of the handwritten digits before resizing it to the 28x28 resolution image;
c. (6 pts) Feed your preprocessed image into CNN for recognition and label each recognized
digit as a numeral on top of its bounding box by using an OpenCV text function.

* In the video or Real-time webcam window will show recognition of handwritten digits.
3-a: I made RoI with Green lines for each digit.
3-b: These Square Images preprocessed will be shown in another 'preprocessed square image for
each digit' window. And In the 'frame' window, there are other square digits images which are
color images before preprocessing and resizing.
* **There is a new window to show preprocessing square images in
real_time_webcam_output_mp4, recorded_video_preprocessing.mp4.**
* **There is not a new window in recorded_output.mp4, because it was written by a python
file as results directly**
3-c: The number will be shown below the digits. These digits will be Yellow.