MTRE4300 Machine Learning for Robot Perception

Project #1

Due by 11:59 pm on 01/27/21 (Wednesday)

In this project, you are required to develop a python program to validate some basic image processing skills. In particular, your python program will complete the following tasks:

1. Continuously grabs 4,500 frames from the internal camera of your laptop.
2. Save the frames into a video file: live_camera.avi.
3. Open the video file of live-camera.avi
4. Read from the video file frame by frame.
5. For each frame (image),
    - Show the frame on a window.
    - Print its shape.
    - Use additional three windows to show the red, green and blue channel of the image separately.
    - Resize the image to 70% of its original size.
    - Convert the new image from the RGB color space to the HSV color space.
    - Assigned 0.5 to the V values of all pixels in the image.
    - Use another window to show the histogram of the S channel in the image.
    - Equalize the histogram of the S channel of the image and show its new histogram in a new window.
    - Convert the processed image from the HSV space to the RGB space.
    - Use a 7x7 Gaussian filter to remove the noise in the image.
    - Show the filtered image on another window.
    - Save the filtered image (frame) to a new video file: modified_video.avi
6. Open the video file "modified_video.avi" and play back the video in a window.
7. **You need to complete this project individually.** Save your Python code as "image_operation.py", put your rname on the first line with a leading string "### ", and upload it to the D2L drop box.

Grading Rubric
10 points: Project submitted correctly.
10 points: Code runs without any syntax errors.
10 points: The video file of "live_camera.avi" is generated correctly.
20 points: The RGB channels of the frame are showed correctly.
10 points: The histogram of the S channel is showed correctly
20 points: The equalized histogram of the S channel is showed correctly
20 points: The video file of "modified_video.avi" can be played back correctly.