

HW1-ICA

This assignment is intended to familiarize you with the basic concepts of how to use:

- The Python language
- OpenCV
- Matplotlib
- Jupyter Notebooks
- Anaconda

The tasks you need to perform are the following:

- 1) Install Anaconda in your system. (You can install anaconda in either Windows or Linux, however in this class we assume that you will be using Linux)
- 2) In Anaconda install
 - a) Jupyter Notebooks
 - b) OpenCV
 - c) Matplotlib
- 3) Write a python program that processes images through OpenCV and plots results in a Jupyter Notebook using the Matplotlib library. Your program needs to:
 - a) Load an image using OpenCV convert it from BGR to an RGB color format and plot it using Matplotlib
 - b) Print (i) the number of pixels and (ii) the height, width, and number of channels of the **loaded** image
 - c) Isolate the information of the Red, Green, and Blue channels of the image and plot them in the Jupyter Notebook using Matplotlib
 - d) Calculate the unnormalized histograms of the Red, Green, and Blue channels of the image and plot them using Matplotlib
 - e) Convert the image to grayscale and plot it in the Jupyter Notebook using Matplotlib
 - f) Print (i) the number of pixels and (ii) the height, width, and number of channels of the **grayscale** image
 - g) Calculate the unnormalized histogram of the grayscale image and plot it using Matplotlib
 - h) Use a binary threshold on your grayscale image and plot the result in the Jupyter Notebook using Matplotlib
 - i) Calculate the unnormalized histogram of the thresholded image and plot it using Matplotlib
 - j) Include a commentary section in your Jupyter Notebook where you answer the following questions
 - i) What are the differences you observe in the histograms for the different color channels?
 - ii) Converting an image to grayscale is the same operation as isolating a color channel? Yes/No and why?
 - iii) What are the differences you observe in the histograms for the grayscale image and the thresholded image?

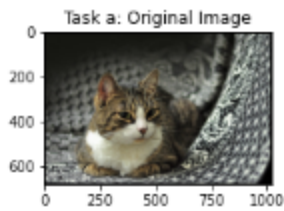
Image to be used in your assignment:



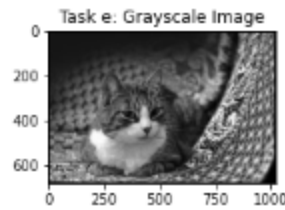
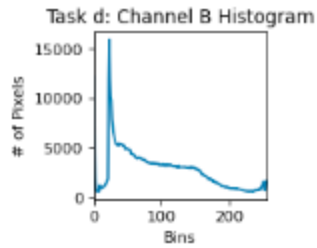
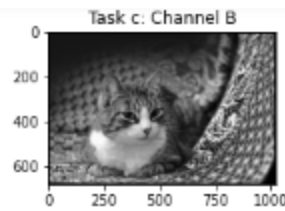
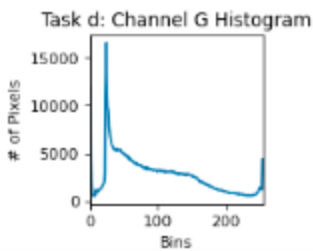
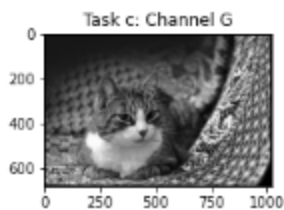
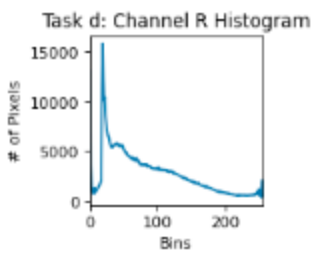
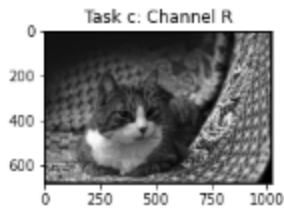
References:

1. How to install Anaconda:
<https://docs.anaconda.com/anaconda/install/index.html>
2. Image Thresholding:
<https://stackabuse.com/introduction-to-image-processing-in-python-with-opencv/>
3. How to calculate image histograms using OpenCV:
<https://www.pyimagesearch.com/2021/04/28/opencv-image-histograms-cv2-calchist/>
4. "Cat on the sofa" image by sushiraider is licensed with CC BY-NC-SA 2.0. To view a copy of this license, visit <https://creativecommons.org/licenses/by-nc-sa/2.0/>

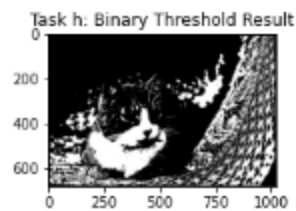
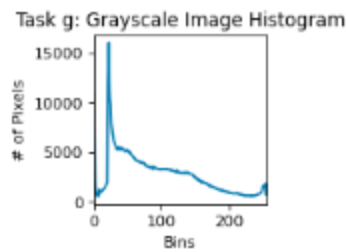
Appendix: Your code output should resemble the following:



Task b: Height=684 Width=1023 Channels=3



Task f: Height=684 Width=1023



Task i: Binary Threshold Image Histogram

