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In this assignment, I have used Jupyter notebook and I have shown all my codes and output on the .iypnb files itself.

Running Instructions:
Just run all the cells of the ipynb file in the notebook.

Approach:
For the first three questions, I have converted the image into .hsv format and change the saturation value which is a user input for qn 2 and 3.

For qn 4, I have plotted CIE chromaticity plot using the csv file which is given and I have also calculated the xy value of rgb images.

Description of functions

1. **def maxSat(img):**
   Inputs image and outputs the maximally saturated image
2. **deSat(img, val):**
   Inputs the image and convert it to hsv format and then increase its value by the parameter val
3. **def satdeSat(img, val1,val2):**
   Inputs the image and convert it to hsv format and then increase its value by the parameter val1 and then decrease the value it parameter val 2
4. **def bgr_img2rgb_matrix(img)**- Takes an BGR [m, n, 3] shaped color image and returns a matrix of shape [3, m*n]. Each column of the output matrix corresponds to [R, G, B] values belonging to a pixel.
5. **def bgr2xy(img**)- Takes a BGR [m, n, 3] shaped color image and computes its XYZ color space values using the above function and doing a single matrix multiplication with a pre-defined conversion matrix. Finally it computes x = X / (X + Y + Z) and y = Y / (X + Y + Z) for each pixel and returns a [2, m*n] shaped array having the 2D chromatic characteristics of the original image.

Packages Required
Colour-science (for plotting CIE chromaticity graph), pandas(for loading the csv file), cv2, matplotlib