

Practise session 7: Color images

1. The horizontal R, G, and B intensity profiles for an image are given in Fig. 1. (1p)
 - a. Generate the corresponding RGB color image.
 - b. What color a person would see in the horizontal position $N/2$?
 - c. Convert the RGB colors to HSI color space and visualize the H, S, and I components.
 - d. If there are 8 bits allocated for each color channel, then how many different shades of gray can be presented with that system?

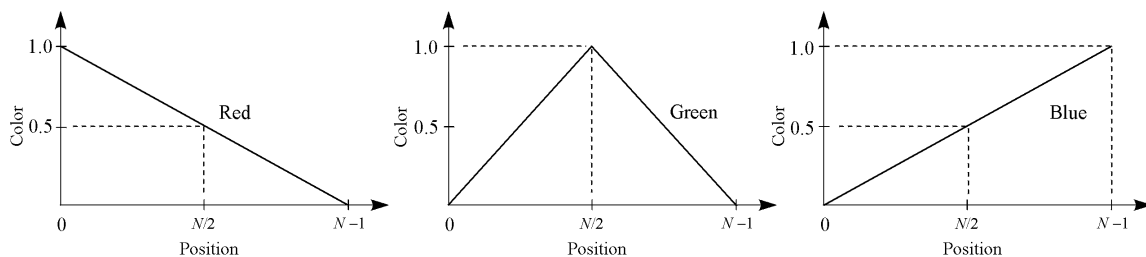


Fig. 1. Horizontal intensity profiles for an image.

2. The 8-bit images in Fig. 2 show the H, S, and I components of a color image. (1p)

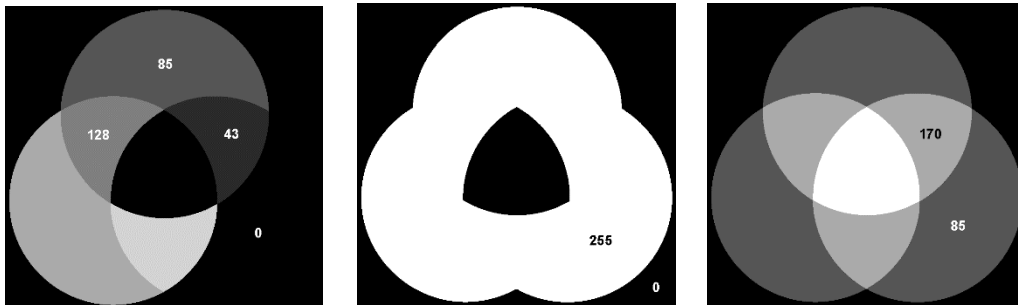


Fig. 2. H, S, and I components of a color image.

- a. Which gray-levels there are in the hue image (H), in the saturation image (S) and in the intensity image (I)? Some gray-level values are already given in images in Fig. 2.
 - b. Show the color image based on these HSI components.
3. Consider the two images A and B in Fig. 3 with the corresponding RGB-component images. The component images (R, G, and B) consist of only two different values, 0 and 1 (or 0 and 255). (1p)
 - a. Show the corresponding color images A and B.
 - b. Find the gradient image for all three component images, i.e. gradient images for R, G, and B component images. Perform this for both images A and B.

- c. Sum the component-wise gradients from the previous phase to create one “gradient” for the full color image. Perform this for both images A and B. Compare the “gradients” for the image A and B. How would you comment the magnitudes and directions for those two “gradients”?



a) R, G, and B components (left to right) of image A.



b) R, G, and B components (left to right) of image B.

Fig. 3. Images A and B shown as their RGB-component images.