WAHYU, Zoya Estella 20462503

COMP4421 — Assignment 1

Written Assignment.

(a) ori(x,y) — original image

h( ) — high-frequency emphasis filter

histeq( ) — histogram equalization function

result(x,y) — resulted image

- Case 1: Apply high-frequency emphasis filter first, then do histogram equalization.

$$result(x,y) = histeq(h() \circledast ori(x,y))$$

$\circledast$ ⇑ convolution

- Case 2: Do histogram equalization first, then apply high frequency emphasis filter.

$$result(x,y) = h() \circledast histeq(ori(x,y))$$

Since histeq( ) is a function that alters the intensity values in the input image to create uniform distribution of intensity in the output image, histeq( ) is a non-linear function

$\therefore histeq(h() \circledast ori(x,y)) \neq h() \circledast histeq(ori(x,y))$

$\therefore$ The order matters

(b) high-frequency emphasis filtering is used to sharpen (define the edge / details of) an image by increasing the intensity in the high intensity pixels and decreasing the intensity in the low intensity pixels. Therefore, what it does is the exact opposite of histogram equalization.

If we use the high-frequency filter after histogram equalization, the image will lose the overall contrast / intensity balance that was obtained beforehand.

On the other hand, If we use the high-frequency filter before histogram equalization, the image will appear to have more contrast while still preserving the details obtained from the filter.