EEE6512 - Image Processing and Computer Version HW1

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1-4: Problem: Image Processing, as defined in textbook, produces an output images from an input image. What are the two primary purposes for such output images?

① ~~Transformation~~ Enhancement: Transform an input image into another one to improve its visual appearance.

② Restoration: Restore an image that has been corrupted by some types of noise.

③ Compression: Store an image with fewer bits than are required by the original signal while affecting viewing quality of the decompressed image as little as possible.

1-8. Explain the statement, "computer version is the inverse of computer graphics."

Ans: Computer graphics is the problem of generating an image viewable by a human from a 3D model of the world stored in the computer.

Computer version is the problem of inferring some model of the world from an image that is generally viewable by a human.

1-16. Suppose an image ~~from~~ has 640 columns & 480 rows and is stored in raw-major order. Convert the coordinates $(x, y) = (38, 52)$, $(592, 241)$, and $(33, 0)$ to 1D indices. Conversely, convert the following 1D indices to (x, y) coordinates: $i = 8092$, 24061, and 38190.

$(38, 52) \rightarrow \quad i = 52 \times 640 + 38 = 33318$

$(592, 241) \rightarrow \quad i = 241 \times 640 + 592 = 154832$

$(33, 0) \rightarrow \quad i = 0 + 33 = 33$

$i = 8092 \rightarrow \text{mod}(8092, 640) = 412$, $(8092 - 412)/640 = 12 \rightarrow (412, 12)$

$i = 24061 \rightarrow \text{mod}(24061, 640) = 381$, $(24061 - 381)/640 = 37 \rightarrow (381, 37)$

$i = 38190 \rightarrow \text{mod}(38190, 640) = 430$, $(38190 - 430)/640 = 59 \rightarrow (430, 59)$

1-17 Equations (1.3) - (1.5) apply to an image stored in row-major order. Write the equivalent expressions to convert between 2D coordinates and 1D indices for an image stored in column-major order.

Ans: Interchange x & y ; replace width and height.

$i = x \cdot height + y$

$y = mod(i, height) = i - x \cdot height$

$x = [i / height]$

1-18. Suppose the following 1D array of bytes in memory stores a 2×2 color image (in blue-green-red order) : 52, 68, 31, 133, 192, 88, 255, 208, 32, 233, 161, 25

(a) Assuming that the image is stored in interleaved format, convert to planar format. What are the RGB values of the pixel at location (1,1) ?

(b) Assuming that the image is stored in the planar format, convert to interleaved format. What are the RGB values of the pixel at location (0,1) ?

Ans:

(a) In interleaved format → $\begin{bmatrix} (52, 68, 31) & (133, 192, 88) \\ (255, 208, 32) & (233, 161, 25) \end{bmatrix}$

∴ The RGB values at (x,y) = (1,1) are (233, 161, 25)

that is blue = 233, green = 161, red = 25

(b) blue = $\begin{bmatrix} 52 & 68 \\ 31 & 133 \end{bmatrix}$, green = $\begin{bmatrix} 192 & 88 \\ 255 & 208 \end{bmatrix}$, red = $\begin{bmatrix} 32 & 233 \\ 161 & 25 \end{bmatrix}$

The RGB values at (x,y) = (0,1) are (31, 255, 161).

that is blue = 31, green = 255, red = 161

uments ▸ image processing

/Users/frances_w/Documents/im

flipim.m

```
c;clear;
ipim(imread('warhol.png'));
```

Figure 1

文件 编辑 查看 插入 工具 桌面 窗口 帮助

Input Size: 550*438*3

Output Size: 550*438*3