

Lab Evaluation-2

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Aim: Apply Bit Plane Slicing on a 8-bit Image

Software Used: Python, Jupyter, OpenCV

Theory:

Bit plane slicing is a method of representing an image with one or more bits of the byte used for each pixel. One can use only MSB to represent the pixel, which reduces the original gray level to a binary image. The three main goals of bit plane slicing is:

- Converting a gray level image to a binary image.
- Representing an image with fewer bits and corresponding the image to a smaller size
- Enhancing the image by focusing.

6	7	6	6	7
0	0	0	1	2
1	1	1	2	3
4	5	5	4	2
6	6	6	7	7

Bit plane slicing:

Since the given image has a maximum grey level of 7, it is a 3-bit image. We convert the image to binary and separate the bit planes.

110	111	110	110	111
000	000	000	001	010
001	001	001	010	011
100	101	101	100	010
110	110	110	111	111

Code:

```
from skimage import data
import numpy as np
import cv2
from scipy import ndimage
import matplotlib.pyplot as plt
original_image = cv2.imread('messi_3.jpg')
```

```

plt.imshow(original_image)
plt.show()
# processed_image Copy
processed_image=original_image.copy()
processed_image=processed_image.astype(np.int32)
# Helper Function to calculate Binary
def returnNumber(x,b,m):
    a=(bin(x).replace("0b",''))
    # print(a)
    a=[int(i) for i in a]
    # print(a)
    count=8-len(a)
    # print(count)
    for i in range(0,count):
        a.insert(i,0)
    a=m*a[b]
    # print(a)
    return a
#At 7bit plane
eight_bit_slice=processed_image.copy()
f=np.vectorize(returnNumber)
eight_bit_slice=f(eight_bit_slice,0,128)
plt.imshow(eight_bit_slice,plt.cm.gray)
#At 6bit plane
seven_bit_slice=processed_image.copy()
f=np.vectorize(returnNumber)
seven_bit_slice=f(seven_bit_slice,1,64)
plt.imshow(seven_bit_slice,plt.cm.gray)
#At 5bit plane
six_bit_slice=processed_image.copy()
f=np.vectorize(returnNumber)
six_bit_slice=f(six_bit_slice,2,32)
print("Min intensity level is {} and Max intensity level is {}".
format(np.amin(six_bit_slice),np.amax(six_bit_slice)))
plt.imshow(six_bit_slice,plt.cm.gray)
#At 4bit plane
five_bit_slice=processed_image.copy()
f=np.vectorize(returnNumber)
five_bit_slice=f(five_bit_slice,2,32)
print("Min intensity level is {} and Max intensity level is {}".
format(np.amin(five_bit_slice),np.amax(five_bit_slice)))
plt.imshow(five_bit_slice,plt.cm.gray)
#All bits concatenation
all_bits=eight_bit_slice+seven_bit_slice+six_bit_slice+five_bit_slice+four_bit_
slice+three_bit_slice
plt.imshow(all_bits,plt.cm.gray)
print(all_bits)
print(original_image)

```

```
print(all_bits/original_image)
```

Output:



Observation & Conclusion: Separating a digital image into its bit planes is useful for analyzing the relative importance played by each bit of the image, implying, it determines the adequacy of numbers of bits used to quantize each pixel , useful for image compression.

Submitted Sheet;

B1 , DIP Lab evaluation-1

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Date	

In date - .

Saffaiya S. Pusohit

Branch - Electronics - 2nd shift

Batch - B1

Roll. NO. - 16

Sub - DIP Lab

classmate

Date _____

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Executed.

DIP lab Evaluation - 2.

Aim - Apply Bit Plain Slicing for image compression.

Theory -

Bit Plane Slicing is a method of representing an image with one or more bits of the bytes used for each pixel.

One can use only MSB to represent the pixel, which reduces the original gray level to a binary image.

MSB - Known as Most Significant Bit

0,256)

The gray level of each pixel in digital image is stored as one or more bytes in a computer.

An 8-bit image or an 7-bit image, 0 is encoded as 00000000 and 255 as 11111111.

Any no. between 0 to 255 is encoded as one bit.

Left most is referred as - MSB - can change value by bit.

Right most is referred as - LSB - cannot change encoded grey value much.

In short,

Bit Plane Slicing is conversion of image into multilevel binary image.

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missives of public value tip B

To download a file from the server to the local system, we can use the command "RUN". The command "RUN" is used to download files from the server to the local system. It is a built-in command in the Windows operating system. To run the command, type "RUN" in the command prompt and press Enter. The command will prompt you to enter the URL of the file you want to download. Once you enter the URL, the file will be downloaded to your local system. The file will be saved in a word file format.

Conclusion- Bit plain slicing technique and able to execute it successfully.