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CPE409 – 1002

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Make-Up Midterm

ALL THE WORK IS INDIVIDUAL.

Students with an even number student ID's design a circuit for outputting the intensity of the input image corresponding to the max count of the histogram of the image.

If there is a number of levels with the same Max count, then the lowest intensity level is one to output. Example: $\text{count}(97) = 450$ and $\text{count}(254) = 450$, The circuit must output 97.

Use onions.png or peppers.png, or any other image. Convert from color to gray image using `rgb2gray` function. Resize the big images to save the FPGA resources:

```
>> y = imread('peppers.png'); % 3-dimensional image (u,w,3)
```

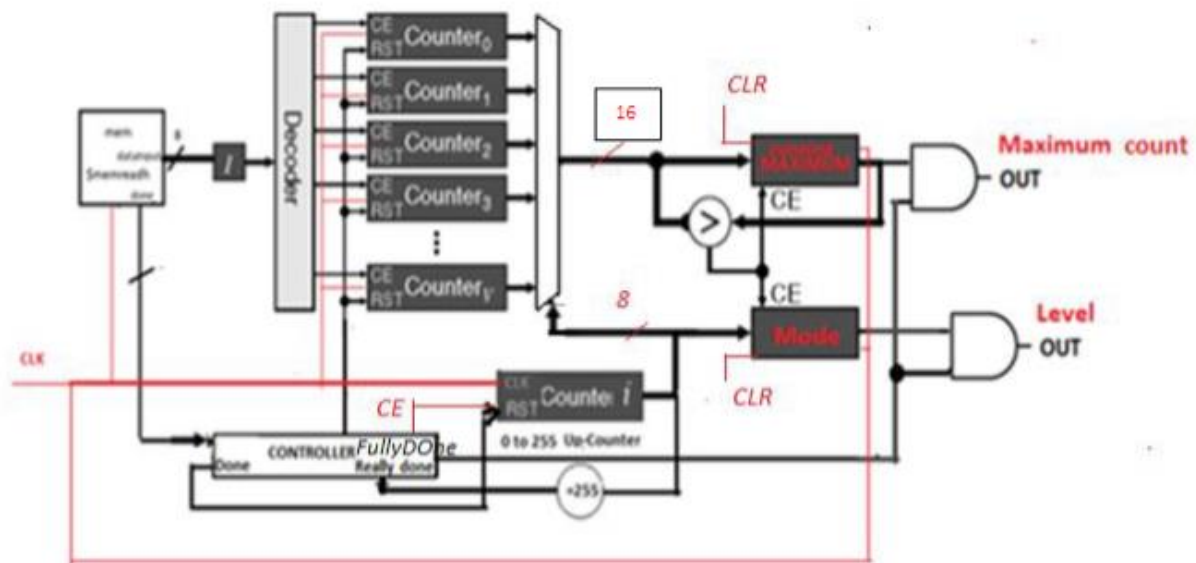
```
>> yy=rgb2gray(y); % 2D image [u w] %384 x 512 % this is the size of peppers.png image
```

```
>> ImLowR= imresize(yy, 0.25); % the size is reduced 4 times to 96x128
```

Submission:

a) The output is to be included in the waveform, b) Verify the output in the MATLAB c) provide the design modules and the testbench .

Explanation: Mode is an intensity level corresponding to the maximum value (count) in the histogram.



Original Image:

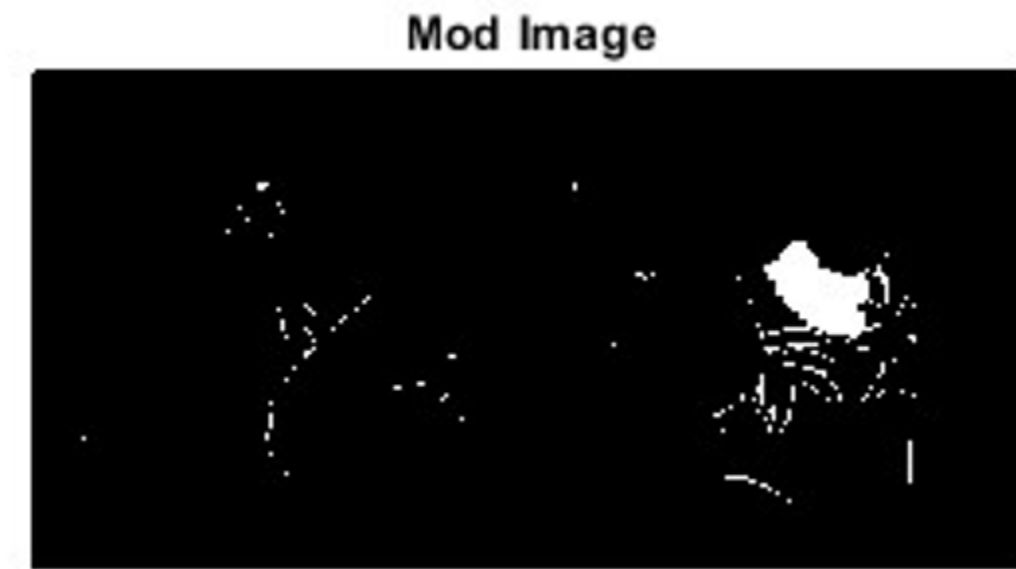


Converted to Grayscale Image and Low Res:

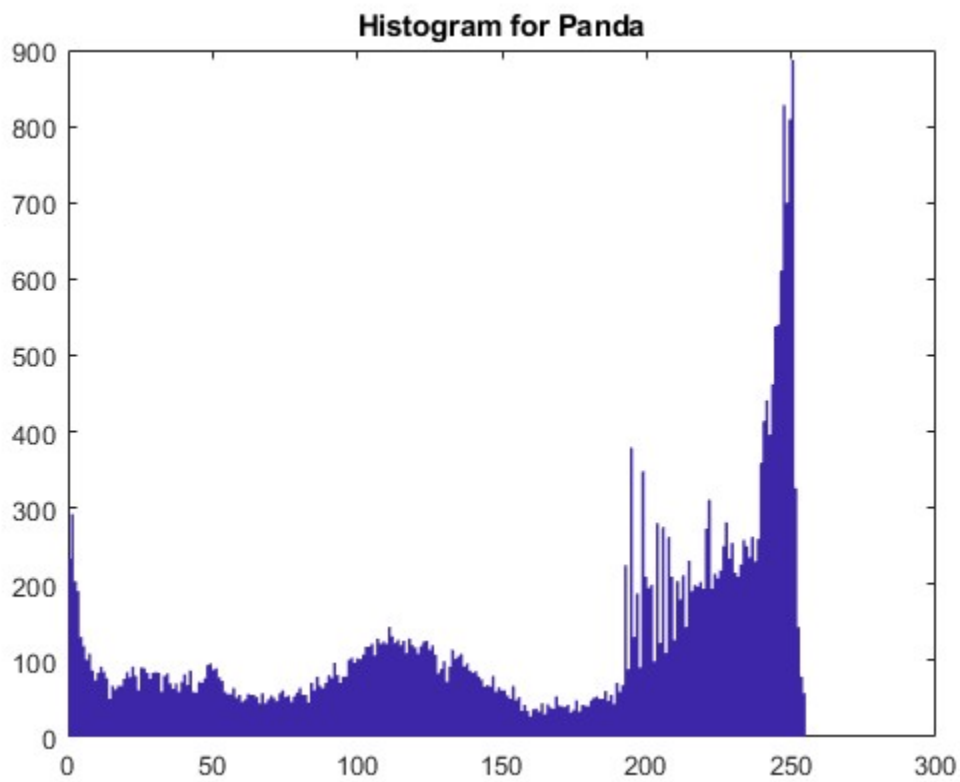
Black/White Image




Modified Image Circuit Result:



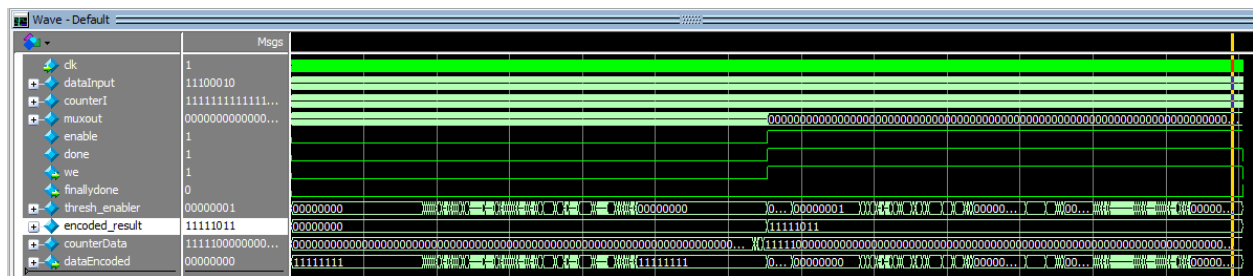
Histogram:



Max Value:

 mode_value 251

Waveform:



Output:

```
# Break in Module testbench at C:/Users/zhaib/Downloads/CPE409_Mid_MU/testbench.v line 64
Simulation successfully
```

Comments:

- In comparing the maximum count obtained from both the MATLAB analysis and the circuit, it's noteworthy that the encoded result reached a count of 251, closely resembling the mode (max) value obtained through MATLAB analysis.
- The image I chose was an original 1050 x 510 JPG image, compressed to be 128 x 255 after processing it through MATHLAB.
- The modified image was the result of comparisons between the max histogram count from the image to each counter.
- The waveform/output shows the successful run through of the circuit.