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CS116 HW#1 Writeup

Matlab Warmup

3.

A. **>> a = [5:15];**
>> b = a([1:3:end]);

- a is a variable that stores an array of numbers from 5 to 15. So a would be to [5,6,7,8,9,10,11,12,13,14,15].
- b is a another variable that stores an array of indices from a. The indices stored will be 1,4,7,10 so a(1), a(4), a(7), and a(10) will be stored in b. So b would be [5,8,11,14].

B. **>> f = [1501:2000];**
>> g = find(f > 1850);
>> h = f(g);

- f is a variable that stores an array of numbers from 1501 to 2000.
- g is a variable that stores an array of the indices from f that is greater than 1850. So it will contain the position of f where a number is greater than 1850.
- h is a variable that stores all parts of f that is greater than 1850. Since g holds all the positions of f that is greater than 1850, h is assigned to all those values in f.

C. **>> x = 22.*ones(1,10);**
>> y = sum(x);

- x is a variable that that stores a 1x10 matrix or a row of length 10 of 1 multiplied by 22, so x holds a row of length 10 filled with 22s.
- y is a variable that holds the sum of all numbers in x, which is 22 * 10 = 220.

D. **>> a = [1:100];**
>> b = a([end:-1:1]);

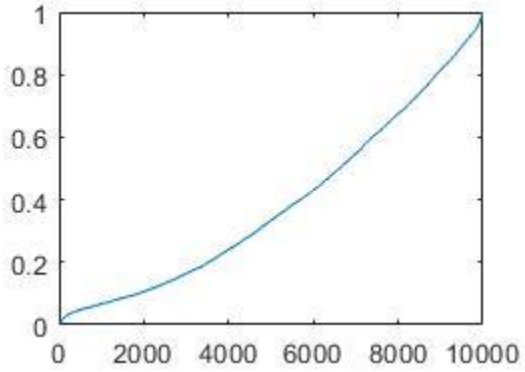
- a holds an array from 1 to 100.
- b holds a reversed array of a from 100 to 1.

4.

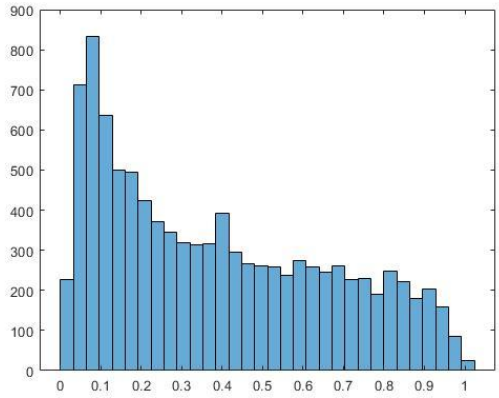
Image: Gray-Scaled: 100x100:



A. Sort all the intensities in *A*, put the result in a single 10,000-dimensional vector *x*. Plot this sorted vector in a figure.



B. Display a figure showing a histogram of of the intensities with 32 bins using the *hist* function. Note: you will need to pass *hist* a vector not a 2D array for this to work properly.



C. Create and display a new binary image the same size as *A*, which is white wherever the intensity in A is greater than a threshold *t*, and black everywhere else. Experiment in order to choose a value for the threshold which makes the image roughly half-white and half-black.

Threshold = 0.5

D. Generate a new image (matrix), which is the same as *A*, but with *A*'s mean intensity value subtracted from each pixel. After subtracting the mean, set any negative values to 0 and display the result.

E. Let *y* be the vector: y = [1:6]. Use the reshape command to form a new matrix *z* whose first column is [1, 2, 3]', and whose second column is [4, 5, 6]'.

- Script:
  - %e
  - y = (1:6);
  - z = reshape(y,3,2);
- Input:
  - y = 1 2 3 4 5 6
- Output:
  - z =1 4
  - 2 5
  - 3 6

F. Use the *min* and *find* functions to set a variable *x* to the minimum value that occurs in *A*, and set *r* to the row it occurs in and *c* to the column that this value occurs in. If there is more than one minima then return the first one.

- Script:
  - mins = min(A);
  - x = min(mins);
  - pos = find(A==x);
  - [r,c] = ind2sub(size(A),pos(1));
- Input:
  - x = min(mins) = 0
- Output:
  - r = 34
  - c = 65

G. Let *v* be the vector: v = [1 8 8 2 1 3 9 8]. Using the *unique* function, compute the total *number* of unique values that occur in *v*.

- Script:
  - v = [1 8 8 2 1 3 9 8];
  - number = length(unique(v));
- Input:
  - v = 1 8 8 2 1 3 9 8
- Output:
  - unique_value = 5

Programming: Average Images

5.

Set 1:

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- The average image of set one looks like this because all the images in set one were images of various boats. This averaged boat image faintly looks like a blurry boat because of the different boats being averaged together. It is blurry because it is basically all the images in set one combined and smoothed out.

Set 2:

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- This images is the result of the same of set one. However the images in set two were all the dimensions in regards to the actual jpeg file, but most of the images were not the same size hence the semi white borders in this image. Some images filled in the border while the others were white, so the average of all the images resulted in a semi white color.

Programming: Color Sensor Demosaicing

5.

Raw Image 500x500:

Demosaic Image 500x500

- The reason why the demosaic image is darker than the .jpeg image is because demosaic is just one step of the photo manipulation process. Since we used a raw image file, the demosaic process is to color in the picture. Further enhancements and touch ups must occur before the image is as bright as the .jpeg such as gamma correction, white balancing, noise reduction, etc.