

ECE-5554 Computer Vision: Problem Set 0

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L^AT_EX

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Matlab Code**Answer Sheet****Short answer problems**

1. Skipped.
2. (a) Creates a row vector containing random permutations of numbers between 1 and 1000.
(b) Line 1: Creates a matrix:

$$a = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

Line 2 assigns the second row of x to the variable b.

$$b = [4, 5, 6]$$

- (c) Creates a matrix:

$$a = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

Line 2 assigns the all the values the variable b.

$$b = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

- (d) Line 1 creates the matrix f with the normally distributed random values.

Line 2 sets another variable and fills it with the elements of f which are above 0.

- (e) Line 1 sets a row vector $[1 \times 10]$ with zeros and adds 0.5 to each element of it.

$$x = [0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5]$$

Line 2 creates another row vector with the same size of vector x $[1 \times 10]$, and multiplies each element of new row vector with 0.5.

$$y = [0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5, 0.5]$$

Line 3 sums vector x and y and assigns the result to z .

$$z = x + y$$

$$z = [1, 1, 1, 1, 1, 1, 1, 1, 1, 1]$$

- (f) Line 1 creates a row vector $[1 \times 100]$ which contains the sequence starting from 1 to 100 (inclusive).

$$a = [1, 2, 3, 4 \dots 98, 99, 100]$$

Line 2 flips the vector and sets vector b with these values.

$$a = [100, 99, 98, 97 \dots 3, 2, 1]$$

3. The code is in PS0_1-3.m file.

```
(a) function result = diceTrials(n)
2     if (n>0)
3         result = uint8(rand([1,n])*5)+1;
4     else
5         result = 'You may wanna not to do that operation ,
                the number of trials must be greater than 0';
6         error(result)
7     end
```

(b)

(c)

(d) %% clear workspace , and command window, close all figures
already open.

```

2  clear all , close all , clc;
3  %% PS0-1.3a
4  diceResults = diceTrials(99);
5  %% PS0-1.3b
6  % y = [1, 2, 3, 4, 5, 6]'
7  y = (1:6)';
8  % z = [1, 3, 5; 2, 4, 6]
9  z = reshape(y,[2,3]);
10 %% PS0-1.3c
11 % find the max value of matrice y and of which indice
12 [x, I] = max(y);
13 % convert indice to subscripts (row and column number)
14 [r, c] = ind2sub(size(z),I);
15 %% PS0-1.3d
16 % create vector v = [1, 8, 8, 2, 1, 3, 9, 2]
17 v = [1,8,8,2,1,3,9,2];
18 % alter the value of vector x
19 % the problem can be solved by two different approach
20 % 1 - x = numel(v(v==1))
21 % 2 - x = sum(v==1)
22 x = numel(v(v==1));
```

4. The code is in PS0Q1.m file.

- (a) Randomly generated intensity and the result of sort process.



- (b)
- (c)
- (d)
- (e) %% clear workspace , and command window, close all figures
already open.

```

2  clear all , close all , clc ;
3  figure(1);
4  A = uint8(randi(255,[100,100]));
5  subplot(2,2,1) , imshow(A);
6  title('Random Generated Intensity Profiles (A)')
7  save('inputAPS0Q1.mat' , 'A');
8  load('inputAPS0Q1.mat' , 'A');
9  %% PS-0 4a
10 A_sorted = sort(reshape(A,[numel(A) , 1]) , 'descend');
11 A_sorted = reshape(A_sorted , size(A));
12 subplot(2,2,2) , imshow(A_sorted);
13 title('Sorted Intensity Values (A)')

```

```
14 %% PS-0 4b
15 bins = 20;
16 maxA = max(A(:));
17 minA = min(A(:));
18 range = (maxA-minA)/bins;
19 hist = zeros(1,bins);
20 y = zeros(1,bins);
21 for i=1:20
22     hist(i) = numel(A(A>=(minA+(i-1)*range) & A<(minA+(i)*
        range)));
23     y(i) = minA+(i-1)*range;
24 end
25 subplot(2,2,3), bar(y,hist, 0.8, 'r');
26 axis([0 255 min(hist) max(hist)*1.05])
27 grid on;
28 title('Intensity Histogram of A (20 windows)');
29 %% PS-0 4c
30 % X = A_sorted(size(A,1)/2:size(A,1), 0:size(A,2)/2);
31 X = A_sorted(size(A_sorted,1)/2+1:size(A_sorted,1), 1:size
    (A_sorted,2)/2);
32 save('outputXPS0Q1.mat','X');
33 subplot(2,2,4), imagesc(X);
34 %% PS-0 4d
35 Y = A - mean(A(:));
36 save('outputYPS0Q1.mat','Y');
37 figure(2);
38 imagesc(Y);
```

```
39 %% PS-0 4e
40 Z = uint8( zeros( size(A_sorted,1), size(A_sorted,2),3) );
41 ind = A(A>mean(A(:)));
42 [u v] = ind2sub( size(A), ind );
43 for i=1:numel(ind)
44     Z(u(i),v(i),:) = [255,0,0];
45 end
46 figure(4);
47 imshow(Z);
```

Short Programming Question

- 1.
- 2.
- 3.
- 4.