

Computer Vision I

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1 Histogram Calculation

1. Matlab-Funktion:

```
1 function H = myHistogram(im)
2     H = zeros(1,256);
3     [width, height] = size(im);
4     for x = 1:width
5         for y = 1:height
6             intensity = im(x,y);
7             assert(intensity >= 0 & intensity <= 255, "Not
              all matrix elements are between 0 and 255");
8             H(intensity+1) = H(intensity+1) + 1;
9         end
10    end
11    H ./= 1/(width*height);
12 end
```

2. Generate the plots:

```
1 % Read the images
2 fruitsA = imread('images/fruitsA.png');
3 fruitsB = imread('images/fruitsB.png');
4
5 % Calculate the histograms
6 histA = myHistogram(fruitsA);
7 histB = myHistogram(fruitsB);
8
9 % Plot the histograms
10 figure();
11
12 subplot(2,2,1);
```

```

13 imshow(fruitsA);
14 title('fruitsA.png');
15
16 subplot(2,2,2);
17 b = bar(0:255, histA);
18 title('Histogramm for fruitsA.png');
19 xlabel('Intensity');
20 ylabel('Probability');
21
22 subplot(2,2,3);
23 imshow(fruitsB);
24 title('fruitsB.png');
25
26 subplot(2,2,4);
27 bar(0:255, histB);
28 title('Histogramm for fruitsB.png');
29 xlabel('Intensity');
30 ylabel('Probability');
31
32 print('Histograms', '-depsc')

```

3.

Abbildung 1: Plot of the histograms



Abbildung 2: Plot of the histograms

4.

5.

Abbildung 3: Plot of the rows

2 Local weighting

1.

$$\begin{pmatrix} \cdot & \cdot & \cdot & \cdot \\ 1 \cdot 1 + 1 \cdot 1 & 1 \cdot 1 & -1 \cdot 1 + -1 \cdot 1 + 1 \cdot 1 & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \end{pmatrix} = \begin{pmatrix} \cdot & \cdot & \cdot & \cdot \\ 2 & 1 & -1 & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \end{pmatrix}$$

2. TODO

```
3. lena = imread('images/lena.tif');
2 lenaNoise = imread('images/lenaNoise.tif');
3
4 B = ones(3,3) / 9;
5
6 subplot(2,2,1);
7 imshow(lena);
8 title('lena.tif');
9
10 subplot(2,2,2);
11 imshow(imfilter(lena,B));
12 title('Filtered lena.tif');
13
14 subplot(2,2,3);
15 imshow(lenaNoise);
16 title('lenaNoise.tif');
17
18 subplot(2,2,4);
19 imshow(imfilter(lenaNoise,B));
20 title('Filtered lenaNoise.tif');
21
22 print('BoxFilter', '-depsec');
```