Computer Vision
Assignment №2

Theoretical Questions

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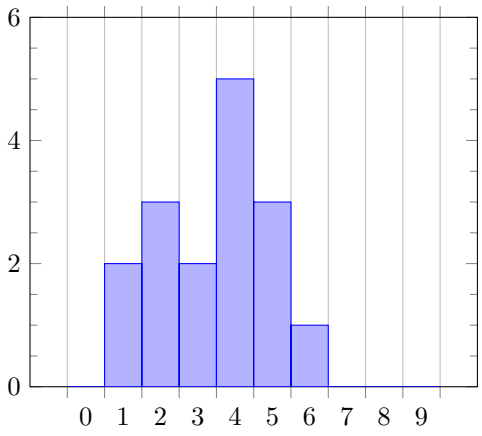
1 Histogram Equalization

1. **Drawing the original image and it's histogram**

1	2	4	4
2	1	4	5
5	3	4	3
5	4	6	2



2. Calculating the cumulative sum of the histogram.

k	0	1	2	3	4	5	6	7	8	9
$\sum_{j=0}^{k} n_j$	0	2	5	7	12	15	16	16	16	16

3. Normalizing the cumulative sum

We devide each sum result by total number of pixels: 16

k	0	1	2	3	4	5	6	7	8	9
$\sum_{j=0}^{k} n_j$	0	2	5	7	12	15	16	16	16	16
$\sum_{j=0}^{k} \frac{n_j}{n}$	0	$\frac{2}{16}$	$\frac{5}{16}$	$\frac{7}{16}$	$\frac{12}{16}$	$\frac{15}{16}$	1	1	1	1

4. Multiply the result vector by the value of $L-1$

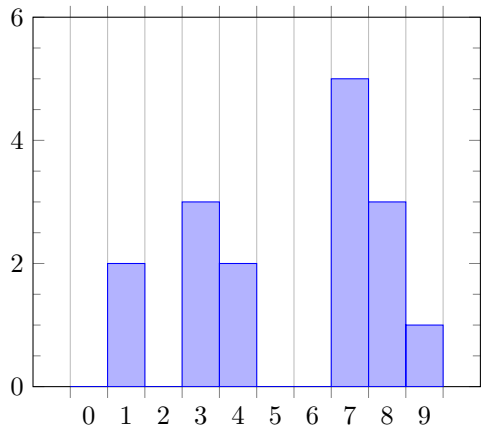
We multiply the previous vector by 9 and round the values.

k	0	1	2	3	4	5	6	7	8	9
$\sum_{j=0}^{k} n_j$	0	2	5	7	12	15	16	16	16	16
$\sum_{j=0}^{k} \frac{n_j}{n}$	0	$\frac{2}{16}$	$\frac{5}{16}$	$\frac{7}{16}$	$\frac{12}{16}$	$\frac{15}{16}$	1	1	1	1
$(L-1)\sum_{j=0}^{k} \frac{n_j}{n}$	0	1.125	2.81	3.93	6.75	8.43	9	9	9	9
round	0	1	3	4	7	8	9	9	9	9

5. Applying the transition function to the original photo

After applying the transition we draw the new photo and it's histogram.

1	3	7	7
3	1	7	8
8	4	7	4
8	7	9	3



2 IP Cameras and Analog Cameras

Analog cameras are traditional CCTV cameras. Analog cameras record images and send them as analog signals over a coaxial cable to a DVR (Digital Video Recorder). Then the DVR converts the video from analog to digital signals and stores it in a hard drive for future use. To watch the video some monitors should be connected to the DVR or the DVR must be shared in a network using the network's modem or router.[1]

in contrast, IP cameras (also called Digital security cameras or Digital CCTV) record the image and video signal digitally from beginning. They are able to send the recorded digital signal directly over an computer IP-based network without the need of a DVR. These cameras use an NVR as a counterpart to DVR in analog cameras. An NVR is a Network Video Recorder. An IP camera send the digital video and image signals to an NVR over an standard Ethernet cable. Unlike DVR, the NVR doesn't process the video data, that step is completed at the camera before it is transmitted.[2]

Analog CCTV systems are wired, Whereas IP CCTV systems can be wired or wireless.

[1] Source
[2] Source