	Practice the first series **Computer vision basics course**	Mohammadi **Related teaching assistant:** Mohammad Mousavi, Mohammad Mirzaei **Delivery deadline/23:12/1401**

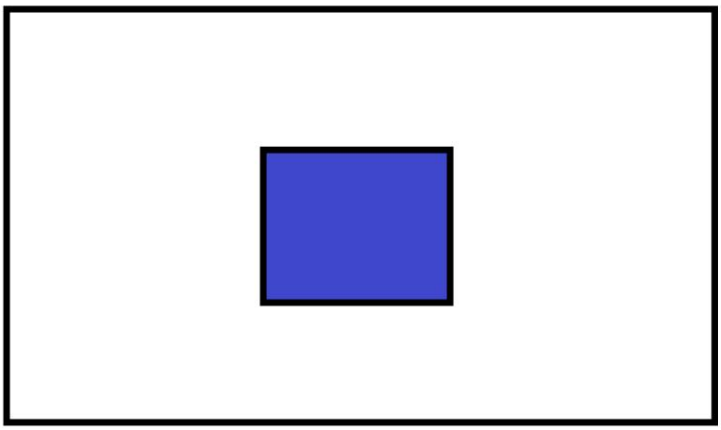
1. According to the picture below, answer the questions. (15)

If we use shutter rolling, how is the image recorded? A is moving with speed to the left and A) if

)Explain(

We use the global shutter with a low shutter speed, image b) if the object is moving quickly to the right and

How is it registered?)Explain(



First, the picture question

2. In the calculation sections, please mention all your calculations in the report. (15)

A) We have prepared 1 image using a camera with a lens. If our lens has the ability to change the focal length and

The distance between the baseball ball and the camera lens should be 70 cm, and the distance between the film screen and the lens should be 10 cm.

Modes How and how much to change the focal length?

_ The desired object is a basketball that is located at a distance of 50 cm from the film screen.

_ The desired object is a soccer ball that is 60 cm away from a basketball.

b) Explain how the use of aperture helps to adjust the depth of field.

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3. In the calculation sections, please mention all your calculations in the report. (20)

A) For the image below, first draw the histogram and then apply the histogram stretching process on it and draw the histogram again.

[150, 151, 153, 155, 156, 155, 154]
[150, 151, 153, 155, 156, 155, 154]
[150, 151, 153, 155, 156, 155, 154]
[150, 151, 153, 155, 156, 155, 154]
[150, 151, 153, 155, 156, 155, 154]

b) Refer to the relevant notebook and obtain and draw the histogram of the above array. Define the stretch function that takes the image and applies the histogram stretching process to it and returns the new image, and then draw the new histogram (Use the opencv library to get the histogram.)

c) Read and display the image 2image. Then try to improve this image using the stretch function that you implemented in part b. Did the image improve? Why?

d) Define a new function to improve the image. (Library use is not allowed)

4. In this question, we are going to implement matching histogram. (20)

A) Please refer to the 4Q notebook and complete the requested parts. (Make sure that in all parts of this You are not allowed to use specialized libraries.

b) What kind of problems is this method used in?

In case of implementation without using for loop and...while) you get a point score. (10)

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required parts. 5. In this question, the objective Check and upgrade methods. Please refer to the 5Q notebook and fill in the

Complete it. (30)

A) Perform histogram balancing with opencv library. Did the image improve? State your reason.

b) In the lesson, you got acquainted with two methods of balancing the compatible histogram. In this part, we want to implement the

improve? Why? first method. Analyze the obtained output and say whether this method helps to

c) In this part, we want to implement the second method of balanced histogram. Analyze the obtained output

and mention the shortcomings of this method?

Discuss clip size. d) In this part, implement the CLAHE method and about the size of the filter

Note: You are allowed to use the library in all sections except the CLAHE section.

Please read the document on the rules for conducting and delivering the exercises of the lesson and comply with the requested items.

Good luck.