

Petra University		 جامعة البتراء - خمسة وعشرون عاماً University of Petra Anniversary
Private Accredited University		(جامعة خاصة معتمدة)
Faculty of Information Technology		كلية تكنولوجيا المعلومات

Computer Vision(606384_1)
Midterm Exam

Department: DSAI

Academic Year: 2025-2026

Term: 1st

Date: December 14, 2025

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Section: 1

Question	Points	Score
1	Out of 10	8
2	Out of 5	2
3	Out of 5	1
4	Out of 10	2
Total	30	9

Exam Notes and Rules:

- The following material is provided: exam paper.
- Materials allowed: none.
- The exam period is 60 minutes.
- Be very specific and brief in your answers.
- Show all work for full credit.

QUESTION 1:

[10 POINTS]

Choose the best answer:

1. What is an image made of?
 - a. Only brightness values
 - b. A matrix of pixels
 - c. A list of text values
 - d. Audio samples

2. What does converting an image to grayscale do?
 - a. Adds more color
 - b. Makes the image 3-channel
 - c. Reduces it to one channel (0-255 values)
 - d. Converts it to binary

3. Which filter is BEST for removing salt-and-pepper noise?
 - a. Gaussian Blur
 - b. Median Blur
 - c. Sharpening
 - d. Histogram Equalization

4. Which smoothing method gives the most natural blur?
 - a. Average Blur
 - b. Median Blur
 - c. Gaussian Blur
 - d. Canny Blur

5. What does histogram equalization improve?
 - a. File size
 - b. Color saturation
 - c. Image contrast
 - x d. Sharpness

6. Which thresholding technique automatically finds the best cutoff?
 - a. Simple Thresholding
 - b. Adaptive Thresholding
 - c. Otsu's Thresholding
 - d. Binary Inversion.

7. Which edge detection method produces the cleanest and most reliable edges?
 - a. Sobel
 - b. Laplacian
 - c. Canny
 - d. Histogram

8. Which OpenCV function is used to combine Sobel X and Y results?

- a. cv2.merge()
- b. cv2.addWeighted()
- c. cv2.stack()
- d. cv2.add()

L

9. Why do we resize images in preprocessing?

- a. To change image color
- b. To reduce computation and standardize input size
- c. To add more details
- d. To rotate the image

X

10. A binary image contains only pixel values 0 or 1

- a. True
- b. False

✓

QUESTION 2:

[5 POINTS]

Replace the substituted Parameter (?) with the correct term, and describe the purpose of it:

1. `cv2.rectangle(img, (?), (410,410), (0,255,0), 4)`

100

2. `cv2.circle(img, (150,150), ?, (255,0,0), 2)`

40

3. `cv2.putText(img, "Hello", (60,40), cv2.FONT_HERSHEY_SIMPLEX, 1, ?, 2)`

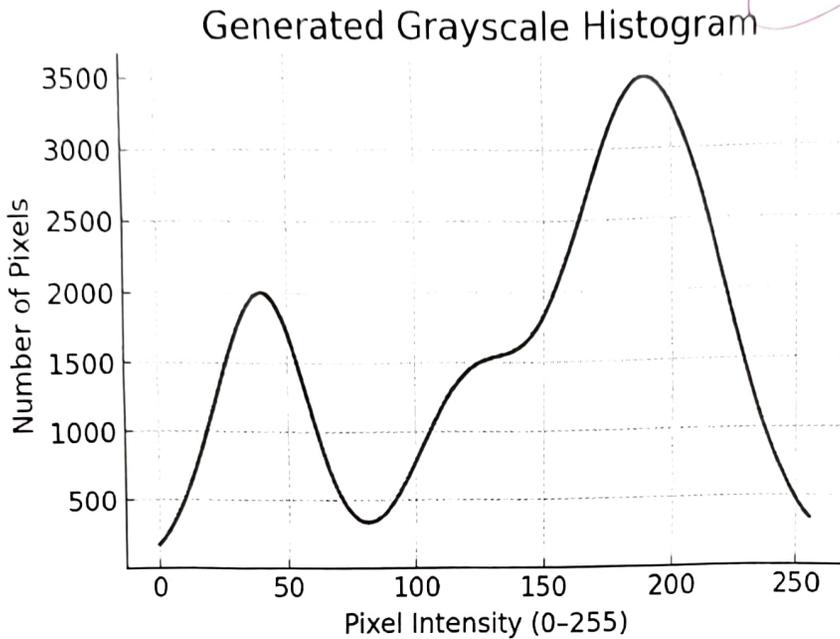
4. `cv2.convertScaleAbs(img, ?, beta=30)`

5. `cv2.threshold(gray, 127, ?, cv2.THRESH_BINARY)`

QUESTION 3:

[5 POINTS]

The figure below shows the grayscale histogram of an image.



Using the histogram, answer the following:

1. Describe whether the image is mostly dark, mostly bright, or balanced.

balanced (0 → dark / 255 → bright / between balanced)

2. Identify the approximate intensity range where the highest peak occurs.

3. Does the image contain good contrast or poor contrast? Explain your answer.

*alpha > 1 more contrast
< 1 less contrast*

4. Is there more detail in the dark regions or the bright regions? Explain using the histogram.

5. Based on the histogram, does the image contain more dark pixels or more bright pixels? Explain how you can tell from the peak values.

*bright pixels because in histogram its higher in
wight range (250)*

QUESTION 4:

[10 POINTS]

You have recently joined a technology company called *VisionTech Solutions*, which specializes in building computer vision tools for medical, security, and industrial clients. Your manager assigns you a task to prepare a basic image-processing pipeline using Python, OpenCV, and Google Colab. A Google Drive folder named "UoP images" contains several color images that the company needs to process.

You are told that the folder path is: `"/content/drive/MyDrive/UoP images/"`

The company already provided you with a Python list called:

```
image_files = ["img1.jpg", "img2.jpg", ...]
```

which contains all the image names inside "UoP images".

Write a complete Python program that applies the following image processing pipeline to every image in "UoP images":

1. Access the folder path `/content/drive/MyDrive/UoP images/`.
2. Loop through every file name in `image_files`.
3. Read each image using `cv2.imread()`.
4. Convert the image to grayscale.
5. Resize the grayscale image to `320x320` pixels.
6. Apply Gaussian Blur using kernel `(5,5)` and `sigma = 0`.
7. Apply Canny Edge Detection with thresholds `100` and `200`.
8. Create a subfolder named "Processed" inside "UoP images" if it does not exist.
9. Save each processed image into "Processed" with a prefix "edge_".
10. Ensure that your program uses correct file paths, correct OpenCV functions, and proper indentation.

Write the full Python code that performs ALL the above steps. Your answer should be complete and syntactically correct.

Good Luck

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