| Reg. No. | | | | | | | | | | |
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# MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

*(A constituent unit of MAHE, Manipal)*

**V SEMESTER B.TECH. CSE(AI&ML)**

**END SEMESTER EXAMINATION, Nov/Dec 2023**

**SUBJECT: FOUNDATION OF COMPUTER VISION [CSE 3172]**

Time: 3 Hours MAX. MARKS: 50

**Instructions to Candidates:**

- Missing data may be suitably assumed.

| Q No. | Questions | Marks | CO | AHEP LO | Blooms Level |
|---|---|---|---|---|---|
| 1A. | With respect to histogram processing, illustrate the process of matching histogram of one image with that of a reference image. How is it different from histogram equalization? Also, mention the drawback of histogram equalization and how to overcome it? | 4M | CO1 | 1 | 2 |
| 1B. | Suppose you are separately applying box filter, gaussian filter, min filter, max filter on an image. What will be the result of filtering operation in each case? In filtering, how is convolution different from correlation? | 4M | CO1 | 1 | 3 |
| 1C. | Explain the powerlaw transform to enhance quality of an image. How is it used in gamma correction? | 2M | CO1 | 3 | 2 |
| 2A. | Identify the main limitation of Harris interest point detector? How does Scale Invariant Feature Transform (SIFT) overcome this limitation? Provide the details of keypoint detection on SIFT. | 4M | CO2 | 1 | 3 |
| 2B. | Mention any four factors that cause edges in an image. How do you apply non maxima suppression to detect pixels close to the true edges in a given image. | 4M | CO2 | 3 | 3 |
| 2C. | It is required to compute the threshold automatically for different images. Show the necessary steps to achieve this. | 2M | CO2 | 3 | 2 |

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| **3A.** | How are lanes and lines detected using Hough Transform? Consider slope intercept line equation and explain. What is the drawback of slope intercept form, and how is it overcome? | **4M** | **CO2** | **3** | **3** |
| **3B.** | According to you, can morphological Hit or Miss transform be used for template matching? If yes, discuss how is it done? | **3M** | **CO2** | **3** | **6** |
| **3C** | What are the motivational factors for using local features? Also explain the steps involved in feature matching. | **3M** | **CO2** | **2** | **2** |
| **4A.** | With the help of a neat diagram explain epipolar geometry to derive fundamental matrix. | **4M** | **CO3** | **2** | **2** |
| **4B.** | A mobile robot is fitted with stereo cameras. How will it calculate the depth from two *stereo* images? Illustrate with a neat diagram. | **4M** | **CO3** | **1, 3** | **2** |
| **4C.** | Identify the steps involved in Hartley's 8-point algorithm to compute Fundamental matrix. | **2M** | **CO3** | **1, 3** | **3** |
| **5A.** | Describe the optical flow method for motion estimation. How do you compute motion vectors using Lucas Kanade method? | **4M** | **CO4** | **2** | **6** |
| **5B.** | Design a method to detect humans in a video sequence. | **4M** | **CO5** | **1, 3** | **5** |
| **5C.** | How can you effectively eliminate outliers with RANdom SAmpling and Consenses? | **2M** | **CO4** | **3** | **3** |

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