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# MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

*(A constituent unit of MAHE, Manipal)*

## VII SEMESTER B.TECH. (COMPUTER SCIENCE & ENGINEERING)

## END SEMESTER MAKEUP EXAMINATION, December 2019

SUBJECT: ELECTIVE – IV– COMPUTER VISION [CSE 4002]

**REVISED CREDIT SYSTEM**
**(28/12/2019)**

Time: 3 Hours MAX. MARKS: 50

**Instructions to Candidates:**

- Missing data may be suitably assumed.

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| 1A. | What is the difference between filtering using convolution and correlation? Briefly describe some of the filters used for image blurring and sharpening in spatial domain. How can you achieve image sharpening using smoothening filters? | 4M |
| 1B. | How do you detect lines in a given image using Hough transform? What is the limitation of using line equation in slope intercept form? How do you overcome this limitation? | 4M |
| 1C. | Explain the different steps involved in feature matching. | 2M |
| 2A. | What is the limitation of interest point detector? How can you overcome this limitation? Explain the method. | 4M |
| 2B. | Provide the necessary steps to compute HoG features. | 4M |
| 2C. | Show that Difference of Gaussian an approximation to Laplacian of Gaussian. | 2M |
| 3A. | Derive the equation to calculate depth information from two *stereo* images. | 4M |
| 3B. | What are intrinsic and extrinsic camera parameters? What are the matrices required to derive camera matrix? Write the matrices in homogeneous form. | 4M |
| 3C | What is the rank of a fundamental matrix? How do you enforce the rank on the estimated fundamental matrix? | 2M |
| 4A. | Derive the motion vectors using Lucas Kanade method. | 5M |

**4B.** Mention the steps involved in tracking of features using KLT method. **5M**

**5A.** With respect to model fitting method RANSAC, answer the following. **3M**

(i) Suppose we know that 30% of our data is outliers. How many times do we need to sample to assure with probability 20% that we have at least one sample being all inliers? (Consider number points in sample = 2)

(ii) What is the minimum number of points we must sample in a seed group to compute an estimate for a circle?

**5B.** How can you detect blob in a given image using different scales? **2M**

**5C.** Draw a block diagram of a simple pipeline for object recognition. Name few challenges for the existing visual recognition algorithms. **5M**

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