Total No. of Questions : 8]

SEAT No. :

PD-4806

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B.E. (Robotics and Automation)

MACHINE VISION SYSTEM

(2019 Pattern) (Semester - VII) (411501)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of Calculator is allowed.***
4) ***Assume Suitable data if necessary.***

Q1) a) Explain in detail arithmetic mean filters with relevant mathematical equations. **[8]**

b) For the below given 5 × 4 image find out following : **[10]**

Image:

1 4 5 1 6

6 5 7 0 1

2 0 1 5 1

2 0 1 0 6

i) Probability Density Function (PDF) of each pixel value.

ii) Huffman's Code for each pixel value.

iii) What is the Huffman's code length for highest & lowest probability for pixel and why? Justify your answer.

OR

Q2) a) Why it is important to know compression ratio & signal to noise ratio in any compression technique? Justify your answers? **[5]**

b) Draw & explain degradation model in image compression. **[5]**

P.T.O.

c) Below is the 5 × 3 binary image. **[8]**

Image:

0 0 1 1 1

1 1 1 0 0

0 0 1 1 1

For the given image calculate following:

i) Total number of Run length vectors.

ii) Compression ratio.

iii) Predict if data is compressed? Justify your answer.

Q3) a) How the image is segmented with technique-based approach? And explain Hybrid technique in detail. **[9]**

b) Write a short note on region-based segmentation technique in detail. **[9]**

OR

Q4) a) Explain approach-based segmentation in image segmentation. **[9]**

b) What do you understand by term clustering in image segmentation? Explain in detail with considering examples. **[9]**

Q5) a) Explain Fourier based alignment in motion estimation & how it is different from hierarchical motion estimation? **[9]**

b) Write a note on windowed correlation motion estimation technique. (expression is mandatory). **[8]**

OR

Q6) a) Write a note on rotation and scale motion estimation techniques with relevant example. **[9]**

b) Write a note on parametric motion estimation techniques. **[8]**

Q7) a) What do you understand by Principle Component Analysis (PCA)? Explain in detail. **[8]**

b) What are deep neural networks and how it can be implemented in humanoid robots? **[9]**

OR

Q8) a) What are convolutional neural networks explain how it is feasible to use in robotics applications. **[8]**

b) Explain in detail unsupervised learning and explain in detail. **[9]**

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