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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: VII**
Branch: ES – Cluster Elective **Duration: 3 hrs.**
Course Code: 19EI7CE2VA **Max Marks: 100**
Course: Vision Technology and Applications **Date: 28.02.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1 a) With the help of a Pin – Hole Camera, explain the state of the art image formation technique **06**

b) How do you extract I-level vision information from Edges, Corners, Lines and Circles? Discuss **06**

c) What are image pyramids? Show that scale space generation using Laplacian of Gaussian (LoG) operator can be applied to bring invariance in SIFT algorithm by discussing various stages of operation. **08**

UNIT - II

2 a) Explain the working of Split-Merge technique of image segmentation for object detection. **06**

1	1	1	1	1	1	1	2
1	1	1	1	1	1	1	0
3	1	4	9	9	8	1	0
1	1	8	8	8	4	1	0
1	1	6	6	6	3	1	0
1	1	5	6	6	3	1	0
1	1	5	6	6	2	1	0
1	1	1	1	1	1	0	0

Fig.2(a)

Apply the same technique to identify an object present in the image matrix shown in fig 2(a).

b) Define motion extraction and tracking in Vision Technology Explain the working of background subtraction method for object tracking **06**

c) What do you mean by Optical Flow? Obtain the expression for local motion extraction using Lucas Kanade Technique of optical flow detection. **08**

UNIT - III

3 a) What are Tensor Flow Models? How do they help in building the signal flow graphs in Neural Networks? **06**

	b)	With the help of K-Means Algorithm explain the technique of unsupervised classifier	**06**
	c)	What are the limitations of a single layer Artificial Neural Network? Explain concept of hidden layer in an Artificial Neural Network with the help of two layer Perceptron	**08**

OR

4	a)	How can we use "Neural Network" model concept to learn two input AND gate logic? Explain	**06**
	b)	Explain the Linear Regression model in detail and also differentiate Linear Regression from Logistic Regression	**06**
	c)	What are Convolutional Neural Networks? How are the Deep Neural Networks applied to develop intelligent vision systems? Explain	**08**

UNIT - IV

5	a)	With the help of a partition control system, explain the control architecture required for every joint in an Autonomous Robot.	**07**
	b)	List the sensors necessary for Robot Navigation Explain the working principle of each of the sensors	**07**
	c)	What is an absolute optical encoder? How does it help in extracting the feedback from an actuator in a Robot? Discuss	**06**

OR

6	a)	With the help of generalised block diagram, explain the role of Vision technology in motion planning for a Robot.	**07**
	b)	How does Hall Effect Sensor help in building Position and Speed encoder in a closed loop control for a Robot? Explain	**07**
	c)	What do you mean by pose estimation in a Robot? Relate the actual coordinates with image coordinates in an intelligent Robot.	**06**

UNIT - V

7	a)	Why Deep Leering algorithms are important for vision-based motion planning in Robot? Discuss	**07**
	b)	List any two applications of AI based Robot Vision system. Elaborate on any one	**07**
	c)	What is the need of Residual Networks in Deep Learning with respect to Vision Technology? Explain	**06**

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