Question Paper

Exam Date & Time: 07-Jan-2023 (02:30 PM - 05:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

SEVENTH SEMESTER B.TECH END SEMESTER MAKEUP EXAMINATIONS, JAN 2023

Multi Sensor Data Fusion [ICE 4057]

Ма	rks: 50					Duration:	180 mins.	
				Α				
An	swer all the	questions.				Section Duration	: 180 mins	
Inst	ructions to C	Candidates: Answer ALL qu	uestions M	issing data may be su	litably assumed			
1)		What is sensor uncertainty? Describe different types of sensor uncertainty. [CO1, PO1, BL2]					(3)	
	A)							
	B)	Describe serial and parallel fusion networks with necessary diagrams. [CO1, PO1, BL2] ((3)	
	C)	Given two time series, P = (1.7, 3.6, 6.3, 2.7, 8.3, 6.9) and Q = (2.8, 6.4, 5.2, 1.1, 7.4, 8.3), calculate cummulative matrix D and also optimal warping path using dynamic programming. [CO2, PO2, PO3, BL4]						
2)		What is the requirement of semantic alignment?					(5)	
	A)	Let X= (x1, x2, x3, x4, x5) ^T denote an input vector. By partitioning X using two different clustering algorithms {A, B}, resulting identity vectors are: A= ($\alpha 2 \alpha 1 \alpha 3 \alpha 3 \alpha 1$), B= ($\beta 1 \beta 2 \beta 2 \beta 3 \beta 3$). Write the corresponding two co-association matrices and the mean co-association matrix. [CO2, PO2, PO3, BL3]						
	B)	Describe 4 scales of measurement. [CO2, PO2, PO3,BL2]						
	C)	Explain Dasarthy's Input/	t/output Dat	ta fusion model [CO4,	PO1, BL2]		(2)	
3)	۵)	Given data for five people in Table. Each person vector has a Height, Score on some test, and Age. Determine the Mahalanobis distance of another person $v = (59, 605, 49)$ from the set of data.[CO3, PO1, PO2, PO3, PO4, BL3]						
	n)	X,Height		Y ,Score	Z,Age			
		74		644	47			
		63		556	32			
		71		473	33			
		65		529	46			
		69		620	55			
		74		651	59			
	B)	For the given values of Y= (13, 3, 4, 12, 14, 10, 5, 1, 8, 2, 7, 9, 11, 6, 18), form a binary search tree [CO3, PO1, PO2, PO3, PO4, BL3]						
	C)	Explain Waterfall model of fusion process with an example [CO4, PO1, BL2]					(4)	
4)		With neat figure, describe different levels of JDL fusion framework [CO4, PO1, BL2] ((4)			

	A)		
	B)	Explain Omnibus model with an example. [CO4, PO1, BL2]	(4)
	C)	Describe the Luo-Kay data fusion framework. [CO4, PO1, BL2]	(2)
5)	A)	Estimate the temperature of a vessel using the Kalman filtering technique for the following data:	(5)
		True temperature = 72	
		Initial Estimate=68	
		Initial error in estimate=2	
		Error in measurement =4	
		Measurements= {75,71,70,74} [CO5, PO1, BL3]	
	B)	What is Bayesian filtering? Classify the types of Bayesian filters[CO5, PO1, BL2]	(3)
	C)	Explain the need for data filtering. [CO5, PO1, BL2]	(2)

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