

Enrollment No.....



Faculty of Engineering
End Sem Examination May-2023

IT3EA04 Pattern Recognition

Programme: B.Tech.

Branch/Specialisation: IT

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. What does the Bayesian network provide? 1
(a) Complete description of the domain
(b) Partial description of the domain
(c) Complete description of the problem
(d) None of these
- ii. What is needed to make probabilistic systems feasible in the world? 1
(a) Reliability (b) Crucial robustness
(c) Feasibility (d) None of these
- iii. The main disadvantage of maximum likelihood methods is that they 1
are _____.
(a) Mathematically less folded
(b) Mathematically less complex
(c) Computationally lucid
(d) Computationally intense
- iv. Which algorithm is used for solving temporal probabilistic reasoning? 1
(a) Hill-climbing search
(b) Hidden markov model
(c) Depth-first search
(d) Breadth-first search
- v. Which of the following algorithms cannot be used for reducing the 1
dimensionality of data?
(a) t-SNE (b) PCA
(c) LDA False (d) None of these

P.T.O.

- vi. Which of the following comparison(s) are true about PCA and LDA (fisher discriminant analysis)? **1**
 (a) Both LDA and PCA are linear transformation techniques.
 (b) LDA is supervised whereas PCA is unsupervised.
 (c) PCA maximizes the variance of the data, whereas LDA maximize the separation between different classes.
 (d) All of these
- vii. What is the minimum no. of variables features required to perform clustering? **1**
 (a) 0 (b) 1 (c) 2 (d) 3
- viii. Which of the following is required by K-means clustering? **1**
 (a) Defined distance metric
 (b) Number of clusters
 (c) Initial guess as to cluster centroids
 (d) All of these
- ix. Consists of the hardware in a biometric device that converts biometric input into electrical signals and conveys this information to the attached computer, such as a fingerprint sensor- **1**
 (a) Arch (b) Sensor (c) Identity (d) Mimic
- x. The automated process of locating and encoding distinctive characteristics from a biometric sample in order to generate a template. **1**
 (a) Verification (b) Extraction
 (c) Feature Extraction (d) Signature Verification

- Q.2 i. Write a short note on discriminant function. **2**
 ii. Explain decision tree with an example. **3**
 iii. What is Bayesian Belief Network? Also explain supervised learning. **5**
 OR iv. Explain Bayes Decision Theory and Minimum-error-rate classification. **5**
- Q.3 i. Explain Gibb's algorithm for sampling. **2**
 ii. What is parameter estimation? Explain Maximum-Likelihood estimation in Gaussian case. **8**
 OR iii. Explain Hidden Markov Models with three central issues. **8**

- Q.4 i. What is dimensionality reduction? **3**
 ii. What do you mean by curse of dimensionality? Explain Principal component analysis. **7**
 OR iii. Explain Non-Parametric Techniques: Parzen windows and k-nearest neighbor estimation. **7**
- Q.5 i. Write difference between classification and regression. **4**
 ii. Explain both Scatter Criteria and Trace Criterion for Criterion Functions. **6**
 OR iii. Explain K-Means algorithms for clustering. Give a two-class example. **6**
- Q.6 Attempt any two:
 i. Explain Support Vector Machine with its applications in pattern recognition. **5**
 ii. Write a note on Pattern recognition applications. **5**
 iii. Explain any two in context of pattern recognition: **5**
 (a) Face recognition
 (b) Speech recognition
 (c) OCR

Marking Scheme
CS3EA04 / IT3EA04 Pattern Recognition

Q.1	i.	What does the bayesian network provides?	1	OR	iii.	What is bayesian belief network? Also explain supervised learning.	5		
		a) Complete description of the domain				Bayesian belief network	-3 marks		
	ii.	What is needed to make probabilistic systems feasible in the world?	1			Supervised learning	-2 marks		
		b) Crucial robustness			iv.	Explain Bayes Decision Theory and Minimum-error-rate Classification	5		
	iii.	The main disadvantage of maximum likelihood methods is that they are _____	1			Explanation	-3 marks		
		d) computationally intense				Formula	-2 marks		
	iv.	Which algorithm is used for solving temporal probabilistic reasoning?	1		Q.3	i.	Explain Gibb's algorithm for sampling.	2	
		b) Hidden markov model					Explanation	-1 mark	
	v.	Which of the following algorithms cannot be used for reducing the dimensionality of data?	1				Algorithm	-1 mark	
		b) none of these				ii.	What is parameter estimation? Explain Maximum-Likelihood estimation in Gaussian case.	8	
vi.	Which of the following comparison(s) are true about PCA and LDA(fisher discriminant analysis)?	1		Explanation		-5 marks			
	d) All of above			Derivation		-3 marks			
vii.	What is the minimum no. of variables features required to perform clustering?	1	OR	iii.		Explain Hidden Markov Models with three central issues.	8		
	b) 1					Explanation	-5 marks		
viii.	Which of the following is required by K-means clustering?	1				Three issues	-3 marks		
	d) all of the Mentioned			Q.4		i.	What is Dimensionality reduction?	3	
ix.	Consists of the hardware in a biometric device that converts biometric input into electrical signals and conveys this information to the attached computer, such as a fingerprint sensor	1				Explanation	-3 marks		
	b) Sensor				ii.	What do you mean by curse of dimensionality? Explain Principal component analysis.	7		
x.	The automated process of locating and encoding distinctive characteristics from a biometric sample in order to generate a template.	1				Curse of dimensionality	-3 marks		
	c) Feature Extraction					PCA	-4 marks		
Q.2	i.	Write a short note on discriminant function.			2	OR	iii.	Explain Non Parametric Techniques : Parzen windows and k-nearest neighbor estimation.	7
		Formula			-1 mark			Parzen window (with formula)	-3.5 marks
		Explanation	-1 mark				k- nearest neighbor (with formula)	-3.5 marks	
					Q.5		i.	Write difference between classification and regression.	4
						Each difference	-1 mark		

	ii.	Explain both Scatter Criteria and Trace Criterion for Criterion Functions.	6
		Scatter Criteria	-3 marks
		Trace Criterion	-3 marks
OR	iii.	Explain K-Means algorithms for clustering give a two class example.	6
		K-Means algorithms	-4 marks
		two class example	-2 marks

Q.6		Attempt any two:	
	i.	Explain Support Vector Machine with an example.	5
		Explanation	-3 marks
		Example	-2 marks
	ii.	Write a note on Pattern recognition applications.	5
		Each application	-1 mark
	iii.	Explain any two in context of pattern recognition:	5
		1) Face recognition	
		2) Speech recognition	
		3) OCR	
		Each explanation	2.5 marks
