

M. Tech Data Science 2nd Semester Examination, 2023

MTDS PE 241 Pattern Recognition

Max Marks: 60

Time: 2.5 hrs

Section A (ALL questions are COMPULSORY) 4*5=20

Q. No	Question	CO	BL
1a	What led to the conceptualization of Bayes decision theory? Explain with an example.	3	4
B	Give an example of a pattern recognition model in real-life	1	2
C	Explain k-means algorithm with following example given $\{(2,3), (1,2), (2,4), (1,3)\}$. $K=2$ and perform up to two steps of iteration only.	5	5
D	What is a discriminant function, Explain w.r.t, Bayes decision theory. Also, explain the concept of decision boundary	2	3

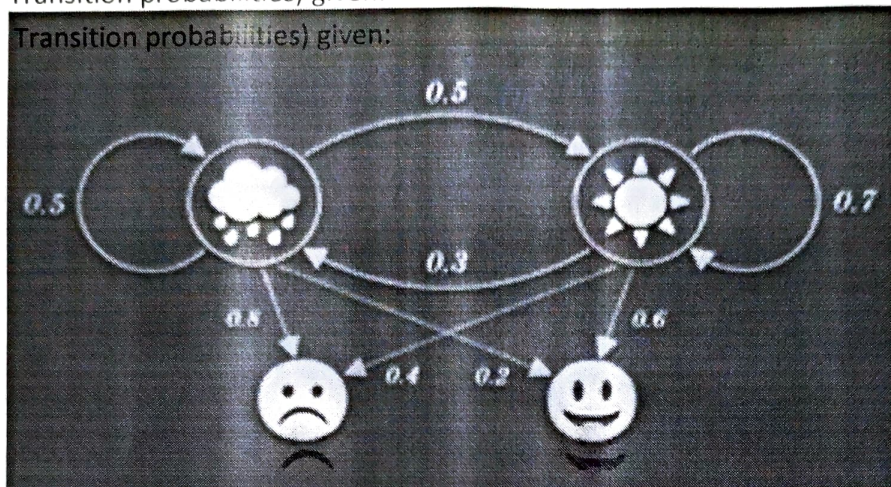
Section B (Attempt any FOUR)

4*10=40

Q.No.	Question	CO	BL
2	Consider the problem statement: A coin was tossed (say) 50 times and the outcome is 40 heads were observed and 10 tails. Assume, p is the probability of obtaining a head. Suppose, the coin was taken from a box containing two coins: One which gives heads with probability $p = 1/2$, and another which gives heads with probability $p = 1/4$. Now calculate using maximum likelihood estimation, the coin that has the max likelihood to be found, assuming that the label has been lost.	2	6
3	a. Is dimensionality reduction a curse in pattern recognition. If yes, how. Besides, explain any two ways of handling the missing values.	3	4
	b. Explain the mobile ecosystem w.r.t mobile design, apps used, and games.	4	3
4	Explain the following: 1. KNN 2. PCA dimensionality reduction method	4 3	3
5	Explain the significance of the hidden Markov model and its associated terms. Given, A person is happy or sad depending on the weather: sunny or cloudy. Construct the following matrices (Emission probabilities, and	4	6

Transition probabilities) given:

Transition probabilities) given:



6

- What is meant by decision boundary. how do we devise it?
- Explain the following concepts:
Feature vector, dimensions, Gaussian distribution.

1

3

1,2

3