

Please check that this question paper contains 09 questions and 03 printed pages within first ten minutes.

EVENING

21 JUN 2023

[Total No. of Questions: 09]

[Total No. of Pages: 03]

Uni. Roll No.

Program: B.Tech. (Batch 2018 onward)

Semester: 6th

Name of Subject: Machine Learning

Subject Code: PCCS-114

Paper ID: 17190

Scientific calculator is Allowed

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1.

- a) Describe the significance of Kernel functions in SVM.
- b) Discuss the advantages and disadvantages of FIND-S hypothesis.
- c) Define the term Version space. Illustrate with an example.
- d) Compare Cross validation with Bootstrapping Techniques.
- e) Suppose while solving a classification task, you first train your network on 20 samples. Training converges, but the training loss is very high. You then decide to train this network on 10,000 examples. Is your approach to fixing the problem, correct? Justify your answer.
- f) Differentiate between bagging, boosting and voting.

Part – B

[Marks: 04 each]

- Q2. Explain maximum likelihood and least-error squared hypothesis.
- Q3. State the mathematical formulation of the SVM problem. Give an outline of the method for solving the problem.
- Q4. Define inductive bias. Explain inductive bias in decision tree learning. Is there any effect on classification due to bias?

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- Q5. State two reasons why linear regression is not used for classification? Why is mean squared error cost function not used with logistic regression? Write the cost function that is used instead.
- Q6. "The genetic algorithm is based on the genetic structure and behaviour of the chromosome of the population." Justify this statement by discussing various phases of genetic algorithms.
- Q7. Given the data in Table, evaluate the eigen values using the Principal Component Analysis (PCA) algorithm.

Feature	Example 1	Example 2	Example 3	Example 4
X ₁	4	8	13	7
X ₂	11	4	5	14

Part – C

[Marks: 12 each]

- Q8. i) List the issues in Decision Tree Learning. Interpret the algorithm with respect to overfitting the data. (6)
- ii) Explain K-means clustering algorithm in detail. Why do we need higher dimension feature vectors in K-Means? (6)

OR

- i) Explain the concept of a Perceptron with a neat diagram. Under what conditions the perceptron rule fails and it becomes necessary to apply the delta rule. (4)
- ii) Write down algorithm for backpropagation. Also derive the general formula considering the training rule for Output Unit weights and Training Rule for Hidden Unit weights. (8)

- Q9. Apply the candidate elimination algorithm to find consistent hypothesis for the example given below:

Example	Citations	Size	InLibrary	Price	Editions	Buy
1	Some	Small	No	Affordable	One	No
2	Many	Big	No	Expensive	Many	Yes
3	Many	Medium	No	Expensive	Few	Yes
4	Many	Small	No	Affordable	Many	Yes

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OR

The following data set contains factors that determine whether tennis is played or not.

Using Naive Bayes classifier, infer the class label for play prediction for the day:

outlook=overcast, temperature=60, humidity=62, windy=false

Day	Outlook	Temperature	Humidity	Windy	Play
DAY 1	Sunny	85	85	False	No
DAY 2	Sunny	80	90	True	No
DAY 3	Overcast	83	86	False	Yes
DAY 4	Rainy	70	96	False	Yes
DAY 5	Rainy	68	80	False	Yes
DAY 6	Rainy	65	70	True	No
DAY 7	Overcast	64	65	True	Yes
DAY 8	Sunny	72	95	False	No
DAY 9	Sunny	69	70	False	Yes
DAY 10	Rainy	75	80	False	Yes
DAY 11	Sunny	75	70	True	Yes
DAY 12	Overcast	72	90	True	Yes
DAY 13	Overcast	81	75	False	Yes
DAY 14	Rainy	71	91	True	No
